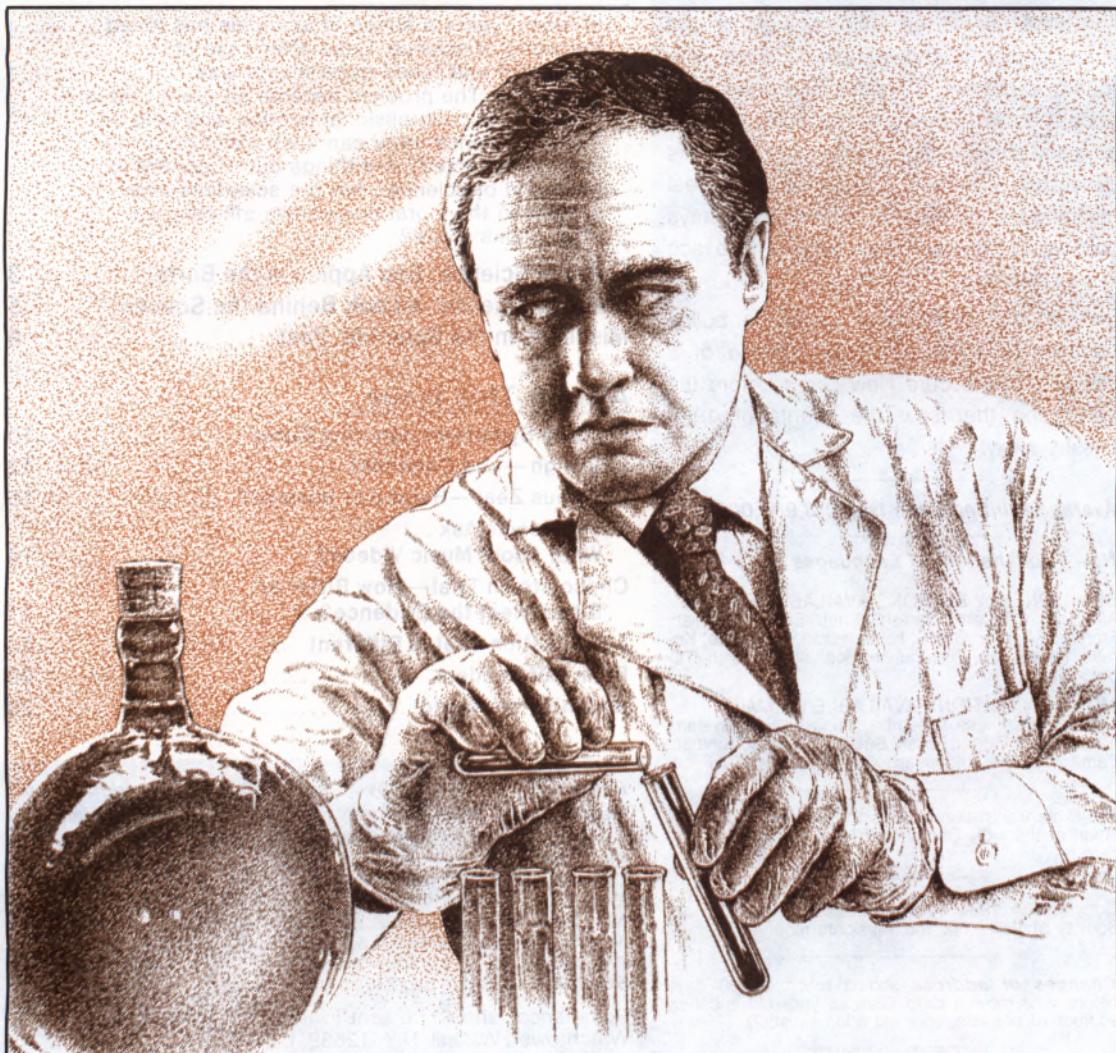


Awake!

MAY 22, 1984



FRAUD IN SCIENCE

Is the Halo Slipping?

WHY AWAKE! IS PUBLISHED

AWAKE! is for the enlightenment of the entire family. It shows how to cope with today's problems. It reports the news, tells about people in many lands, examines religion and science. But it does more. It probes beneath the surface and points to the real meaning behind current events, yet it stays politically neutral and does not exalt one race above another.

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Feature Articles

In recent years a series of scandals has jolted the world of science. Case after case of plagiarism and faked experiments was uncovered. The problem became so great that in 1981 a U.S. congressional hearing was held on fraud in science. How can such fraud go on for years undetected? Are things out of control in the world of science? Are the scientists also subject to the moral breakdown afflicting all other walks of life?

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Frederick W. Franz, President

Fraud in Science: Bad Apples in the Barrel?

THE world of medical research was astir with excitement. A 24-year-old graduate student at Cornell University had come up with a new theory on the cause of cancer and the experimental data to support it. The work seemed so impressive that some thought it could win him and his professor the Nobel prize.

By those who worked with him, the young man was considered one of the brightest scientists. In just a few weeks he was able to complete certain experiments that others had been struggling with for years. Projects seemed to work only when he was involved. Things seemed just too good to believe.

The reason soon became apparent. In July 1981, fraud was discovered in his work. A chemical that should not have been there evidently made the experiments turn out the way they were expected to. Quickly, scientific papers published on his work were withdrawn. Further investigations revealed that somehow he had entered graduate school without earning either a bachelor's or a master's degree. And professors in other schools he had attended recalled his not being able to repeat exper-



iments he claimed to have done.

This incident is but one in a series of scandals that has jolted the world of science in the last few years. While it brought his apparently promising career to ruin, another case uncovered at about the same time brought what was considered "the stiffest penalty the Government has

ever imposed for scientific falsification."

Barely seven years out of medical school, another brilliant student, aged 33, already had to his credit over a hundred research papers published in major scientific journals. His work was considered brilliant and creative by his colleagues, and he was on his way to becoming a member of the faculty of Harvard Medical School and the head of his own research laboratory.

But this success story was soon to crumble. In May 1981, when asked to produce the lab data for an experiment he claimed to have done, he was found falsifying his records to make a few hours' work look like what would have taken a couple of weeks to do. Soon more of his work became suspect. It was also discovered that he, without their knowledge, had used the names of other scientists as coauthors for

many of his papers, and some of the experiments on which the papers were based were completely fictitious. Somehow he had managed to operate undetected for 14 years.

What made these cases particularly disturbing was the fact that they came to light right on the heels of a U.S. congressional hearing on fraud in science. That hearing, held on March 31 and April 1, 1981, was conducted to investigate a series of frauds in research that had been uncovered just prior to that time.

Among them was one in which an associate professor at the Yale University School of Medicine was found plagiarizing another researcher's work along with forging and smoothing out the data in his own report. Another case involved a senior

Falsified research, plagiarism, forgery and a congressional investigation of fraud in science

researcher at Massachusetts General Hospital. In a study of Hodgkin's disease, a form of cancer, he had used cell cultures that turned out to be from an owl monkey and from a person who did not appear to have the disease.

In addition to shock, embarrassment and disappointment, news of such fraudulent practices casts a heavy shadow over the credibility and image of science and scientists in the minds of the public. How can fakers go so far and for so long before being detected?

Invariably, the reply from the scientific community is that these cases were nothing more than a few bad apples in the barrel, blown out of proportion by the press. They argue that with the large

number of scientists working today the few cases of fraud uncovered only prove that science has a far better batting average than almost any other field of endeavor. This, they insist, is because science is a self-correcting system, and it has a built-in mechanism that would spot any attempts at forgery quickly and efficiently.

The way any scientific work comes to be recognized is through publication in one of the professional journals. Papers to be published are first evaluated by an independent panel of experts, known as referees. This process is said to be the first line of defense against forgery. Once the work is published, it is open to the entire scientific community not only for scrutiny but also for replication, that is, the experiment must be repeatable by others. Obviously, if any forgery is involved, it is argued, it would show up at this stage.

Additionally, due to the high cost of scientific research today, much of it is supported by government grants. Again, grant applications are reviewed by government-appointed advisory committees made up of experts in the field. By this procedure unworthy and questionable proposals can be screened before they even get started.

With such a system—so goes the argument—it is highly unlikely that anyone would even attempt to perpetrate a fraud. In fact, anyone who does so must be mentally unbalanced or disturbed, in the same league with the celebrated Dr. Frankenstein or Dr. Jekyll and Mr. Hyde.

The arguments seem sound enough, at least in theory. What about in practice? Are cases of fraud really such rare exceptions as the scientists claim? Are the ones who have been caught mental deviants or schizophrenics? Is there something we, the laymen, can learn from the phenomenon of fraud in science?

Fraud in Science: A Look Behind the Scenes

PEERING down the microscope, the scientist jumped at what he saw. "Eureka!" he shouted. And another great scientific discovery was made.

That is the sort of thing we are taught to believe about the triumphs of science. Recall your elementary-school science class for a moment. Remember the great heroes in science's hall of fame? Men like Galileo, Newton, Darwin and Einstein are extolled not only for their scientific achievements but also for their virtues—objectivity, dedication, honesty, humility, and so forth. The impression was that by the sheer force of their superior intelligence and rational mind, the mysteries of nature just unveiled themselves and the truth simply popped out in front of them.

In reality, however, things are not quite that simple. In most cases, scientists must spend months or years laboring in the laboratories, struggling with results that often are confusing, puzzling and even contradictory.

Ideally, one might expect that the dedicated scientist would press forward undaunted until the truth is found. But the fact of the matter is that generally we know very little about what goes on behind closed laboratory doors. Is there reason to believe that those engaged in scientific pursuits are less influenced by the baser human characteristics such as prejudice, rivalry, ambition and greed?

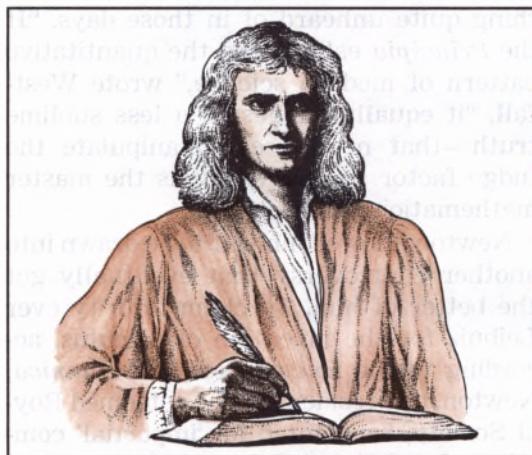
"Personal preferences and human emotions are said to be suppressed by the scientist in the interest of securing truth,"

wrote Michael Mahoney in *Psychology Today*. "However, the annals of both early and contemporary science suggest that this portrayal is less than accurate."

In a similar vein, columnist Alan Lightman wrote in the magazine *Science 83*: "The history of science is replete with personal prejudices, misleading philosophical themes, miscast players. . . . I suspect all scientists have been guilty of prejudice at times in their research."

Do these comments surprise you? Have they at least tainted, if not shaken, the image you had of science and scientists? Recent study on the subject has revealed that even scientific luminaries of the past were not above using unethical methods to advance their own ideas or theories.

Isaac Newton is often called the father



Even Isaac Newton adjusted his data to support his theory

of modern physics for his pioneering work on the theory of universal gravitation. The idea, when published in his famous treatise *Philosophiae Naturalis Principia Mathematica* (Mathematical Principles of Natural Philosophy), was strongly opposed by some contemporary scientists, including the German mathematician Gottfried Leibniz. This resulted in an extended feud

"I suspect all scientists have been guilty of prejudice at times in their research"

between them that was not put to rest until the end of their lives.

Writing in *Science*, Richard S. Westfall asserted that, to strengthen his position, Newton made some "adjustments" in the *Principia* so that his calculations and measurements would more closely support his theory, making it more convincing. In one example, accuracy of one part in 3,000 was claimed, and in another his computations were carried to seven decimal places, something quite unheard of in those days. "If the *Principia* established the quantitative pattern of modern science," wrote Westfall, "it equally suggested a less sublime truth—that no one can manipulate the fudge factor so effectively as the master mathematician himself."

Newton allowed himself to be drawn into another controversy that eventually got the better of him. To claim priority over Leibniz for the invention of calculus, according to the *Encyclopaedia Britannica*, Newton, as president of the esteemed Royal Society, "appointed an 'impartial' committee [made up mostly of his adherents] to investigate the issue, secretly wrote the report officially published by the society,

and reviewed it anonymously in the *Philosophical Transactions*," thus crediting himself with the honor.

That a man of Newton's stature would resort to such tactics is indeed a paradox. It clearly shows that conscientious and honorable though a scientist, or anyone, may be in other things, when his own reputation or interest is at stake, he can become quite dogmatic, irrational, even reckless, or take a shortcut.

"It seems a reasonable, not to say trite, thought that scientists are human, subject to the same frailties as we all are, heroic, cowardly, honest and sly, silly and sensible in about the same measure, expert in some fields, but not in many," writes consultant Roy Herbert in *New Scientist*. Though this view may not be held universally in the world of science, he adds, "I find no difficulty in accepting that."

What, though, about the supposedly close-knit, self-correcting and self-policing structure of science—the processes of review, refereeing and replication?

In the wake of the widely publicized

"What kind of protection against fraud does peer review offer?"

recent series of frauds in prestigious research institutes, the Association of American Medical Colleges issued a report setting out guidelines on how to deal with fraud in research. The report, in essence, maintained that "the overwhelming probability that fraudulent data will be detected soon after their presentation" is a safeguard against unethical practices.

This assessment, however, did not sit well with many others, both inside and outside the scientific community. For ex-

ample, a *New York Times* editorial, calling the report "a shallow diagnosis of science fraud," pointed out that "none of the frauds was originally brought to light through the standard mechanisms by which scientists check each other's work."

In fact, a member of the report committee, Dr. Arnold S. Relman, who is also an editor of *The New England Journal of Medicine*, likewise disagreed with the report's conclusion. "What kind of protection against fraud does peer review offer?" he asked. "Little or none." To back up his argument, Relman continued: "Fraudulent work was published in peer-reviewed journals, some with very exacting standards. In the case of the two papers we published, no suggestion of dishonesty was raised by any of the referees or editors."

As for the effectiveness of replication in spotting fraud, there appears to be a vast gap between theory and practice. In today's highly competitive field of scientific research, scientists are more concerned with breaking new ground than with repeating what someone else has done. Even if a scientist's work is based on an experiment done by someone else, the experiment is rarely repeated in exactly the same form.

The problem of replication is further compounded by what is sometimes called salami science. Some researchers deliberately 'slice up' their experimental findings into small bits in order to multiply the number of publishable works. This "affords an opportunity for dishonesty," says a Harvard committee, "because such reports are less likely to be verified by others." Researchers well know that unless an experiment is really important, it is unlikely that anyone will try to repeat it. It has been estimated that as much as half of all published papers are "unchecked, unrelicated, and maybe even unread."

The Craft of Fraudulent Science

In 1830 English mathematician Charles Babbage published a book entitled *Reflections on the Decline of Science in England* to summarize what he observed to be the existing state of scientific affairs. Therein, Babbage listed what he thought some scientists might be doing or were tempted to do when things did not turn out the way they expected.

"Trimming," wherein irregularities were smoothed out to make the data look extremely accurate and precise.

"Cooking," wherein only those results that best suited one's theory were selected and the rest discarded.

"Forging," the worst of all, wherein some or all of the data, in experiments one might or might not have performed, was fabricated.

This does not mean, however, that science, as an institution, is failing or is not working. Quite to the contrary, a great deal of important research is being done, and many useful discoveries are being made. All of this is a credit to what is essentially an honor system—the ideal that scientific advancement is based on mutual trust and the sharing of knowledge within the scientific community.

What the recent cases of fraud in research have demonstrated is the simple fact that this ideal has its limitations and that not all members of the scientific community are equally ready to abide by it. The facts show that within the self-policing and self-correcting mechanism of science there are enough loopholes that

anyone bent on beating the system and who knows his way around it could do it.

As in everything else, economics plays a large role in the world of science. The days of the self-supporting, inventive tinkerers are apparently over. Scientific research today is big money, and much of it is funded by government, industry or other foundations and institutions. Yet the economic crunch and budget cuts have made grants harder and harder to get. According to the National Institutes of Health, which funds some 40 percent of all biomedical research done in the United States on a yearly budget of about \$4 billion, only about 30 percent of applicants for NIH grants re-

Science, too, has its skeletons in the closet

ceive them, whereas in the 1950's the figure was about 70 percent.

What this means for the researchers is that the emphasis has been shifted from quality to quantity—the 'publish or perish' mentality. Even established scientists often find themselves more occupied with raising funds to keep their expensive laboratories going than with working in them. This was what led to the downfall of a doctor who was receiving over half a million dollars in grants.

This man was given a paper to check that was sent to his busy supervisor for prepublication review. The paper happened to deal with a subject on which he was also working. Rather than giving an honest appraisal of the paper and taking the risk of losing his claim to priority, and perhaps the grant along with it, the doctor hurriedly touched up his experiment, plagiarized some material from the other paper and submitted his own work for publication.

Actually the pressure to succeed is felt early along in the life of aspiring scientists, especially those in the medical field. "Stories of cheating among premedical students are common," said Robert Ebert, former dean of Harvard Medical School, "and the race for high grades so as to insure admission to medical school is hardly designed to encourage ethical and humanitarian behavior."

This early conditioning is easily carried over into the professional career where the pressure is even more intense. "In an environment which can ever permit success to become a more coveted commodity than ethical conduct, even the angels may fall," lamented Ebert.

The current situation was well summarized by Stephen Toulmin of the University of Chicago, when he said: "You can't change something into a highly paid, highly competitive, highly structured activity without creating occasions for people to do things they never would do in the earlier, amateur stage."

Our brief excursion into the world of scientific research has provided us with a glimpse of the scientist at work. We have seen that, despite their training, scientists are just as much subject to human frailties as they are imbued with virtues. Donning the white lab coat does little to change the picture. In fact, if anything, the pressures and competition in today's world of science may well make it all the more tempting to seek out the shady shortcuts.

The phenomenon of fraud in science is a reminder to all of us that science, too, has its skeletons in the closet. Though they are usually kept well out of sight, they are there, nonetheless. Their occasional exposure ought to make us realize that though science and scientists are often put on a pedestal, their place on it should be carefully reevaluated.

Misdeeds in the Scientific Past

Great scientists of the past were not all as pure and dedicated as we are made to believe. Besides Sir Isaac Newton (1642-1727; see page 6), here is a list of some others whose misdeeds have also come to light.

- Claudius Ptolemy, of the second century C.E., whose geocentric view of the universe held sway for 1,400 years, was considered "the greatest astronomer of antiquity." Today scholars believe that he obtained his data, not by observations, but by copying the work of an early Greek astronomer, Hipparchus of Rhodes. He was also suspected of having obtained some data by working backward from the results he expected.
- Galileo Galilei (1564-1642), Italian mathematician and astronomer, noted for the testing of falling weights at the leaning tower of Pisa, was regarded as the founder of modern experimental science for his reliance on observable facts rather than the writings of Aristotle for answers. Yet contemporaries had difficulty reproducing his results, and he was known for his "thought experiments," imagining rather than observing the outcome.
- Gregor Mendel (1822-1884), Austrian monk and botanist, was credited with the discovery of the laws of heredity. His experiments with garden peas pioneered the science of genetics. His theory and data agreed so precisely that some investigators thought "he made occasional subconscious errors in favor of expectation," while others felt he was guilty of data selection, using only those that agreed with his theory.
- Robert Millikan (1868-1953), eminent American physicist, won the 1923 Nobel prize for determining the electric charge of the electron. In recent years, scholars studying Millikan's lab notebooks detected data selection—discarding the half that did not suit his theory—even though his paper specifically stated that this was *all* the data obtained "during 60 consecutive days."
- Sir Cyril Burt (1883-1971), leading figure in British psychology, helped shape England's educational policy by his work on the IQ of children and his theory that intelligence is largely inherited. Another psychologist, in preparing Burt's biography, discovered fraud in nearly everything Burt published in the last 30 years of his life. "His work often had the appearance of science, but not always the substance," said the biographer.

"If the luminaries of scientific history would on occasion misrepresent their data for the personal vindication of seeing their ideas prevail, the temptations must be all the greater for contemporary scientists," says the book *Betrayers of the Truth*. Whether this is true or not, science and scientists are no exception when it comes to fraud and deception.

Fighting Symptoms, Ignoring Cures

"Is the safety and sacredness of human life diminishing everywhere?"

"Are governments even less morally restrained than was formerly the case?"

"Do the leaders of the United States and the Soviet Union possess sufficient common sense and concern for the future to avoid the use of nuclear weapons and negotiate an understanding to ensure the survival of life on earth?"

THOSE THREE QUESTIONS were raised by *US Trends* in its report of December 8, 1983. The answers are self-evident. Daily newscasts show that regard for the sacredness of life is diminishing. Certainly moral restraints are weakening with both individuals and governments. And recent developments have accelerated fears about the common sense and concern of the United States and Russia relative to nuclear weapons.

Last November scientists from both Russia and the United States participated in a conference on "The World After Nuclear War." One Russian scientist from the Academy of Sciences said: "Nuclear devices shouldn't be considered as a means of waging war or conducting policy. It is a weapon of suicide." Another Russian from the Academy declared: "A nuclear war of any scope would mean either the disappearance of mankind or its degradation to a level below the prehistoric one."—*Science News*, December 24 and 31, 1983.

Unanimous conclusions from the conference: The death toll from direct bomb effects was projected at over two billion—half the world's population. Temperatures would drop far below freezing and remain so for months. Darkness would prevail at noonday. Light would be insuffi-

cient to sustain photosynthesis, and plants would die. Most animals would die. Food would be scarce. Agreement was unanimous that "we could not preclude the extinction of *Homo sapiens*."—*Science News*, November 12, 1983, pages 314-7.

Similar warnings appeared in *Science*, official magazine of the American Association for the Advancement of Science. The editorial in that issue raised this crucial point: "There remains the question of who is listening and how deeply these warnings penetrate and adhere to the nation's thought. For a few days, the news of potential biological catastrophe is the stuff of media prominence, only to be quickly displaced by the next catastrophe."—*Science*, December 23, 1983, pages 1281-1300.

Obviously, the superpowers are not listening, common sense is not functioning, and concern about suicidal and globicidal nuclear weapons is insufficient.

The threat of a nuclear holocaust is frightening, but other calamities are already engulfing humanity. War, hunger, moral breakdown, family collapse, greed, violence, crime, murder, terrorism, meism—to name a few.

Actually, all these things are symptoms. A symptom, according to Webster, is "something that indicates the existence

of something else." These conditions indicate the existence of something else, namely, morally diseased hearts. Much effort is expended to combat the symptoms, but little is done to cure the heart.

Because the physical heart lies deep within the body, it is used figuratively to mean what a person really is deep within. So it is that the Bible speaks of "the secret person of the heart," and that God does not look on the outward appearance but "sees what the heart is." Jesus said: "Out of the heart come wicked reasonings, murders, adulteries, fornications, thieveries, false testimonies, blasphemies. These are the things defiling a man."—1 Peter 3:4; 1 Samuel 16:7; Matthew 15:19, 20.

Curing Diseased Hearts

This world's propaganda fills minds and hearts with garbage. Through its press, movies, television and stage plays true values are belittled while decadence and sin are glorified. The message is, Those who shun immorality are prudes; those who practice it are normal. Just as in an ancient time of moral decay, everywhere today there are "those who are saying that good is bad and bad is good, those who are putting darkness for light and light for darkness, those who are putting bitter for sweet and sweet for bitter!"—Isaiah 5:20.

It is time for honest-hearted people to think about the cure. It is time to be "making your mind over." It is time to "make for yourselves a new heart and a new spirit, for why should you die?" (Romans 12:2; Ezekiel 18:31) That's

right—die. Even now, thousands are dying hourly from avoidable calamities spawned in the hearts of men. If a nuclear war occurs, the human race could die.

It need not be so. The cure is simple. Jesus said it long ago: "Love your neighbor." Immediately the cry goes up: 'That's not just simple, that's simplistic! It's not practical. People won't do it! It won't work!' It has never been tried. And it is true, not all people will do it. But if they did? There would be no armies, no armaments, no wars. No stealing, no embezzling, no violence. No rape, no murder, no crime. That would mean no police, no criminal courts, no prisons. All very practical.

Yes, "make for yourselves a new heart." "Put away the old personality . . . Put on the new personality which was created according to God's will in true righteousness and loyalty." (Ephesians 4:22-24) Doing this, you may be one of those who will remain on the earth after it is cleansed.—Psalm 37:10, 11, 29.

Yes, it will be cleansed. The woeful symptoms now afflicting the world will pass. They not only are symptoms of morally bankrupt hearts but constitute a sign of the last days of this present decadent system of things. And the polluting of the earth now taking place for the first time in history will not succeed in totally ruining the earth, nor will the feared nuclear holocaust be allowed to wipe out the human race. Jehovah God will not allow it. He has promised to "bring to ruin those ruining the earth."

—Revelation 11:18.

"When your country and mine shall get together on the teachings laid down by Christ in this Sermon on the Mount, we shall have solved the problems not only of our countries but those of the whole world."
—Gandhi, to Lord Irwin, former viceroy to India

Food Freezing to Save Money and Time

Is there a way to beat the rising cost of food—and reap dividends in time and energy saved as well? With a little effort on your part, food freezing could be the answer.

Consider the advantages. Meat, fish, poultry, vegetables and fruits can be bought in bulk quantities at wholesale prices to save money and time. Seasonal foods are inexpensive while they last; freezing makes them available the year round. You can cash in on the 'specials' at the food markets and prepare a variety of dishes to be frozen for use later on. Meals can be cooked in double or triple quantities to save both time and energy. Even leftovers can be frozen and reused with no loss of appeal.

When properly prepared, frozen food can maintain its flavor, color, texture and nutritional value for long periods of time. To achieve this is not as hard as it may seem. But understanding some of the basic principles may help.

First of all, the faster you freeze the food the better its qualities are preserved. Most freezers and some freezer compartments of refrigerators have a temperature setting for quick freeze. Put this on an hour or two before you do your freezing and leave it on until the food is frozen solid. Where there is no such control, you can compromise by using the shelf nearest to the freezing coils. Remember, too, that smaller and thinner packages freeze faster than large ones.

The cold, dry air in the freezer is moisture hungry and can rob frozen foods of their good eating qualities. So proper packaging is important. Heavy-gauge freezer foil and plastic bags can be wrapped tightly around cuts of meats. Be sure that all, or as much as possible, of the air in the package is squeezed out. For cooked foods, plastic containers, preferably rectangular ones, with tight-fitting lids are best. Glass containers require extra space inside for expansion during freezing. Labeling each package with content and date will eliminate much confusion and possible embarrassment later on.

Another time-saving feature of frozen foods is that most of them can be, and in fact should be, cooked straight out of the freezer. Poultry is perhaps the only exception. Large birds should be thoroughly thawed before they are used. Cooking meat while it is still frozen seals in the juices—along with its good taste and nutrition. Vegetables can be dropped right into boiling salted water. When the water returns to the boiling point, you will soon have a tasty dish that is little different from one freshly cooked.

Are you tempted to try your hand at food freezing? Any one of the many instruction books available at bookstores will supply you with a host of useful tips. You may soon come to agree with other freezer owners who say that they would rather be without any other appliance than their freezer.

and a shadow to the world's airports and seas and land and air.

And so it is during our time right now. The world is facing a major problem, an worldwide economic crisis that testifies all of the world's political and economic systems.

Sky-High—and Confident!

By "Awake!" correspondent in Australia

A COMMERCIAL airliner bound for Los Angeles rose from the runway at Chicago's O'Hare Airport. About 500 feet off the ground it lost one engine on its left wing, rolled to the left, plunged into the ground, killing all 272 persons on board.

On investigation it was found that the engine fell off due to a faulty maintenance procedure that was used to save time when it was removed and replaced after an overhaul.

Such air disasters as this renew the fears some have as to how safe air travel really is. To alleviate some of those fears, we took a look behind the scenes of an average international airline to see just how much attention airline companies give to the safe transport of you, the passenger, to your destination.

Safety Checks

Most air travelers are aware that each time a plane lands, specialist teams descend upon it for what is called a transit check. Within two hours a Jumbo can be completely serviced. However, if the stopover is more than four hours, it is towed to the jet base where more extensive maintenance is performed.

While some aircraft may look a little old, every three or four months in the life of the plane, or after 1,400 flying hours, each jet is "hospitalized" to undergo a major maintenance check. Then every five years, or about every 20,000 flying

hours, there is a complete refit of the airframe and its engines. What results is virtually a new aircraft internally.

The expert attention given to service a jet engine that operates with a 50,000-pound (23,000-kg) thrust is even more delicate than that given a fine watch by a watchmaker. The engines are meticulously cleaned before being exhaustively examined with microscopes, X-ray equipment, fluorescent penetration equipment and magnetic particle inspectors to detect flaws and cracks too minute for the human eye ever to see.

The extreme accuracy sought and obtained is reflected in the engineering shop where machines work to a tolerance of one millionth of an inch. The thickness of this page that you are reading is more than 3,000 times that measurement, a hefty three thousandths of an inch thick!

Navigation Systems

The gyros that guide the aircraft are tested so accurately that their rate of drift is less than 0.1 of a degree per hour. This means that after a ten-hour flight (Sydney to Honolulu) without any checks or outside help from any other guidance system during the flight, the aircraft would be, at most, only 7 miles (11 km) off target, after flying a distance of 5,000 miles (8,000 km). Yet there is not just one guidance system operating but two others as a backup in case one should fail.

The high performance demanded of the sensitive navigation systems could be impaired by the slightest dust contamination while being serviced. As a guarantee against such contamination, the workshop at the jet base has been quite appro-

Every three or four months, or after 1,400 flying hours, each jet is "hospitalized" to undergo a major maintenance check

priately dubbed the "clean room." Its standard of cleanliness would be the envy of every housewife or hospital surgery.

The staff are scrubbed clean before entering, and are fitted with special clothing that covers even their hair and feet. The chance of impurities entering when the entry door is opened is minimized by having the staff step into the room at the downstream end of a gentle flow of air moving at about 1.2 miles (2 km) per hour.

Electronic equipment filters every pocket of air and permits no more than three and one half contaminating airborne particles, down to 0.5 of a micron in size, in each liter of air (a hair from your head is a chubby 100 microns thick). A supersensitive machine monitors the amount of airborne contamination in the "clean room." Ideal conditions give a zero readout on the digital display.

When the workshop first acquired the machine, technicians were a little doubtful that it was working properly because it showed a constant zero or near zero readout. In a simple test, they took it outside the "clean room" environment into an adjacent corridor. The counter

jumped to hundreds of thousands within seconds, illustrating just how clean their room really was.

Computer Contributions

Spawned from space-age technology, computers have been drafted into airline safety and service. A computer memory lists all identification cards that jet-base staff are required to produce to gain entry to the base. Entrance is denied to anyone trying to use a card reported as missing.

Rosters for airline crews are also computer controlled to make sure that the pilots are experienced. The pilots especially are subjected to its scrutinizing eye. They must have recent experience in flying the required route, have had a night landing every 90 days, an instrument landing every 45 days, and they must meet many other requirements before they will be allowed to fly the aircraft.

Your safety has also been enhanced by automatic flight planning, also done by computers. The aircraft will be flown over the shortest possible route—yet around bad weather—so as to burn minimum fuel. On just one sector of flight alone, from Sydney to Singapore, up to three tons of fuel can be saved by automatic computer flight planning.

Crew Training

There is more behind the captain's confident voice than most passengers realize. Because the flight crew of pilots and flight engineers have faultless performances demanded of them, their skill, condition of health and proficiency are constantly examined throughout their flying career.

The training of aircrews has taken a giant step forward with the introduction

(and constant updating) of flight simulators. These are identical to the actual aircraft cockpit with all its avionic and electronic control systems. Every moment, and movement in some cases, of a jet plane in flight can be reproduced in such simulators, though they never get off the ground. The pilot hears the engine noise, the cabin noises, feels the bumps in the runway as he taxis along, sees the

Your safety is enhanced by automatic flight planning, also done by computers

runway disappearing beneath him as he takes off with trees and airport buildings flashing past, and flies through more varied weather patterns in the simulator flight than he is normally likely to meet. He is also trained to identify airports and their surroundings by night presentation through the simulator, and to make night landings. On board is an instructor who, with a computer, can create any one of 350 emergency situations—from systems failures to extreme weather conditions—even subjecting the flight crew to multiple emergencies. Thus the flight crew receive training over and above the call of normalcy before progressing to the real thing.

The cabin crew of stewards and hostesses are likewise trained to handle all that they are likely to meet in a day's work and are rigidly schooled and examined in emergency situations. In a mock-up of a Boeing 747 Jumbo, which never leaves the ground, cabin crews are intensively instructed in matters that range from mixing a cocktail to midwifery, how to evacuate over 400 passengers in less

than 90 seconds using only half of the aircraft's ten emergency exits, and how to ditch at sea.

Time and the Unforeseen

The Bible reminds us, at Ecclesiastes 9:11, that, despite all the skill and preparation, "time and unforeseen occurrence befall them all." Hence, matters outside the programmed technical field affect the safety of air travel. Fatigue, heart attacks and mere errors of judgment have all taken their toll.

Runway lights attract insects and spiders, which in turn attract birds. Incidents involving aircraft striking birds have cost millions of dollars in damage along with loss of human life.

Since increased security was ordered in 1973, more than 2,500 million passengers and 4,000 million pieces of carry-on luggage have passed through U.S. airport security systems. More than 19,000 firearms were detected in that time, resulting in over 7,000 arrests. In only one

The training of the flight crew has taken a giant step forward with the introduction of flight simulators

case, in 1979, did a hijacker smuggle a firearm onto an aircraft. In all other attempts, the hijacker only claimed to have a weapon.

Man's ambition to fly a heavier-than-air machine with success and safety has achieved a remarkable measure of success. Knowing a little more of what goes on behind the scenes to ensure our safety certainly causes us to breathe more easily. Our flight is the safest that 20th-century technology can generate.

Religious Zeal

—Helpful or Harmful?

NOT long ago, two "very, very religious" women in the United States prayed and fasted for their relatives. They kept it up until they starved to death. In front of a crowd of onlookers, a widow in India burned herself to death on her dead husband's funeral pyre, following the banned Hindu custom of suttee. In the same land, men pierce themselves with hooks and walk on fire or razor blades in religious rituals.

In Canada five devout women attempted to set fire to a religious leader's home and several other buildings because of a religious curse. In the jungles of Guyana, 900 followers of charismatic cult leader Jim Jones committed suicide at his command.

In countries like Ireland and Lebanon, strong religious feelings are a root cause of bloodshed and civil strife. Hence, in the ears of many, the words "religious zeal"

God has never required Christians to inflict suffering on themselves

doubtless have an ominous ring. Do we need such zeal today? Would it not be better if people were less intense about religion?

Jesus was zealous. The intensity of his zeal was seen in many ways. After his baptism he devoted all his energies to spreading the good news of God's Kingdom. Jesus gave of himself, never refusing to help those who approached him. He

sacrificed material comforts, rejecting offers of worldly glory, and, ultimately, submitted to an agonizing and humiliating death, giving "his soul a ransom in exchange for many."—Matthew 20:28.

Jesus' zeal also embraced a 'hatred of lawlessness.' (Hebrews 1:9) Thus he boldly exposed the Jewish religious leaders, branding them as "blind guides," and "hypocrites." (Matthew 23:15, 16) Also, on two occasions, he drove out of the temple area profiteering merchants who were enriching themselves at the expense of faithful Jewish worshipers. This action reminded his followers of the prophecy: "The zeal for your house will eat me up."—John 2:13-17; Matthew 21:12.

Jesus' zeal was in connection with the doing of his Father's will, which today is revealed to us in the Bible. If you read that book carefully, you will see that God has never required Christians to be fanatical, to commit suicide or to inflict needless suffering on themselves or others. It never took on a "self-imposed form of worship and mock humility, a severe treatment of the body."—Colossians 2:23.

Jesus' 'hatred of lawlessness' did not lead him to advocate revolution or bloodshed. In fact, while frankly exposing the sins of the Jewish leaders, he recognized their position in the Jewish nation and gave his followers well-balanced counsel: "The scribes and the Pharisees have seated themselves in the seat of Moses. Therefore all the things they tell you, do and observe, but do not do according to their

deeds, for they say but do not perform.”—Matthew 23:2, 3, 13-36.

Neither did Jesus enter into a blood-feud with this group, although he became aware that some of them were seeking to kill him. When individual Pharisees approached Jesus, he showed kindness to them if their motives were good. It was during a discussion with a Pharisee, Nicodemus, that Jesus uttered what are among

Christian zeal should never advocate revolution or bloodshed

his best-remembered words: “God loved the world so much that he gave his only-begotten Son, in order that everyone exercising faith in him might not be destroyed but have everlasting life.”

—John 3:16.

Jesus was always ready to help *people*. However, he hated wrong *practices*, such as profiteering, greed, oppression of the poor, immorality, theft and murder. Jesus, though zealous, did not lose sight of human kindness. On one occasion, a crowd had been following Jesus for some days. His practical concern for them was shown when, out of “pity for the crowd,” he miraculously provided food.—Matthew 15:32-38.

Hence, Jesus was zealous for beneficial things. He stressed respect for parents, forgiveness and love. In his Sermon on the Mount, he set a startlingly high standard when he said: “You heard that it was said, ‘You must love your neighbor and hate your enemy.’ However, I say to you: Continue to love your enemies and to pray for those persecuting you.”—Matthew 5:43, 44.

In today’s world, riddled as it is with

tensions and hatreds, strong religious feelings that encourage strife, revolution and enmity are certainly harmful. However, a balanced but intense zeal—such as Jesus had—for doing God’s will, cultivating godly qualities and serving our neighbors is surely helpful.

Does such zeal exist today? Well, there are people who try to imitate Jesus’ zeal. They work with the help of God’s spirit at being “zealous for what is good.”—1 Peter 3:13.

A comment in the London, England, *Daily Telegraph* showed how this has affected them in one part of the world. It said: “Jehovah’s Witnesses have shown themselves, through Africa, to be decent, orderly citizens living up to a high moral code. . . . The sect inculcates habits of thrift, punctuality, honesty and obedience.”

A chief aspect of the Witnesses’ religious zeal prompted this comment: “Jehovah’s Witnesses have literally covered the

Christians should be “zealous for what is good”

earth with their witnessing. . . . It may be truly said that no single religious group in the world displayed more zeal and persistence in the attempt to spread the good news of the Kingdom than the Jehovah’s Witnesses.”—*These Also Believe*, by C. S. Braden.

Without doubt, Christian zeal is helpful in many ways. Such zeal can help an individual to maintain high standards. It can give him a hopeful outlook that few today possess. Such religious zeal is not merely helpful; for a sincere individual, it is the best way of life.

Young People Ask...

What About Music Videos?

"Have you seen the new song by . . . ?"

"Keep your eyes on the music!"

STANGE comments? Not really, thanks to the "hottest" new art form in the music business—videos. These minimovies (usually three to five minutes long) "transform a song into a sight unexpected," as *Seventeen* magazine put it.

But why the video boom? Why have videos suddenly become "a powerful force in the music business," according to the magazine *Rolling Stone*? Why are artists and record companies spending thousands, even *hundreds of thousands* of dollars to make a video clip of a song? It's simple: videos sell records. And that's 'music to the ears' of the record industry, which in the United States had recently been experiencing a four-year decline in revenues.

But there's another reason for the video explosion: Videos often boost a new artist's career. In the past couple of years, more than a few new acts, struggling for exposure, reached the top of the music charts due mainly to the strength of their videos. In one case, an artist went without a hit record for eight years until his video got heavy airplay on a cable-television video channel. The result? Sales of the record skyrocketed.

Why do young people like videos? "They have things that appeal to young people—nice cars, pretty good music," explains

19-year-old Andrew. "I like the dancing," adds Sherry, also 19 years old. Many young people, after hearing a song that they like, are anxious to see the video. Why? Explains 17-year-old Dave: "The video's a way for the artist to express what the song's about. He's describing the song to you."

Yes, videos have revitalized the record industry. But what are these three- to five-minute minimovies all about? Are they always a harmless form of entertainment? Or is there reason, at least, for careful selectivity?

Videos—What Do They Contain?

There are basically two types of videos: *concert* videos, which are taped performances of the artist singing/playing his

Videos "transform a song into a sight unexpected"

or her song, and *concept* videos, which amount to an interpretation of the song, telling a story along with the music. Does the story have anything to do with the song's lyrics? Not always. Does this matter? Not really—judging by viewer reaction.

Little wonder, then, that videos often are bizarre. For example, notice how Fred Bruning, writing in *Maclean's*, described one video: "A punkish singer stands on the roof of what seems to be a prehistoric skyscraper while waifs in rags claw their way up the side. Eventually, the tattered legions reach the roof, only to be pitched overboard by electrical charges released when the singer uses his body to short-

Videos often are bizarre

circuit a dynamo. In the background, we see the silhouette of a nude woman bound by rope, struggling in rhythm to the music. A final shot captures the spent performer, the ragamuffins, who, incredibly, have climbed the building a second time and a huge screen filled with the scowling face of a woman we saw first as a tattoo on the singer's arm."

Beyond the bizarre, though, a number of videos have taken up another theme: sex and violence. Thus, *Newsweek* notes that "several [video] clips feature women in leather gear acting out scenes of torture, bondage and violence." Adds *Rolling Stone*: "The surest shortcut to memorable videos seems to be a liberal dose of sex, violence or both."

What effect may such videos have on you? For one thing, they fix in your mind a visual interpretation of the song. Thereafter, every time you hear that song, you'll likely recall what you saw in the video. As Dave explains: "There was this song that I liked. Then I saw the video. It showed the performer being chased by what looked to me to be a rapist. After that, every time I heard that song I thought of this video."

Understandably, many people are con-

cerned. Sue Steinberg, former executive producer of a cable-television channel, was quoted by *Rolling Stone* as objecting to the "violence to women. . . . They seem to see how far they can go. And it's getting worse."

Another popular theme in videos? The ghoulish. *Film & Comment* describes one video in which the artist plays a "reluctant groom who develops cold feet at the altar and hallucinates that the entire bridal party, fiancée included, has turned into *Night of the Living Dead* ghouls anxious to add him to their ranks by way of holy matrimony."

Not that all videos feature sex, violence or the ghoulish theme. Some endeavor to teach a lesson—like brotherhood or refraining from violence. In all honesty, though, it must be admitted that such videos are the exception, not the rule.

"I Would Never Do It Again!"

In another popular video, *Thriller*, the performer is seen to transform first into a "cat person," then a dancing "monster."

"The surest shortcut to memorable videos seems to be a liberal dose of sex, violence or both"

Evidently not wanting viewers to conclude that it promoted spiritism, the film begins with the disclaimer: "Due to my strong personal convictions, I wish to stress that this film in no way endorses a belief in the occult.—Michael Jackson." Nevertheless, it was so realistic that some who saw it admitted that they were horrified at first. What was this short film intended to convey? And how does the

performer, Michael Jackson, feel about it in looking back?

"I would never do it again!" says Jackson. "I just intended to do a good, fun short film, not to purposely bring to the screen something to scare people or to do anything bad. I want to do what's right. I would never do anything like that again." Why not? "Because a lot of people were offended by it," explains Jackson. "That makes me feel bad. I don't want them to feel that way. I realize now that it wasn't a good idea. I'll never do a video like *that* again!" He continues: "In fact, I have blocked further distribution of the film over which I have control, including its release in some other countries. There's all kinds of promotional stuff being proposed on *Thriller*. But I tell them, 'No, no, no. I don't want to do anything on *Thriller*. No more *Thriller*.'"

What Will You Do?

So, then, what about videos? Is it fair to conclude that *all* videos are bad and therefore not to be viewed? Not any more than you could say that all movies, or all songs,

**"I'll never do a video like
that again!"**

—Michael Jackson

or all TV programs are bad. But one thing is certain. As is the case with movies, songs and TV programs, CAREFUL SELECTIVITY IS NEEDED.

But this can present a real challenge. As 20-year-old Brian explains: "You don't always know what's going to be on next. You may want to see a video of a particular artist, but there may be others shown first—good ones and bad ones. It's harder to be selective with videos on cable TV."

What can help you to decide whether a particular video should be viewed as entertainment? Well, a good indicator is to ask yourself: How does it measure up against Bible principles? Consider an example or two.

Regarding immoral sex, the Bible says: "Since you are God's people, it is not right that any matters of sexual immorality or indecency or greed should even be men-

"Be very selective. Be careful of both the songs and the videos"

tioned among you." (Ephesians 5:3, 4, *Today's English Version*) Since such things should not "even be mentioned among" God's people, what do you think about videos that feature themes suggestive of sexual immorality?

Regarding violence the Bible says: "Jehovah himself examines the righteous one as well as the wicked one, and anyone loving violence His soul certainly hates." (Psalm 11:5) If we freely watch videos that contain senseless violence, can we rightly claim that we are not 'lovers of violence'?

While not condemning all videos, don't you agree that genuine Christians should rightly reject any videos (and *any other* form of entertainment) that feature sex, violence, occultism or any other theme that is clearly contrary to the principles set forth in God's Word, the Bible? And why put on a pedestal those who produce such things?

What should you do? Perhaps it was best summed up by young Bob, who said: "Be very selective. Be careful of both the songs and the videos. Be ready to change the channel."

Chocolate on Trial

— How Bitter or Bittersweet the Evidence?

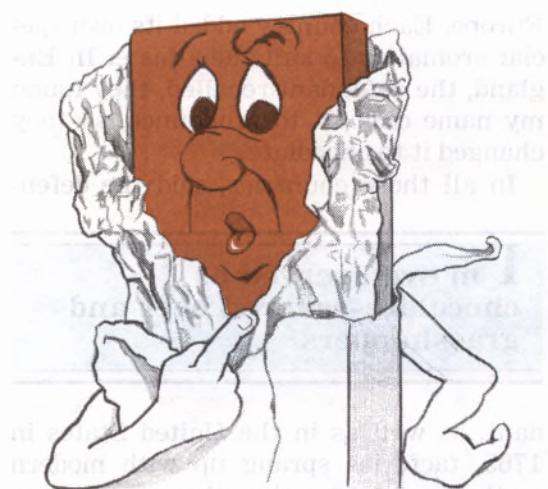
ALL the testimony had been entered. The attorneys for the prosecution and the defense had made their final summations. The jury had been dismissed to consider the evidence and reach their decision. For hours the interested spectators crowding the courtroom had watched a steady stream of witnesses offering testimony for and against the defendant. Now they were waiting for the verdict.

The accused waited with them. Whether from heat or from anxiety, the defendant looked as if he would melt. As he waited, his mind raced back over the hours of testimony. He thought of his own account of his earlier years.

The Defendant's Testimony

In 1519, he had told the court, the Spanish explorer Hernando Cortés led an expedition into the heart of Mexico to capture gold and silver treasures from the Aztec Indians. The emperor, Montezuma, along with his Aztec subjects, thought Cortés and his soldiers were "white gods, risen from the sea." They were welcomed and feasted and served a cold, bitter drink that was very popular with the Aztec hosts. It was called *cacahuatl*.

The Spaniards learned that the Aztecs believed that one of their prophets had brought the seeds of the cacao tree from



paradise and had planted them in his garden. By drinking liquor pressed from the seeds, he acquired universal wisdom and knowledge. Montezuma himself believed that it not only gave him strength and energy but stimulated his waning sexual powers as well. Also, the cacao beans served as money.

Cacahuatl was too bitter for the European taste of the conquistadores, but by adding a little sugar it was improved immensely, and Cortés determined to introduce this sweetened version, called *chocolatl*, into the Spanish court. In Spain it was an immediate success. Fashionable ladies enjoyed it so much that they had their maids bring them steaming cups of *chocolatl* to sip while in church. The demand for the exotic drink rose rapidly, and soon Spanish ships were bringing regular supplies of cacao beans from the equatorial countries where the beans were grown.

The source and the recipe for this unusual and exciting drink were kept a closely guarded secret. But the secret leaked out, Spanish monks revealing it to monks in Italy. The drink spread like wildfire—to Italy, into France and England, and all of

Europe. Each country added its own special aromatics to suit their taste. In England, the defendant recalled, they found my name difficult to pronounce, so they changed it to chocolate.

In all these countries, said the defen-

I'm even served as chocolate-covered bees and grasshoppers

dant, as well as in the United States in 1765, factories sprang up with modern methods of converting the cacao beans into chocolate, then later milk chocolate, chocolate bars, chocolate with nuts in it, chocolate with cherries in it and chocolate over caramel. In Italy there is a chocolate pasta. In some countries chocolate gravy is served over meats. In Denmark chocolate sandwiches are eaten for snacks. There is also chocolate tobacco and chocolate chili. You can even get chocolate-covered bees and grasshoppers, the defendant had said with a smile. But the judge gagged at this and reached for his glass of water.

"It is obvious," the defendant had concluded to the court, "that the world is hooked on me. But this is not an indictment of me. This is testimony to my good character, as the facts have shown."

The defendant remembered well the case for the prosecution. One of the witnesses called to the stand, he recalled, whose testimony the prosecution considered especially damaging to the defense, was a 20-year-old girl. Her face bore the scars of a severe case of acne. The witness testified that she consumed three or four chocolate bars a week. A parade of witnesses, all suffering from the same skin problem, followed her to the stand and

one by one testified to their consuming several chocolate bars a week.

He also remembered the doctor who testified that almost every doctor he knew put chocolate on the list of foods that provoke allergic reactions. He could remember the face of each one who swore under oath that they suffered from hives, migraine headaches or upset stomachs after eating chocolate.

Then there was the dentist who told the court that chocolate caused tooth decay. Others joined him in this contention. Another doctor testified that chocolate was guilty of causing high levels of cholesterol in the blood, bringing on high risks of heart disease. This witness was followed by an expert who claimed that chocolate was "loaded with caffeine," and that one would be better off drinking tea or coffee. On this note the prosecution rested.

The defendant remembered how pleased he was with the first witness for the defense. A noted allergist testified: "With the possible exception of milk and sugar, it is probable that chocolate is sub-

Chocolate can trigger allergic reactions in some people

jected to the most criticism levelled against a food. . . . It is timely to try to separate truth from myth. To do so becomes important because chocolate is a highly nutritious food whose virtues have been recognized where high energy in small bulk is critical."

This witness was asked about the relationship between chocolate and acne. "For many years chocolate was routinely considered to be a major excitant of acne because it was thought to increase blood

lipids, thus affecting sebaceous activity," he said. He referred to research studies that "concluded that chocolate had no particular effect on acne."

A recent study conducted at the University of Pennsylvania was cited. It con-

A carob bar is five times more likely to cause tooth decay than a chocolate bar

cerned 65 acne sufferers. They began to consume large amounts of chocolate daily. Forty-six showed no change in their acne, 10 got better and 9 got worse. When the same patients took look-alike candy, containing no chocolate, 53 showed no change, 5 got better and 7 got worse. It was also brought out that a recent Navy study put a group of midshipmen who suffered from acne on a four-week schedule of eating at least three chocolate bars a day. Their skin lesions were unaffected.

What about migraine headaches, upset stomachs and hives that some people have testified to were due to the consumption of chocolate? Yes, the evidence clearly showed that chocolate can trigger these reactions in some people. The defendant recalled that this admission did make him shift nervously in his chair. The doctor agreed that "chocolate itself can indeed be the incitant in allergic, toxic . . . reactions," but he also pointed out that in view of the widespread use of chocolate, the allergic reactions were relatively low. He also felt that chocolate is often used as a convenient scapegoat where diagnosis is "difficult or obscure" and that chocolate "is blamed and banned promiscuously, often with little justification." Also, "Documented reactions to chocolate are far less frequent than the overall impression en-

tertained by physicians and laymen alike."

The defendant was particularly interested in the defense against the charge that chocolate causes tooth decay. He had listened to reports of studies by three research centers, including the National Institute for Dental Research. Their findings were that chocolate contains an *anti-decay* factor—possibly its fat content—that coats and thereby protects teeth from decay.

However, a milk chocolate bar is 55 percent sugar by weight, and sugar *does* cause tooth decay. But it may be that the antidecay factor in chocolate will combat the decay-enhancing character of the sugar. Moreover, starchy foods, such as potatoes, adhere to the teeth longer than the highly soluble sugar does and may therefore be an even greater culprit in tooth decay!

The defendant remembered with amusement the testimony of a lady authority of Pennsylvania State University: "Your body cannot distinguish between

Beware: A chocolate bar of one and a half ounces has 220 calories!

the sugars from fruits, vegetables, milk or honey, or those from chocolate and confections." And he could not restrain himself from chuckling when he recalled the testimony about a University of Texas study that had found that his rival look-alike, the carob bar, was five times more likely to cause tooth decay than was a bar of chocolate!

The defense went further. No, it is not true that chocolate causes high levels of cholesterol in the blood. Some experts

have shown that the fat in chocolate is saturated, "but unlike other saturated fats it apparently does not raise cholesterol levels in the blood. Since it is a product of plants, pure chocolate contains no cholesterol. Those concerned about heart dis-

When Hillary conquered Everest and astronauts went into space, chocolate went with them

"ease," the article reporting on this continued, "need not avoid chocolate except as a possible contributor of excess calories." So if you are counting calories, beware: A chocolate bar of one and a half ounces has 220 calories!

The defendant, however, did comfort himself by recalling the testimony that these were not totally "empty calories," as some like to say. In chocolate there are small amounts of proteins, vitamins A, D, E and K, linoleic acid, calcium, thiamine, riboflavin, phenylethylamine and iron.

Yes, it is true, chocolate does contain some caffeine. But far less than is found in a cup of tea or coffee. How much less? An ounce of bittersweet chocolate has about 5 to 10 milligrams of caffeine, whereas a cup of brewed coffee has 100 to 150 milligrams.

Last of all, one expert testified that Montezuma and his Aztec subjects were right. Chocolate is a powerful fighter of fatigue and it does give the consumer

On an occasion when Jehovah's people were mourning, they were told to "eat the fatty things and drink the sweet things" and not to be sad but to be joyful instead. (Nehemiah 8:10) It is good to remember that "the kingdom of God does not mean eating and drinking," and "foods which God created to be partaken of with thanksgiving" may be used with moderation.—Romans 14:17; 1 Timothy 4:3, 4

strength and energy. Athletes and soldiers in the field use it. When Hillary's expedition conquered Everest, they took along hundreds of pounds of chocolate and cocoa. And when the U.S. Gemini astronauts went into space, chocolate went with them.

At this point the defendant's recollections were interrupted. The men and women of the jury filed back into the jury box. The judge asked the defendant to rise. A hush fell over the room as the dark-brown defendant rose to his feet and faced the jury. This was what the crowd had been anxiously awaiting. The moment of truth had arrived.

"Ladies and gentlemen of the jury," the judge asked, "have you reached a decision?"

The foreman looked unhappily at the judge. "No," he said simply. "We could not come to a unanimous decision. Feelings were mixed. Some thought him guilty, the rest of us felt he was innocent."

A babble of noise broke out in the courtroom. A hung jury! What happens next? The judge would decide that later. But what about the audience? For now, each one would have to make up his own mind about the accused.

And what about Mr. Chocolate? How did he feel? "I'm satisfied. I'm not nearly as bad as I'm often made out to be, but I'm not perfect either." He thought for a moment, then added with a pleased expression: "But what food is perfect, besides uncontaminated mother's milk?"

A Graduation That Is Different

GRADUATION ceremonies have sparked interest since the 14th century, but none have been as important to the human family's future as those begun more than 40 years ago in a farming community in the northeastern United States. June 23, 1943, saw the first class of missionaries graduate from The Watchtower Bible School of Gilead. March 4, 1984, saw the 76th class. And between those dates, Gilead graduates have spearheaded the preaching of the "good news" of God's established Kingdom to "the most distant part of the earth."—Matthew 24:14; Acts 1:8.

When the first class of 94 missionaries was sent out into foreign fields, the "good news" was being preached in 54 lands by 126,000 Witnesses. But now more than 2,500,000 in 205 countries regularly publish the "good news." The 40 new graduates will add their voices to the declaration of the "good news" being preached in 16 of those countries.

How Is It Different?

What is so different about a Gilead graduation? "Several things," answers Frederick W. Franz, the school's current president. "For one, graduates of other schools have completed courses of *their own* selection that have prepared them for a career in a field of *their own* choosing. But here at Gilead School all graduates shared in the same courses and had their missionary assignments chosen for them. The Governing Body selects the course and the territory to which each missionary will be sent."

In the beginning, Gilead students did

not find out where their missionary assignment was to be until graduation day, but in recent years they know about half-way through their five-month course. This posed no problem for Dominic and Tjitske Busciglio. When they received their invitation to attend Gilead School, they had no idea that they would be assigned to the African country of Senegal. "We remembered Abraham and his wife Sarah, who also received an assignment from Jehovah and did not know where they would end up," said Tjitske, referring back to the day their invitation arrived. "My husband and I would reflect upon Hebrews 11:8, where it says: 'By faith Abraham, when he was called, obeyed in going out . . . although not knowing where he was going.'"

The goals are another reason why Gilead graduation is different. To explain this, let us go back in history to Gilead's first graduation exercise. Note what Nathan H. Knorr, the first president of the school, said to those gathered:

"The men of this world, and their women and children, are storing up riches on this earth, trying to have a place of security insured to them. But do they really succeed? They can never be secure against the destruction unavoidably due to come upon the whole world. However, those who have entered into a covenant with God are storing up riches in heaven that will not rust or be destroyed. They have value with God, who is in heaven."

"So, then, the work that you Bible [school] graduates do in . . . proclaiming the Kingdom message . . . where witness-

Watchtower Bible School of Gilead

76th Class—March 1984



In the list below, rows are numbered from front to back and names are listed from left to right in each row.

- (1) Berglund, G.; Cortez, G.; Bartlett, B.; Wilson, M.; Vittum, Z.; Thompson, K.; Thompson, R. (2) Miranda, M.; McNeill, K.; Turincio, A.; Turincio, C.; Busciglio, T.; Donald, S.; Zubeck, M.; Meyer, D. (3) George, D.; Steinlein, A.; Thrasher, D.; Barreira, J.; George, C.; Etheridge, K.; Hackney, R. (4) Bartlett, K.; McKeel, S.; Cortez, E.; Donald, D.; Fleet, R.; Berglund, C.; Williams, C.; Gjessdal, S. (5) Meyer, R.; Chappell, B.; Nobiss, J.; Vittum, P.; Wilson, R.; Thrasher, R.; Zubeck, J.

In Our Next Issue

- *Your Worst Enemy—Is It You?*
- *“Don’t See the Wheelchair—See Me!”*
- *“Is My Child Hyperactive?”*

es have never gone before . . . is a vital work preliminary to the establishment of the [New Order] of righteousness.”

The goal of Gilead graduates is not material wealth or prestige through employment. Instead, they eagerly look forward to graduation as a means of satisfying their burning desire to preach the “good news” of God’s kingdom and to “make disciples of people of *all the nations*.” And their missionary assignment can reach into the new system of things where they can teach the “good news” to resurrected ones.—Mark 13:10; Matthew 28:19; John 5:28, 29.

Students of Gilead School do not become ordained ministers first upon graduating. They were ordained as ministers long before coming to Gilead. What N. H. Knorr told the first class, on its very first school day, still is true today. He said:

“It is NOT the purpose of this [school] to equip you to be ordained ministers. You are ministers already and have been active in the ministry for years. This is a requirement for entrance . . . The course of study at the [school] is for the exclusive purpose of preparing you to be more able ministers in the territories to which you go.”

Graduates of the 76th class have, on the average, been serving as ordained ministers for more than 12 years, with 8 of those years being spent in full-time service. Interestingly, 1 in 3 of the graduates, a total of 14, had served as full-time ministers at Bethel homes in Britain, Canada or the United States.

Sam Gjesdal, assigned to Brazil, pointed out a feature of Gilead School that made graduation especially meaningful. “Worldly colleges dish out information and you take what you can get,” he said, “but here they really care about you and they want to see that you do the best you can. They take a real interest in you.”

Even the graduation exercise was different. There was no noisy fanfare to inaugurate the program. There was no pompous procession led by solemn-faced college faculty heads. There was no one marching down the aisle of the Assembly Hall to blaring music. There was no one garbed in long black robes and square-topped, tasseled college hats. No, there was nothing here in evidence to glorify human creatures and their attainments. Instead, glory and thankfulness were centered on the One who made it all possible, Jehovah God. Gilead graduations are truly different.

Class Profile

● Total number of students	40
● Number of countries represented	6
● Number of countries assigned to	16
● Number of single brothers	12
● Number of single sisters	2
● Number of married couples	13
● Average age	30.6
● Average years baptized	12.5
● Average years in full-time service	8.3

From Our Readers

Adventism and Homosexuals

In your article "Many Religions—What Are Their Fruits?" (January 8, 1984), you quote from Newsweek that "over the last decade homosexual caucuses . . . have sprung up in main-line Protestant denominations and inspired similar organizations among . . . Seventh-day Adventists . . ." This implies that Adventists as a whole condone homosexuality. But active homosexuals cannot be baptized into the body. This sin is not tolerated.

R. & J. I., New York

The quotation we used did not say that the Seventh-day Adventists as an organized whole condone homosexuality, but only that some groups wanting recognition for such have made their appearance among Seventh-day Adventists. In a circular letter of April 23, 1981, from the Office of the President of the General Conference of Seventh-day Adventists, acknowledgement is made of the activity of homosexuals with Adventist connections. Ministers, teachers and other workers were advised not to meet with or work with such groups, though encouraged to extend a helping hand to individual homosexuals. Nothing is said about practicing homosexuals with Adventist connections being excommunicated for this practice.—ED.

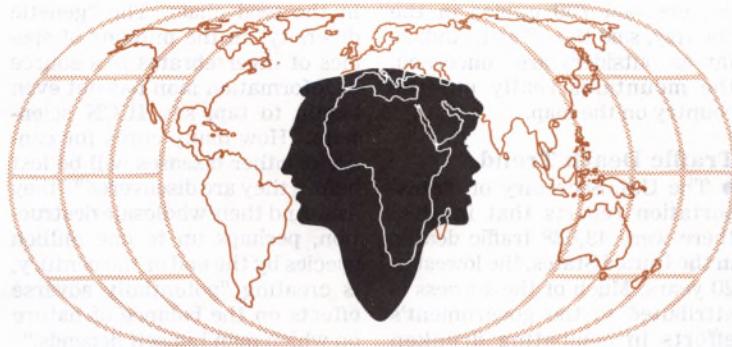
Saving Our Forests

Professional foresters largely deplore your article "Can Our Forests Be Saved?" (January 22, 1984) You allege ". . . just one chain of fast-food restaurants . . . uses up the equivalent of 315 square miles of forest annual-

ly." Instead, this should probably be interpreted that 315 square miles of forests would produce the required quantity each year on a sustained yield basis. Then you promote the popular misconception by saying that excessive destruction of the Amazon forest would "entail the irreversible destruction of an enormous source of oxygen . . ." Common sense tells us that in any mature forest (including the Amazon forest) decomposition consumes an amount of oxygen equal to that produced.

C. E. M., Oregon

The first statement, about the consumption of wood products by fast-food chains, is from the book "The Forest Killers" by Jack Shepherd, who is an environmentalist. However, a similar connection between fast-food stores and consumption of forests is made by Norman Myers for the Committee on Research Priorities in Tropical Biology of the National Research Council. As to the Amazon forest being a valuable oxygen source, this comment was made by Daniel Vidart, a Canadian university professor and UNESCO consultant. While this point might be debatable, and it may be that plant life in the sea plays the major role in supplying oxygen to the atmosphere, yet there seems to be very good reason to research this matter thoroughly before the world's major forests are destroyed. Our article showed that some outstanding conservation measures are being taken to halt the destruction of the world's forests, with many good examples from North America. But the main danger seems to be the devastation wreaked on tropical rain forests to supply the demands of developed lands.—ED.



Watching the World

Clergy Morals

● A two-year study by the Washington Association of Churches concludes that "church organizations are part of a 'conspiracy of silence' about ministers and pastoral counselors who have sex with their parishioners or clients," and that the problem is "more widespread than commonly believed," says *The Seattle Times*. While the majority of clerical personnel do not misuse their influence in this way, "some of them genuinely do believe that it's the best thing for their client or parishioner," said Marie Fortune, a member of the report committee. The study puts the blame on lack of proper training and standards. "In the seminary, we never talked about it," Fortune said. "We were not trained to deal with it as professionals, not given the sense that there was a standard of conduct for us as ministers that precluded sexual conduct with our parishioners." In some cases where such conduct was discovered, the minister was simply moved to another position, Fortune noted, but the matter "was never dealt with, or acknowledged, and the people in the place he was moved to were never told about it."

Acid Rain Costs

● "One inch of Portland stone eaten away from St. Paul's Cathedral, 4,000 biologically dead Swedish lakes, and more than £100 million of damage to Dutch historical archives." These are but a few of the devastating results of acid rain mentioned in a report by the Environment Committee of the European Parliament, according to *The Guardian*. Earlier, the committee had put the annual cost of acid-rain damage to the European Community at £33 to £44 billion. The new report concludes that those estimates "have been underplayed" because acid rain is "responsible for damage to nature" and "an equally heavy toll in socio-economic terms which cannot be quantified with accuracy." Calling acid rain "one of the greatest environmental problems of our time," the report points to power stations and automobiles as the chief source of pollutants, and "the mass of different laws and standards" as the major block to successful control.

Fetus' Musical Taste

● When earphones were placed on the belly of a pregnant mother, the fetus was observed to respond immediately to the lilting waltz "as if it wanted to get up

and dance," said Clifford Olds, a British researcher. But no such effect was observed when the earphones were placed over the mother's ears. Further investigation revealed that "different kinds of music evoke different patterns of heartbeat," reports *Science Digest*, "and the same music quickens the heart in some fetuses, slows it in others." Olds discovered this effect in one set of twins and he predicted that one would grow up to be an extrovert and the other an introvert. "Two years later, the twins' mother said he'd been right." Music also caused the fetus' heart to beat more regularly, and the researcher foresees that the method will be used "as a treatment for fetal distress."

Nuclear Power Slump

● The greatest concern in the field of nuclear power nowadays appears to be, not the threat of radiation leakage or environmental pollution, but whether the whole industry will survive. Technical and financial problems have closed a number of major nuclear plants in the United States and halted construction of others. Countries around the world likewise have cut back their plans for future development. As a result, "the global commitment to building nuclear plants has declined by 31,000 megawatts since 1978," reports *The New York Times*, and "most of the 20 to 30 plants not yet under construction or mothballed are candidates for cancellation." The future for nuclear power as an alternate source of energy appears dim indeed.

Chief Justice's Rap

● America's legal system "is too costly, too painful, too destructive, too inefficient for a truly civilized people," Chief Justice Warren Burger told members of the American Bar Association in his annual State of the Judiciary address. Factors contributing to

the high cost and low public esteem of the legal profession, according to Burger, include "absurd" and frivolous lawsuits to generate large fees, advertising tactics similar to those used for "other commodities, from mustard, cosmetics and laxatives to used cars," the lack of uniform disciplinary action against dishonest and unethical lawyers, and the rapid swelling of their ranks. "Any fair-minded examination of the whole picture today will reveal that what we have done falls short of what is needed," said the chief justice.

Suicide Cycle

● 'Monday blues' appears to be more than just a figure of speech. A study at the Harvard School of Public Health finds that suicide attempts are most likely to take place on Mondays and in the month of May. On the other hand, Saturdays and the month of December are the least likely time for suicides. The study, which analyzed 185,887 suicides, also finds that the monthly suicide rate reaches a peak on the fifth of each month except in the month of April when the peak occurs in the week before the 15th—the income-tax deadline. The researchers say the data "reveal a remarkable cyclic variation which has not previously been recognised."

Nepal's Natural Resource

● Mount Everest and other peaks of the Himalayas not only attract climbers from all over the world but also constitute an important source of income for Nepal. Last year, about 700 mountaineers came to Nepal and spent over 17 million rupees (\$1.125 million, U.S.), according to a Tourism Ministry official. The government also collected peak fees, which vary according to the height of the peak attempted, amounting to another one million rupees. These expeditions also provided employment for 6,000

porters and 700 guides in the country, said the official. And, as far as outsiders are concerned, the mountains really put the country on the map.

Traffic Death Trend

● The U.S. Secretary of Transportation reports that in 1983 there were 43,028 traffic deaths in the United States, the lowest in 20 years. Much of the success is attributed to the government's efforts in combating drunken driving, which accounts for about half of all traffic deaths, according to National Highway Traffic Safety Administration estimates. However, experts warn that the impact of such measures usually is short-lived. Studies of similar programs in Europe found that after initial successes, drunken driving returned to previous levels once the pressure of arrests tapered off. One official feels that the present level of enforcement is "pretty close to the ceiling of what we can accomplish," and he says, "We're talking about arresting only one of every 300 drunken drivers." Authorities agree that "to really solve the problem we're going to have to change the attitudes of this nation with respect to drunk driving," but they say that it may take years, perhaps generations.

Save the Bugs

● The International Union for the Conservation of Nature and Natural Resources, in its publication *The IUCN Invertebrate Red Data Book*, has earmarked 247 endangered species of beetles, snails, spiders, worms and the like for preservation, says *The Wall Street Journal*. But why them? Most people think of them only as pests, says the book, but "the many ways in which they are beneficial to man are rarely considered." For example, they pollinate plants, renew soil fertility, purify water, recycle nutrients and constitute an important link

in the food chain. The "genetic diversity" in the millions of species of invertebrates is a source of information man has not even begun to tap, say IUCN scientists. "How many cures for cancer or other diseases will be lost before they are discovered?" they ask. And their wholesale destruction, perhaps up to one million species by the end of the century, is creating "potentially adverse effects on the balance of nature on which man himself depends."

Bad Medicine

● "Exposure to drugs in our country is staggeringly high," says Hershel Jick of Boston University. About 75 million adult outpatients take one or more drugs once a week, reports *Science News*, and "the average hospital patient receives 9 or 10 drugs during his stay." The result? One of every 30 hospital admissions is due to bad reaction to some medicine, and about 30 percent of all hospital patients suffer at least one of such reactions during their stay, says the report.

Japanese Divorce

● While marriages in Japan dropped to an all-time low of 65 per 10,000 people last year, the divorce rate soared to 15 per 10,000, the second highest on record. The previous high of 15.3 was in 1899 under the social system of the Meiji period. The number one reason for divorce is "chemistry mismatch," says *Mainichi Daily News*. Other reasons given by men include: "Wives refused to live with in-law parents, wives' extramarital relations, and wives' poor relations with in-laws and kins," while those given by women include: "Brutality, husbands' extramarital relations, and that husbands refused to hand over living expenses." In Japan, about half the divorces are not contested and involve no monetary settlement.

Brazilian Defense

● "A jewel of defense"—that was how a leading jewelry store in Brazil last December advertised a line of diamond-studded handguns for women. Other ads offered pistols at \$65 to \$135 (U.S.) with the promise: "Feel more secure." In São Paulo, 40,000 handguns were sold legally in the first nine months of 1983, according to the State Security Department, and 7,000 illegal guns were confiscated, reports *The New York Times*. The brisk gun business, along with rising sales of locks, alarms, guard dogs and the hiring of bodyguards, are all the result of a wave of crime and violence that has struck fear into the hearts of the Brazilians. A Gallup survey found that in São Paulo, four of every ten were victimized at least once. Officials attribute the rising crime wave to

"the financial situation of people, lack of work and difficulty in surviving in general."

Costly Bullets

● Most people are troubled when they hear about the huge sums governments are spending on nuclear bombs and other modern weapons of war. But what about the cost of supplying the American soldiers with plain bullets for their M-16 rifles? Andy Rooney, columnist of New York's *Daily News*, reports that the Defense Department bought 613,700,000 rounds of M-16 ammunition in 1983 and ordered another 705,000,000 rounds for 1984. "Remember, that's without being at war," writes Rooney. "At half a dollar each shot, it comes to \$650,000,000 we've spent in bullets alone, not to kill anyone."

Amazing Brain

● In ten seconds the human brain with its one hundred billion nerve cells or neurons, is capable of processing ten million bits of data, says Professor Marco Trabucchi, director of the Institute of Pharmacology at the University of Brescia, at a conference in Milan. (In comparison, the five computers on board the space shuttle *Columbia* together perform only about 325,000 operations a second.) Equally amazing is the fact that in those ten seconds, all the ten million bits of information must be gathered and transmitted to the brain through the various organs of the body. The professor's figures show that over four million bits come from the eyes, five million from the skin, 300,000 from the ears and the remainder through smell and taste.

American Return

- In the second half of 1983, we saw a sharp increase in the number of members who returned to the Society after having left. This was due to the publication of "The Watchtower" magazine, which has been distributed to millions of people around the world. The magazine has been published since 1879 and is now available in over 100 countries.

"We have noticed a significant increase in the number of people who have returned to the Society," says a spokesman for the Society.

Costly Return

- More people are returning to the Society because they feel that the Society's message is important. They also feel that the Society's message is important because it is based on the principles of Christianity.

Billion-dollar Return

- "A billion-dollar return,"—that's what you get if you buy a thousand-dollar lottery ticket. That's what the Society is getting from its members. The Society's message is important because it is based on the principles of Christianity.