Awake!

January 22, 1990

FRAUD in Science

During this century, science has greatly increased our knowledge of the natural world around us. Its telescopes have revealed the awesome wonders of the starry heavens, just as its microscopes have disclosed the amazing complexities of molecules and atoms. The marvels of design in plants and animals, the wisdom reflected in our own fearfully and wonderfully made bodies —this knowledge also comes to us through the discoveries of hard-working scientists. We are not unappreciative.

But there is another side to science. Not all its practitioners measure up to the image of the objective, passionate pursuers of truth, regardless of where it might lead. There are too many scientists who select the material that supports their theory and discard what doesn't. They report studies they have never made and experiments they have never performed, and they fake what they cannot establish. They plagiarize the writings of fellow scientists. Many claim authorship of articles they have never worked on and maybe have never even seen!

Flagrant fraud may be rare, but some of the manipulating of data mentioned above is common. Even more common, however, are two additional kinds of fraud, both involving deceitful propaganda. The four articles that follow examine the problem.

FRAUD in Science

It Makes the Headlines

The image of scientists as invariably dedicated to truth has been tarnished, as these headlined items show.

"Ethics in Science"

"A fight is building in the U.S. House of Representatives over fraud, misconduct, and conflict of interest in science."—*Science,* July 7, 1989.

"Do Scientists Cheat?"

"After the initial inquiry by this [congressional] committee into this subject, the committee has had growing reason to believe that we are only seeing the tip of a very unfortunate, dangerous, and important iceberg."—*NOVA* broadcast on PBS (Public Broadcasting Service) on October 25, 1988.

"Two New Studies Ask Why Scientists Cheat"

"It was an innocent enough question: how do scientists behave when no one is looking? But it has produced an incendiary answer: not too well, reports a paper this month in the British journal *Nature."—Newsweek,* February 2, 1987.

"A Nation of Liars? Scientists Falsify Research"

"A study published last month accused 47 scientists at the Harvard and Emory University medical schools of producing misleading papers."—*U.S.News & World Report,* February 23, 1987.

"NIH Sees Plagiarism in Vision Paper"

"Panel says researcher took data from paper he peer-reviewed and used it for his own work; . . . NIH [National Institutes of Health] recommends debarment proceedings."—*Science,* July 14, 1989.

"'Permissive Behaviour' Breeds Fraud in the Laboratory"

"Biomedical scientists in America are performing sloppy and sometimes fraudulent research in an effort to publish more papers and make more money."—*New Scientist,* February 25, 1989.

"Researchers Roll Back the Frontiers of Fraud"

"Scientific fraud and carelessness among researchers could be

widespread, warns a study in last week's issue of *Nature.*"—*New Scientist,* January 22, 1987.

"Researcher Accused of Plagiarism Resigns"

"A biochemist accused of plagiarizing a National Academy of Sciences report for a book on nutrition and cancer resigned from his position at the Cleveland Clinic Foundation."—*Science,* September 4, 1987.

"The Pill: Professor's Safety Tests Were Faked"

"His deception puts a question mark over safety checks on pills being taken by up to 2 m[illion] women in Britain and 10 m[illion] worldwide." —*The Sunday Times,* September 28, 1986.

"Senior Drugs Researcher Resigns in Disgrace"

"He resigned last week after an independent committee of inquiry found him guilty of scientific fraud."—*New Scientist,* November 12, 1988.

"NIMH Finds a Case of 'Serious Misconduct'"

"A surprisingly long-running, flagrant and deliberate case of scientific fraud according to a draft report of an investigation conducted for the National Institute of Mental Health."—*Science,* March 27, 1987.

"Research 'Fraud' Puts Poison Into the Ivy League"

"A prominent Bostonian psychiatrist resigned as head of a mental hospital affiliated to Harvard University, following charges of plagiarism."—*New Scientist,* December 10, 1988.

"The Case of the 'Misplaced' Fossils"

"A prominent Australian scientist has examined two decades of work on ancient Himalayan geology and alleges it may be the greatest paleontological fraud of all time."—*Science,* April 21, 1989.

"Now It's the Journals' Turn on the Firing Line"

"[He was speaking] specifically about how poorly many [science] journals have handled scientific fraud. . . . The same message previously dispatched to other members of the scientific community has now been addressed to the journals: clean up your act or you may find legislators getting into it." —*The AAAS Observer,* July 7, 1989.

Awake!®

January 22, 1990
Vol. 71, No. 2

Average Printing: 11,930,000 ***Published in 55 Languages***

Printed in U.S.A.

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Unless otherwise indicated, *New World Translation of the Holy Scriptures* used.

FRAUD in Science

Why It's on the Increase

"THE competition is savage. Winners reap monumental rewards; losers face oblivion. It's an atmosphere in which an illicit shortcut is sometimes irresistible—not least because the Establishment is frequently squeamish about confronting wrongdoing." So opened the article "Publish or Perish—or Fake It" in *U.S.News & World Report.* To escape perishing, many scientific researchers are faking it.

The pressure on scientists to publish in scientific journals is overwhelming. The longer the list of published papers to the researcher's name, the better his chances for employment, promotion, tenure in a university, and government grants to finance his research. The federal government "controls the largest source of research funding, $5.6 [thousand million] a year from the National Institutes of Health."

Because "the scientific community shows little stomach for confronting its ethical dilemma," "has been strangely reluctant to probe too deeply for hard data about its ethical conduct," and "isn't keen about cleaning house or even looking closely for malfeasance," congressional committees have held hearings and considered legislation to do the job of policing for them. (*New Scientist; U.S.News & World*

WHY "AWAKE!" IS PUBLISHED

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

Most importantly, this magazine builds confidence in the Creator's promise of a peaceful and secure new world before the generation that saw the events of 1914 passes away.

Contents: Feature Articles

Also in This Issue

Report) This prospect wrings from scientists much wailing and gnashing of teeth. Yet, one science journal asks and answers the question: "Is the house of science clean and in order? The bit of evidence that reaches the public invites serious doubts."

Some researchers eliminate data that does not support what they want to prove (called cooking); report more tests or trials than were actually run (called trimming); appropriate for their own use data or ideas of other researchers (called plagiarism); and make up experiments or data they never performed or produced (called forging). A cartoon in a science journal poked fun at this last tactic, one scientist talking to another and saying of a third: 'He's published a lot since he took up that creative writing course.'

"What's the major product of scientific research these days? Answer: Paper," *U.S.News & World Report* said. "Hundreds of new journals are being founded each year to handle the flood of research papers cranked out by scientists who know that the road to academic success is a long list of articles to their credit." Quantity, not quality, is the goal. Forty thousand journals published yearly produce a million articles, and part of this flood "is symptomatic of fundamental ills, including a publish-or-perish ethic among researchers that is stronger now than ever and encourages shoddy, repetitive, useless or even fraudulent work."

A senior editor at *The Journal of the American Medical Association,* Dr. Drummond Rennie, commented on the lack of quality: "There seems to be no study too fragmented, no hypothesis too trivial, no literature citation too biased or too egotistical, no design too warped, no methodology too bungled, no presentation of results too inaccurate, too obscure, and too contradictory, no analysis too self-serving, no argument too circular, no conclusions too trifling or too unjustified, and no grammar and syntax too offensive for a paper to end up in print."

"Sixteen people all sign their name to a particular publication"

Making Mountains out of Molehills

The publish-or-perish syndrome has made many researchers very resourceful in nursing a modest output of published articles into phenomenal numbers. They write one article, then chop it up into four smaller ones—called salami slicing in the jargon of the profession. In this way, instead of a publication credit for one article, they have four articles added to their publications list. Then they may send the same article to several journals, and each time it is published, it is counted again. More often than not, one article may show several scientists as authors, and each author adds the article to his list of published articles. A two- or three-page article may show 6, 8, 10, 12, or more authors.

On the NOVA program entitled "Do Scientists Cheat?" telecast on October 25, 1988, one scientist commented on this practice: "People are trying to get their names attached to as many publications as they possibly can, so that very commonly now you find huge teams where 16 people all sign their name to a particular publication, which probably wasn't worth publishing in the first place. But this is part of a kind of rat race, a competitiveness, a vulgar quantitative counting mentality that is absolutely encouraged by the structure of science in the United States today." Some listed as coauthors may have had very little to do with the article, may not even have read it, yet add the article to their list of publications.

Such bloated lists influence the granting of research requests involving hundreds of thousands of dollars of public funds.

Peer Review, a Safeguard Against Fraud?

Editors of science journals often—but not always—submit papers to other scientists for review before publishing them. This practice, called peer review, theoretically weeds out erroneous and fraudulent articles. "Science is *self-correcting* in a way that no other field of intellectual endeavor can match," Isaac Asimov says. "Science is *self-policing* in a way that no other field is." He marveled that "scandal is so infrequent."

But many others do not share this view. Peer review is "a lousy way to detect fraud," said previously quoted Dr. Drummond Rennie. The *American Medical News* said: "Peer-reviewed journals, once regarded as almost infallible, have had to admit that they are incapable of eradicating fraud." "Peer review has been oversold," said a medical writer and columnist for *The New York Times.*

The journal *Science* reports that one researcher assigned to review another researcher's paper was charged with plagiarism. He "took data from paper he peer-reviewed and used it for his own work," according to the NIH (National Institutes of Health). Such conduct is a "violation of trust that is supposed to lie at the heart of the peer-review system," and in this particular case, the reviewer has been declared "ineligible for future federal funding."

"For high-octane gall in proclaiming its ethical purity, the scientific community has long been the runaway winner," said *New Scientist* magazine. The highly vaunted peer-review system that theoretically screens out all the cheats is felt by many to be a farce. "The reality," *New Scientist* said, "is that few scientific scoundrels are caught, but, when they are, they frequently turn out to have been running wild for years, publishing faked data in respectable journals, with no questions asked."

Previously, an official of the NIH said, as reported in *The New York Times:* "I think an age of innocence has ended. In the past people assumed that scientists didn't do this kind of thing. But people are beginning to realize that scientists are not morally superior to anybody else." The *Times* report added: "Although a few years ago it was rare for the National Institutes of Health to receive one complaint a year of alleged fraud, she said, there are now at least two serious allegations a month." *Science* magazine observed: "Scientists have repeatedly assured the public that fraud and misconduct in research are rare . . . And yet, significant cases seem to keep cropping up."

The chairman of one of the congressional investigating committees, John Dingell, at one time said to scientists: "I will tell you that I find your enforcement mechanisms are hopelessly inadequate and that rascality seems to be triumphing over virtue in many incidences in a fashion that I find totally unacceptable. I hope you do too."

The NOVA program on "Do Scientists Cheat?" concluded with this acknowledgment by one of the scientists present: "Skeletons have to come out of the closets, bureaucrats' careers have to be impaired if that's what it takes, and there's no alternative. This is ethically required, this is legally required, and it's certainly morally required."

"This is ethically required, this is legally required, and it's certainly morally required"

FRAUD in Science

A Greater Fraud

Fraud is defined as "an act of deceiving or misrepresenting." It is the "intentional perversion of truth in order to induce another to part with something of value." —*Webster's Ninth New Collegiate Dictionary.*

"EVOLUTION is a fact." This is the standard confession of faith that assures the scientific community of your orthodoxy. And for public consumption, the claim is often added: 'It has been proved so often that there is no longer a need to repeat the proof.' Very convenient, especially since the evolutionist has no proof to repeat. Yet, for years the statement has been made again and again, like some mystical chant: "Evolution is a fact."

In April last year, in a book review in *The New York Times Book Review* magazine, biologist Richard Dawkins wrote: "We are here talking about the fact of evolution itself, a fact that is proved utterly beyond reasonable doubt." He then said that to consider creation "in biology classes is about as sensible as to claim equal time for the flat-earth theory in astronomy classes. Or, as someone has pointed out, you might as well claim equal time in sex education classes for the stork theory. It is absolutely safe to say that if you meet somebody who claims not to believe in evolution, that person is ignorant, stupid or insane (or wicked, but I'd rather not consider that)."

Stephen Jay Gould wrote an essay on evolution in the January 1987 issue of the science magazine *Discover*. Intent on overkill, in this five-page article he proclaimed evolution to be a fact 12 times! Excerpts from the article follow:

Darwin's lifework was "establishing the fact of evolution." "The fact of evolution is as well established as anything in science (as secure as the revolution of the earth about the sun)." By the time of Darwin's death, "nearly all thinking people came to accept the fact of evolution." Gould spoke of it as "secure fact" and "the fact of

transmutation." "Evolution is also a fact of nature." "Evolution is as well established as any scientific fact." "Our confidence in the fact of evolution rests upon copious data." He speaks of biologists' agreement "about the fact of evolution." "Theologians haven't been troubled by the fact of evolution." "I know hundreds of scientists who share a conviction about the fact of evolution."

At one point in the article, Gould said: "I don't want to sound like a shrill dogmatist shouting 'rally round the flag boys,' but biologists have reached a consensus . . . about the fact of evolution." But really, does that not sound like "a shrill dogmatist shouting 'rally round the flag boys'"?

Molecular biologist Michael Denton referred to this glib talk about evolution's being a fact and dismissed it with these words: "Now of course such claims are simply nonsense." It's much more than nonsense. It's fraud. It deceives and misrepresents. It perverts the truth to induce another to part with something of value. Newspapers, radio, TV, nature series, science programs, schoolbooks from second grade on—all drum this evolution-is-a-fact litany into the public mind. Recently, however, *The New York Times* reported that California's school board has issued guidelines for science textbooks that apparently de-emphasize teaching evolution as a fact.—November 10, 1989.

It copies the tactics of the chief priests and the Pharisees of Jesus' day. When officers sent out to arrest Jesus came back without him, the Pharisees demanded: "'Why is it you did not bring him in?' The officers replied: 'Never has another man spoken like this.' In turn the Pharisees answered: 'You have not been misled also, have you? Not one of the rulers or of the Pharisees has put faith in him, has he? But this crowd that does not know the Law are accursed people.'" (John 7:45-49) The tyranny of authority: 'None of the important people, none of the educated people, accept Jesus as Messiah. Only the stupid accursed ones do.'

Evolutionists today use the same Pharisaic approach: 'Believe as we do,' they say. 'All competent scientists believe evolution. All intelligent people believe it. Only the uneducated and the ignorant don't believe it.' By such intimidation and mental bullying, masses of people are herded into the evolutionists' camp. They know nothing of the weaknesses and inadequacies of evolutionary theory or its unsound speculations and hypothesized impossibilities—such as the origin of life from inanimate chemicals.* So they are swept along by the repetitious mantras recited by evolution's propagandizers. The theory becomes dogma, its preachers become arrogant, and

* See *Life—How Did It Get Here? By Evolution or by Creation?*, chapter 4, published by the Watchtower Bible and Tract Society of New York, Inc.

"Propaganda will not lead to success unless a fundamental principle is considered with continually sharp attention: it has to confine itself to little and to repeat this eternally. Here, too, persistency, as in so many other things in this world, is the first and the most important condition for success. . . . The masses . . . will lend their memories only to the thousandfold repetition of the most simple ideas. A change must never alter the content of what is being brought forth by propaganda, but in the end it always has to say the same. Thus the slogan has to be illuminated from various sides, but the end of every reflection has always and again to be the slogan itself."—*Mein Kampf*, by Adolf Hitler.

dissenters reap disdainful abuse. The tactics work. They did in Jesus' day; they do today.

This four-word propaganda line, 'Evolution is a fact,' is little (little in content), is a simple sentence (easily said), and is repeated persistently (even 12 times in one short essay). It qualifies as effective brainwashing propaganda, and with repetition it reaches the status of a slogan—and slogans everywhere repeated are soon programmed into brains and tripped off tongues with little critical examination or skeptical dissection. Once a theory has been sloganized into community thinking, it no longer requires proof, and any who dissent are scorned. If such dissenters present rational refutation of the slogan's validity, they are especially irritating and subjected to the only available response, namely, ridicule.

Evolutionists that specialize in the Big Lie that 'Evolution is a fact' also take another leaf out of Hitler's book, for in it he said of the masses he controlled: "With the primitive simplicity of their minds they will more easily fall victims to a great lie than to a small one, since they themselves perhaps also lie sometimes in little things, but would certainly still be too much ashamed of too great lies." A book of popular quotations lists this one among them: "If you tell a big enough lie and tell it often enough, many will believe it." The one evolutionists tell is apparently big enough, and it's certainly told often enough, for millions believe it.

It is a lie that is also a fraud because it is "an act of deceiving or misrepresenting," an "intentional perversion of truth in order to induce another to part with something of value." Teaching that man's ancestors are animals, starting with some microbe and ending with some ape, evolutionists have "exchanged the truth of God for the lie." By this lie, they induce many to part with something of great value—their faith in God as their Creator. —Romans 1:25.

This fraud does terrible damage. Its victims feel freed from the Creator's laws, and they become a law to themselves: 'No right or wrong. Fulfill all fleshly desires. Do your own thing. No need for any guilt trips.' Enter the moral breakdown, unrestrained and full-blown. Parted from their Creator and the true values of the Bible, they become spiritually impoverished and end up "like unreasoning animals born naturally to be caught and destroyed."—2 Peter 2:12.

The Big-Lie Propaganda

"As to the fact of evolution there is universal assent."—*Limitations of Science,* 1933.

"Evolution as a historical fact was proved beyond reasonable doubt not later than in the closing decades of the nineteenth century."—*The Biological Basis of Human Freedom,* 1956.

"The evolution of life is no longer a theory. It is a fact."—Julian Huxley, 1959.

"All reputable biologists have agreed that the evolution of life on the earth is an established fact."—*Biology for You,* 1963.

"Anyone who is exposed to the evidence supporting evolution must recognize it as an historical fact."—The New Orleans *Times-Picayune,* 1964.

"Today, the theory of evolution is an accepted fact for everyone but a fundamentalist minority."—James D. Watson, 1965.

"Evolution has, by now, the status of fact."—*Science on Trial,* 1983.

"What we do have is incontrovertible proof of the fact of evolution."—Ashley Montagu, 1984.

FRAUD in Science

The Greatest Fraud of All

Evolutionists say: 'Evolution is a fact; God is a myth.' They have proof for neither, but prejudice needs no proof.

PRIVATE PROPERTY. Keep Out. This Means You, God! Evolutionists post the subject of biology and tell God to stay out of it. 'All *competent* scientists believe evolution,' they say. Which also says, in effect: 'Scientists who do not believe are incompetent; they lack *our* expertise.' As for God, they say he has no place in scientific thinking. Moreover, even his existence is not provable.

This glib dismissal of God is the greatest fraud of all.

The New Biology, by Robert Augros and George Stanciu, highlights on page 188 some of the statements of prominent scientists who brush God aside: "The common opinion holds that Darwin rid biology of the need for God once and for all. Eldredge says, Darwin 'taught us that we can understand life's history in purely naturalistic terms, without recourse to the supernatural or divine.' Julian Huxley said: 'Darwinism removed the whole idea of God as a creator of organisms from the sphere of rational discussion.' Jacob writes: 'The idea that each species was separately designed by a Creator, was demolished by Darwin.' And Simpson writes of the origin of the first organism: 'There is, at any rate, no reason to postulate a miracle. Nor is it necessary to suppose that the origin of the new processes of reproduction and mutation was anything but materialistic.'"

'But does not this leave life on earth without a Creator-Designer?' you ask. 'None needed,' evolutionists answer. 'It is in the lap of chance. Blind chance is the designer. We call it Natural Selection.'

But the more we learn, the more design we see. The input of intelligence and wisdom is staggering. Is it not too much for blind, unthinking, brainless chance to handle? Consider just a few of the hundreds of devices in nature that reflect creative wisdom—which human inventors have frequently copied.

The aerodynamics of the wings of birds preceded by millenniums the inferior design found in the wings of planes. The chambered nautilus and the cuttlefish use flotation tanks to maintain buoyancy at whatever depth they swim, much more efficiently than modern submarines do. The octopus and the squid are masters of jet propulsion. Bats and dolphins are experts with sonar. Several reptiles and seabirds have their own built-in "desalination plants" that enable them to drink seawater. Some microscopic bacteria have rotary motors that they can run forward and in reverse.

By ingeniously designed nests and by their use of water, termites air-condition their homes. Insects, microscopic plants, fish, and trees use their own form of "antifreeze." Small fractions of degrees of temperature change are sensed by the built-in thermometers of some snakes, mosquitoes, mallee birds, and brush turkeys. Hornets, wasps, and yellow jackets make paper. Sponges, fungi, bacteria, glowworms, insects, fish—all produce cold light, often in color. Many migrating birds apparently have in their heads compasses, maps, and biological clocks. Water beetles and spiders use scuba gear and diving bells.*—See illustrations on page 15.

To come up with all this design and instinctive wisdom demands an intelligence far beyond man's. (Proverbs 30:24) But some of the most amazing examples are to be found in the world of the infinitely small—where evolutionists hoped to see the simple beginning of life to start evolution on its upward climb to the obviously complex designs everywhere —including us. Simple beginning? No such thing! Consider the complexities reflecting intelligent design in the tiniest cells.

The New Biology says on page 30: "The average cell carries out hundreds of chemical

All this design and instinctive wisdom demands an intelligence

reactions every second and can reproduce itself every twenty minutes or so. Yet all this occurs on such a tiny scale: over 500 bacteria could fit into the area occupied by the period at the end of this sentence. [Biologist François] Jacob marvels at the minute laboratory of the bacterial cell, which 'carries out some two thousand distinct reactions with incomparable skill, in the smallest space imaginable. These two thousand reactions diverge and converge at top speed, without ever becoming tangled.'"

The Center of Life—A Natural History of the Cell, by L. L. Larison Cudmore, says on pages 13, 14: "Just a single cell could make weapons, catch food, digest it, get rid of wastes, move around, build houses, engage in sexual activity straightforward or bizarre. These creatures are still around. The protists —organisms complete and entire, yet made up of just a single cell with many talents, but with no tissues, no organs, no hearts and no minds—really have everything we've got."

The Blind Watchmaker, by Richard Dawkins, on page 116 comments on the amount of information stored in a single cell: "There is enough storage capacity in the DNA of a single lily seed or a single salamander sperm to store the *Encyclopædia Britannica* 60 times over. Some species of the unjustly called 'primitive' amoebas have as much information in their DNA as 1,000 *Encyclopædia Britannicas.*"

Molecular biologist Michael Denton writes in *Evolution: A Theory in Crisis,* page 250: "Molecular biology has shown that even the

* See chapter 12 of *Life—How Did It Get Here? By Evolution or by Creation?,* published by the Watchtower Bible and Tract Society of New York, Inc.

simplest of all living systems on earth today, bacterial cells, are exceedingly complex objects. Although the tiniest bacterial cells are incredibly small, weighing less than [one trillionth of a gram], each is in effect a veritable micro-miniaturized factory containing thousands of exquisitely designed pieces of intricate molecular machinery, made up altogether of one hundred thousand million atoms, far more complicated than any machine built by man and absolutely without parallel in the non-living world.

"Molecular biology has also shown that the basic design of the cell system is essentially the same in all living systems on earth from bacteria to mammals. In all organisms the roles of DNA, mRNA and protein are identical. The meaning of the genetic code is also virtually identical in all cells. The size, structure and component design of the protein synthetic machinery is practically the same in all cells. In terms of their basic biochemical design, therefore no living system can be thought of as being primitive or ancestral with respect to any other system, nor is there the slightest empirical hint of an evolutionary sequence among all the incredibly diverse cells on earth."

George Greenstein acknowledges all this intelligence involved in the earth's structure. In his book *The Symbiotic Universe,* he speaks of the mysterious and incredible series of coincidences that are beyond explaining, coincidences without which life on earth would be impossible. The following statements, appearing throughout pages 21-8, reflect his agonizing over conditions that bespeak the need for an intelligent and purposeful God:

"I believe that we are faced with a mystery —a great and profound mystery, and one of immense significance: the mystery of the habitability of the cosmos, of the fitness of the environment." He sets out "to detail what can only seem to be an astonishing sequence of stupendous and unlikely accidents that paved the way for life's emergence.* There is a list of coincidences, all of them essential to our existence." Yet "the list kept getting longer . . . So many coincidences! The more I read, the more I became convinced that such 'coincidences' could hardly have happened by chance." A shattering fact for an evolutionist to face up to, as he next acknowledges:

"But as this conviction grew, something else grew as well. Even now it is difficult to express this 'something' in words. It was an intense revulsion, and at times it was almost physical in nature. I would positively squirm with discomfort. The very thought that the fitness of the cosmos for life might be a mystery requiring solution struck me as ludicrous, absurd. I found it difficult to entertain the notion without grimacing in disgust . . . Nor has this reaction faded over the years: I have had to struggle against it incessantly during the writing of this book. I am sure that the same reaction is at work within every other scientist, and that it is this which accounts for the widespread indifference accorded the idea at present. And more than that: I now believe that what appears as indifference in fact masks an intense antagonism."

What antagonism? Antagonism to the thought that the explanation might lie in a purposeful Creator. As Greenstein expresses

A bacterial cell has one hundred thousand million atoms

* Distances between stars; resonance of subatomic particles and atoms to form carbon; equal and opposite charges of electron and proton; unique and anomalous properties of water; frequencies of sunlight and absorption frequencies required for photosynthesis; the separation between sun and earth; three dimensions of space, no more, no less; and others.

it: "As we survey all the evidence, the thought insistently arises that some supernatural agency—or, rather, Agency—must be involved. Is it possible that suddenly, without intending to, we have stumbled upon scientific proof of the existence of a Supreme Being? Was it God who stepped in and so providentially drafted the cosmos for our benefit?" But Greenstein recovers from such heretical thinking and reasserts his orthodoxy to the evolutionary religion, reciting one of their creedal dogmas: "God is not an explanation."

Astrophysicist Fred Hoyle in his book *The Intelligent Universe,* on page 9, talks about those, like Greenstein, who fear God's entering the picture: "Orthodox scientists are more concerned with preventing a return to the religious excesses of the past than in looking forward to the truth [and this concern] has dominated scientific thought throughout the past century."

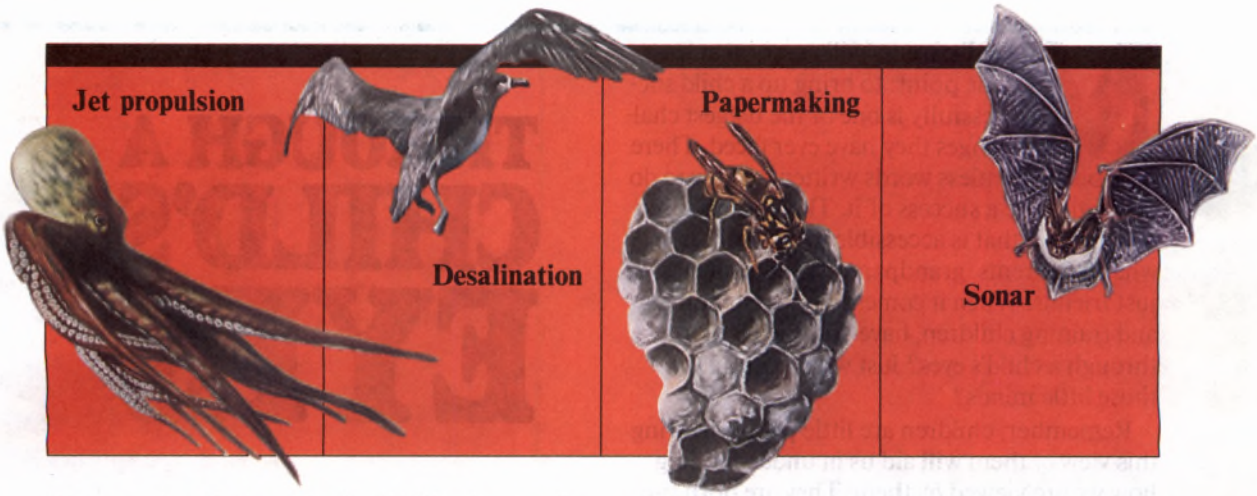
In his book he then discusses these same mysterious features that trouble Greenstein. "Such properties," he says, "seem to run through the fabric of the natural world like a thread of happy accidents. But there are so many of these odd coincidences essential to life that some explanation seems required to account for them." Both Hoyle and Greenstein say chance cannot explain these many "accidental coincidences." Hoyle then says that to account for them, 'the origin of the universe requires an intelligence,' an 'intelligence on a higher plane,' 'an intelligence that preceded us and that led to a deliberate act of creation of structures suitable for life.'

None of this is to be taken as saying that Hoyle is thinking of the God of the Bible, but he does see that behind the universe and the earth and life on it, there must be a tremendous supernatural intelligence. While he does say that "'God' is a forbidden word in science," he allows that we might "define an intelligence superior to ourselves as a deity." He speculates that "through our own minds' pre-programmed condition," there might be "a connecting chain of intelligence, extending downward . . . to humans upon the Earth."

"There are plenty of indications," he says, "that this might be so. The restlessness within us is one such hint. It is as if we have an instinctive perception that there is something important for us to carry out. The restlessness comes because we have not been able to discover as yet exactly what its nature is." Elsewhere he says: "The religious impulse appears to be unique to man . . . Stripped of the many fanciful adornments with which religion has become traditionally surrounded, does it not amount to an instruction within us that expressed rather simply might read as follows: You are derived from something 'out there' in the sky. Seek it, and you will find much more than you expect."

Man is groping. What he gropes for without realizing it is the Biblical truth that we are created in the image and likeness of God, meaning we have a measure of such attributes of God as wisdom, love, power, justice, purpose, and other qualities that account for the great gulf between people and animals. Our minds are preprogrammed for such divine attributes and for the true worship of God. Until these several attributes are in proper balance and a connection is made with God through prayer and his true worship, the restlessness will remain. When these spiritual needs we were created with are fulfilled, the restlessness will give way to "the peace of God

'The origin of the universe requires an intelligence'



that excels all thought."—Philippians 4:7; Genesis 1:26-28.

Acts 17:27, 28 recommends this groping, namely, "for them to seek God, if they might grope for him and really find him, although, in fact, he is not far off from each one of us. For by him we have life and move and exist." It is by him, the Creator of the universe, including earth and us upon it, that we live and move and exist. Shedding the adornments and false doctrines of orthodox religions—which religions have turned millions away from God, including many scientists—and following the true worship of Jehovah God, we will gain life everlasting in a paradise earth, which was Jehovah's purpose in creating the earth in the first place.—Genesis 2:15; Isaiah 45:18; Luke 23:43; John 17:3.

It takes tremendous credulity to think that intelligence of this magnitude resides in blind, brainless chance. It is a faith comparable to that of the pagan religionists of the prophet Isaiah's time: "But you men are those leaving Jehovah, those forgetting my holy mountain, those setting in order a table for the god of Good Luck and those filling up mixed wine for the god of Destiny." (Isaiah 65:11) Evolutionists look to millions of "lucky" chances to produce man from rock, but they haven't got off the ground to reach the first rung of their evolutionary ladder. Their "god of Good Luck" is a bruised reed.

Fred Hoyle feels an ominous foreboding in all of this: "Another point nagging me is a conviction that the window of opportunity for the human species may be very narrow in time. High technology is necessary to open the window, but high technology on its own, without establishing a relation between our species to the world outside the Earth, may well be a path to self-destruction. If on occasions in this book my opposition to the Darwinian theory has seemed fierce, it is because of my feeling that a society oriented by that theory is very likely set upon a self-destruct course."

Alice, in the tale *Through the Looking-Glass,* incredulous at the strange logic of the White Queen, could only laugh. "There's no use trying," she said. "One can't believe impossible things." The queen responded: "I dare say you haven't had much practice. When I was your age I did it for half an hour a day. Why sometimes I've believed as many as six impossible things before breakfast."

Evolutionists are the White Queens of today. They have had infinite practice in believing impossible things.

THROUGH A CHILD'S EYES

MOST parents will agree on at least one point: to bring up a child successfully is one of the biggest challenges they have ever faced. There have been countless words written on how to do this and make a success of it. There is, however, one method that is accessible to all adults, whether parents, grandparents, aunts, uncles, or just friends. When it comes to understanding and training children, have you tried looking through a child's eyes? Just what goes on in those little minds?

Remember, children are little people. Having this view *of* them will aid us in understanding how we are viewed *by* them. They are born tiny into a world of people who loom larger in size, authority, and power. To a toddler, adults can either represent protection, comfort, and help or be a bullying threat.

They Are Not Little Adults

Another important point of insight is to be careful not to make the mistake of treating them as little adults. Childhood should be one of the happiest times of life. There is no need to rush them through it or cause them to miss it altogether. Let them enjoy it. As a parent, you can take the opportunity to build in them the moral principles needed to become, in time, well-adjusted adults.

When dealing with infants, viewing things through a child's eyes does not lose its value. For example, crying should never be an invitation for beatings by frustrated parents. Crying or whimpering is the natural way for the newborn baby to express its needs. After the child comes out from the safekeeping of its mother's womb, it is able to make its viewpoint quite vocal by a hearty cry!

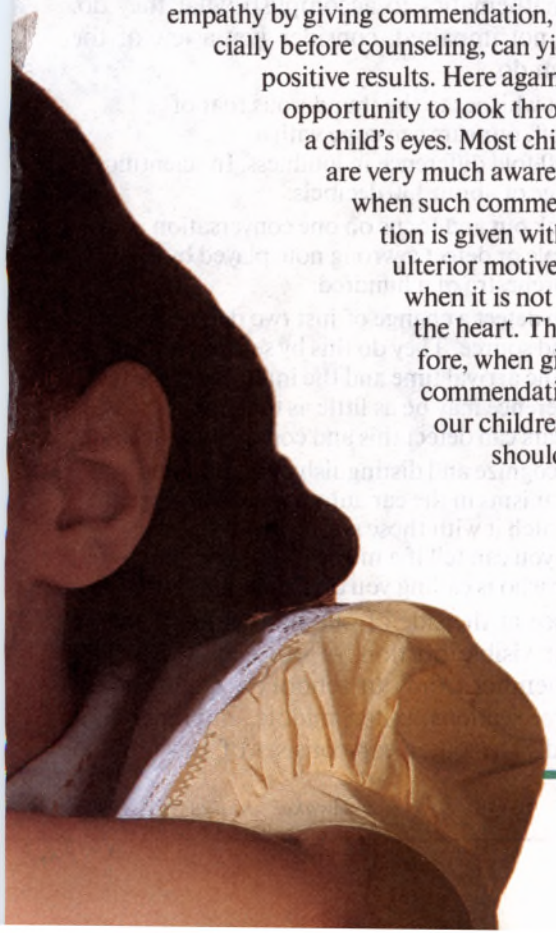
Encourage and Guide Rather Than Demand

It is good to encourage children's efforts to express themselves. Their point of view may reveal problems, and a problem clearly un-

derstood is much easier to solve. But how we respond to their utterances is as important as getting them to express themselves. Wendy Schuman, associate editor of *Parents* magazine, offers advice on how we should try to talk to children: "Putting empathy into words . . . is the central concept underlying much of the recent work in parent-child communications. But empathy itself is not enough if it isn't translated into empathetic language. And this does not come naturally to the lips of most parents."

In other words, if a child is disrespectful or has done something shocking, needing correction, we should try hard not to let our attitude and tone of voice match our annoyance or frustration. Of course, this is much easier said than done. But remember, harsh or belittling replies, such as, "Stupid" or, "Can't you do anything right?" never improve an already difficult situation.

Many parents have found that extending empathy by giving commendation, especially before counseling, can yield positive results. Here again is an opportunity to look through a child's eyes. Most children are very much aware when such commendation is given with an ulterior motive or when it is not from the heart. Therefore, when giving commendation to our children, we should make sure that the praise is genuine and deserved.



Noted child psychologist Dr. Haim G. Ginott, in his book *Between Parent and Child,* emphasizes that parents should praise accomplishments rather than personality. For example, after your son builds a bookcase and proudly shows it to you, your comment, 'That bookcase is not only attractive but also practical,' will build his confidence. Why? Because you are praising his accomplishment. Hence, your praise is realistic to your child. However, the expression, 'You are a good carpenter,' may not be, since you are focusing on him as a person.

Dr. Ginott observes: "Most people believe that praise builds up a child's confidence and makes him feel secure. In actuality, praise may result in tension and misbehaviour . . . When parents tell a child, 'You are such a good boy,' he may not be able to accept it because his own picture of himself is quite different . . . Praise should deal, not with the child's personality attributes, but with his efforts and achievements . . . Praise has two parts: our words and the child's inferences. Our words should state clearly that we appreciate the child's effort, work, achievement, help, consideration."

This sound suggestion for commendation is in harmony with the inspired advice to show generosity, as found at Proverbs 3:27: "Do not withhold good from those who deserve it, when it is in your power to act."—*New International Version.*

In truth it can be said that no matter what good advice or wise counsel we read, there is no shortcut to what some have called the 20-year program of bringing up a son or a daughter. It requires patience, love, understanding, and consideration. But a great help toward success is to learn to see and understand the behavior of your young one "through a child's eyes."

"A wise son is the one that makes a father rejoice," wrote wise King Solomon. (Proverbs 10:1) May a better understanding of your child's way of thinking and point of view assist you in achieving this same joyful experience.

YOU can close your eyes when you do not want to see. You can hold your breath when you do not want to smell. But you cannot really shut down your ears when you do not want to hear. The saying "to turn a deaf ear" is only a metaphor. Your hearing, like your heartbeat, goes on working even when you sleep.

Indeed, our ears are working all the time to keep us in touch with the world around us. They select, analyze, and

YOUR EAR

The Great Communicator

decipher what we hear and communicate it to the brain. Within the confines of about one cubic inch, our ears utilize principles of acoustics, mechanics, hydraulics, electronics, and higher mathematics to accomplish what they do. If our hearing is not impaired, consider just a few of the things the ears can do.

□ From the softest whisper to the thunderous roar of a jet plane taking off, our ears can cope with a 10,000,000,000,000-fold difference in loudness. In scientific terms, this is a range of about 130 decibels.

□ Our ears can pick out and focus on one conversation across a room full of people or detect a wrong note played by one instrument in an orchestra of a hundred.

□ Human ears can detect a change of just two degrees in the direction of a sound source. They do this by sensing the minute difference in the arrival time and the intensity at the two ears. The time difference may be as little as ten millionths of a second, but the ears can detect this and convey it to the brain.

□ Our ears can recognize and distinguish between some 400,000 sounds. Mechanisms in the ear automatically analyze the sound wave and match it with those stored in our memory bank. That is how you can tell if a musical note is played by a violin or a flute, or who is calling you on the phone.

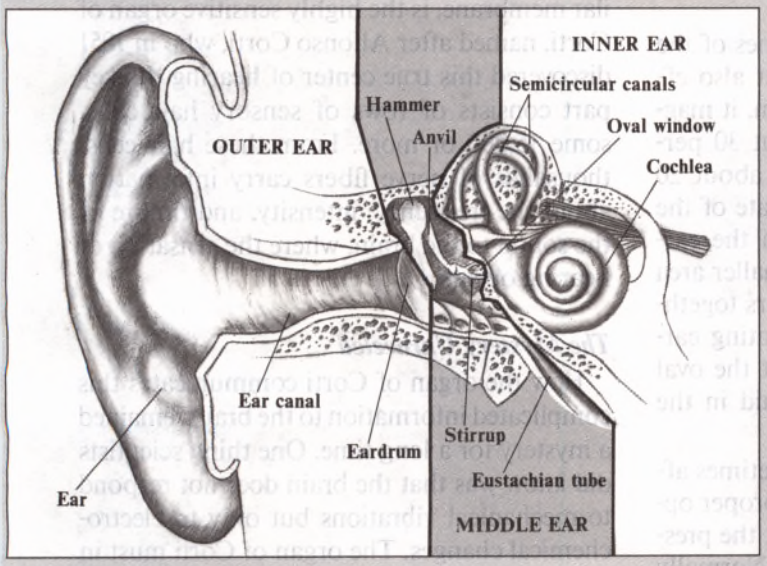
The "ear" we see at the side of our head is really only a portion, the most visible portion, of our ear. Most of us probably still remember from our school days that the ear is made up of three sections: outer, middle, and inner ears, as they are called. The outer ear consists of the familiar

"ear" of skin and cartilage and the ear canal leading inward to the eardrum. In the middle ear, the three smallest bones in the human body—the malleus, incus, and stapes, commonly called hammer, anvil, and stirrup—form a bridge linking the eardrum with the oval window, the portal to the inner ear. And the inner ear is made up of two strange-looking parts: the cluster of three semicircular canals and the snail-shaped cochlea.

Outer Ear—The Tuned Receiver

Obviously, the external ear serves to collect sound waves in the air and channel them to the inner parts of the ear. But it does much more than that.

Have you ever wondered if the convoluted shape of the external ear serves any specific purpose? Scientists find that the cavity at the center of the external ear and the ear



canal are so shaped that they enhance sounds, or resonate, within a certain frequency range. How does that benefit us? It so happens that most of the important characteristics of human speech sounds fall in about the same range.* As these sounds travel through the external ear and the ear canal, they are boosted to about twice their original intensity. This is acoustical engineering of the highest order!

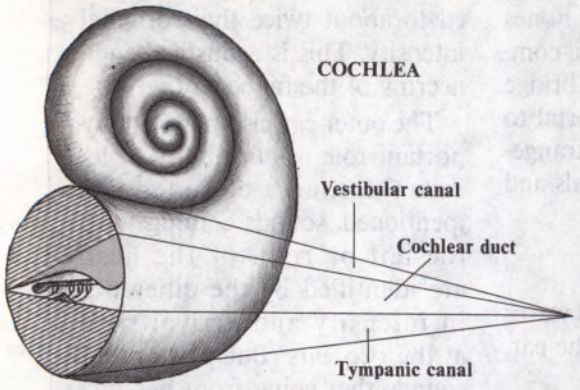
The outer ear also plays an important role in our ability to locate the source of sound. As mentioned, sounds coming from the left or right of the head are identified by the difference in intensity and arrival time at the two ears. But what about sounds that come from behind? Again, the shape of the ear comes into play. The edge of our ear is shaped in such a way that it interacts with sounds coming from behind, causing a loss in the 3,000- to 6,000-Hz range. This alters the character of the sound, and the brain interprets it as coming from behind. Sounds from above the head are also altered but in a different frequency band.

Middle Ear—A Mechanic's Dream

The job of the middle ear is to transform the acoustical vibration of the sound wave into mechanical vibration and pass it on to the inner ear. What takes place in this pea-sized chamber is truly a mechanic's dream.

Contrary to the notion that loud sounds cause significant movement of the eardrum, sound waves actually do so by only microscopic amounts. Such minuscule movement is hardly enough to cause the fluid-filled inner ear to react. The way this obstacle is

* Most of the distinguishing features of human speech sounds fall in the range of from 2,000 to 5,000 Hz (cycles per second), and these are approximately the frequencies at which the ear canal and the central cavity of the external ear resonate.



Schematic shows the three ducts unrolled

overcome demonstrates once again the ingenious design of the ear.

The linkage of the three little bones of the middle ear is not only sensitive but also efficient. Functioning as a lever system, it magnifies any incoming forces by about 30 percent. Furthermore, the eardrum is about 20 times larger in area than the footplate of the stirrup. Thus, the force exerted on the eardrum is concentrated on a much smaller area at the oval window. These two factors together amplify the pressure at the vibrating eardrum to 25 to 30 times as much at the oval window, just enough to set the fluid in the cochlea in motion.

Do you find that a head cold sometimes affects your hearing? This is because proper operation of the eardrum requires that the pressure on either side of it be equal. Normally this is maintained by a small vent, called the Eustachian tube, that connects the middle ear with the back of the nasal passage. This tube opens every time we swallow and relieves any pressure build-up in the middle ear.

Inner Ear—The Business End of the Ear

From the oval window, we come to the inner ear. The three mutually perpendicular loops, called the semicircular canals, enable us to maintain balance and coordination. It is in the cochlea, however, that the business of hearing really begins.

The cochlea (from Greek *ko-khli'as,* snail) is basically a bundle of three fluid-filled ducts, or canals, coiled up in a spiral like the shell of a snail. Two of the ducts are connected at the apex of the spiral. When the oval window, at the base of the spiral, is set in motion by the stirrup, it moves in and out like a piston, setting up hydraulic pressure waves in the fluid. As these waves travel to and from the apex, they cause the walls separating the ducts to undulate.

Along one of these walls, known as the basilar membrane, is the highly sensitive organ of Corti, named after Alfonso Corti, who in 1851 discovered this true center of hearing. Its key part consists of rows of sensory hair cells, some 15,000 or more. From these hair cells, thousands of nerve fibers carry information about the frequency, intensity, and timbre of the sound to the brain, where the sensation of hearing occurs.

The Mystery Unraveled

How the organ of Corti communicates this complicated information to the brain remained a mystery for a long time. One thing scientists did know was that the brain does not respond to mechanical vibrations but only to electrochemical changes. The organ of Corti must in some way convert the undulating movement of the basilar membrane into matching electrical impulses and send these to the brain.

It took the Hungarian scientist Georg von Békésy some 25 years to unravel the mystery of this tiny organ. One thing he discovered was that as the hydraulic pressure waves travel along the ducts in the cochlea, they reach a peak somewhere along the way and push on

the basilar membrane. Waves generated by high-frequency sounds push on the membrane near the base of the cochlea, and waves from low-frequency sounds push on the membrane near the apex. Thus, Békésy concluded that sound of a specific frequency produces waves that flex the basilar membrane at a specific spot, causing the hair cells there to react and send signals to the brain. The location of hair cells would correspond to the frequency, and the number of hair cells triggered would correspond to the intensity.

This explanation holds good for simple tones. Sounds occurring in nature, however, are rarely simple. A bullfrog's croak sounds quite different from a drumbeat even though they may be of the same frequency. This is because each sound is made up of a fundamental tone and many overtones. The number of overtones and their relative strength give each sound its distinctive timbre, or character. This is how we recognize the sounds we hear.

The basilar membrane can respond to all the overtones of a sound simultaneously and detect how many and what overtones are present, thus identifying the sound. Mathematicians call this process Fourier analysis, naming it after the brilliant 19th-century French mathematician Jean-Baptiste-Joseph Fourier. Yet, the ear has been using this advanced mathematical technique all along to analyze the sounds heard and communicate the information to the brain.

Even now, scientists are still not sure what sort of signals the inner ear sends to the brain. Investigations reveal that the signals sent by all the hair cells are about the same in duration and strength. Thus, scientists believe that it is not the content of the signals but the simple signals themselves that convey a message to the brain.

To appreciate the significance of this, recall the children's game in which a story is relayed from one child to another down the line. What the child at the other end hears often bears no resemblance to the original. If a code, such as a number, is passed along instead of the complicated story, it will likely not be distorted. And that, apparently, is what the inner ear does.

Interestingly, a technique used in today's advanced communications systems, called pulse code modulation, works on the same principle. Rather than sending the details of an event, a code representing that event is sent. This was the way pictures of Mars were sent to earth, in binary bits, or the way sounds may be converted into bits for recording and playback. But, again, the ear had it first!

A Masterpiece of Creation

Our ears may not be the most acute or most sensitive among ears, but they are eminently suited to fulfill one of our greatest needs—the need to communicate. They are designed to respond especially well to the characteristics of human speech sounds. Infants need to hear the sound of their mother's voice to grow properly. And as they grow, they need to hear the sounds of other humans if they are to develop their faculties of speech. Their ears allow them to discern the subtle tonal inflections of each language so precisely that they grow up speaking it as only a native can.

All of this is not the result of blind evolution. Rather, we owe our marvelous apparatus of hearing to our loving Creator, Jehovah. (Proverbs 20:12) Our ears are truly masterpieces of creation and expressions of the wisdom and love of our Maker. By means of them we are able to communicate with our fellow human beings. But above all, let us use them to listen to wisdom from God's Word, so that we may learn from our heavenly Father, Jehovah God.

What Is Happening to My Body?

WONDERFUL changes have begun taking place in your body.

Right now, though, they may seem anything but wonderful. You may feel confused, embarrassed, or even terrified by what is happening to you. "I just wasn't ready," said one girl. "I thought, Oh, no, I don't want this to start happening to me yet." Said one boy: "I don't know whether I'm weird or normal. I'm 13 and changes are happening in my body . . . I feel really different and alone sometimes and I'm really scared that someone is going to make fun of me."

It is understandable that you might feel similarly. You are going through what one teenage girl described as the time her "body started to go crazy." But what may seem "crazy" at the time is really an orderly process that is changing you from a child to an adult. It is called puberty. And despite its scary-sounding name, puberty is not some disease, nor are you the first one to go through it. Your mother and your father experienced it. Your schoolmates and other friends your age are probably going through it. And rest assured, you will survive.

But just what is this strange development that takes over your body?

The Chemistry of Puberty

The Bible says that some time after he turned 12 years old, "Jesus went on progressing . . . in physical growth." (Luke 2:52) Yes, even Jesus Christ went through puberty. During puberty, you will experience a period of physical growth and development. Just what causes this growth to occur, though, is a real mystery, a miracle! We are reminded of a parable of Jesus in which he spoke of a man who planted a seed. Said Jesus: "The seed sprouts and grows tall, just how he does not know." (Mark 4:27) Similarly, doctors can give us only a rough outline of what happens during puberty.

Somewhere between the ages of about 9 and 16, you are launched into puberty. (The age varies from person to person, and girls usually get a year or two head start.) Your brain begins a startling chain reaction by switching on a tiny gland above the roof of your mouth called the pituitary gland. The pituitary responds by manufacturing chemical messengers called hormones. These swim through your bloodstream and signal your reproductive organs to begin the manufacture of yet other hormones. A boy's testicles primarily produce male hormones, such as testosterone; a girl's ovaries, female hormones, such as estrogen.

These hormones, in turn, now signal yet other glands and organs to begin changing the way you look.

The Changes Girls Experience

If you are a girl, the first thing you may notice is the gradual enlargement of your breasts. Your hormones have triggered your mammary glands to begin developing. (These milk-producing glands give mothers the ability to feed their infants.) Your hormones also trigger the manufacture of fat, which gives your breasts their shape. Fat will also be deposited on your hips, thighs, and buttocks. You will gain weight and may experience a rapid growth spurt.

While most girls welcome these physical changes, not all girls welcome all of them. For example, the hair on your arms, legs, and underarms may become thicker and darker. Now, in some lands, such body hair may be considered unfeminine or unstylish. Fashion notwithstanding, it is a healthy sign that you are growing into womanhood.

Another unwelcome change may be the increased activity of your sweat glands—you will perspire more. The accompanying odor may embarrass you. But if you bathe frequently and wear clean clothing, there are rarely serious odor problems. Some youths also choose to use deodorants as further protection against odor.

One very personal development involves the growth of hair around your genital area. This is called pubic hair. If you haven't been informed in advance about this, you could find it a bit scary. But it is perfectly normal and nothing to be embarrassed about.

Puberty may also trigger what *The New Teenage Body Book* called the "number-one [appearance] concern among teens"—skin problems. The changes in your body chemistry often result in oilier skin. Pimples and blackheads sprout. (According to one survey, acne problems afflicted nearly 90 percent of the teenagers polled!) Fortunately, the problem can usually be controlled with good skin care.—See the article "Can't I Do Something About My Acne?" appearing in the February 22, 1987, issue of *Awake!*

Spurts of growth make coat sleeves too short

The Changes Boys Experience

If you are a boy, the initial effects of puberty will not be as visible as a girl's. As your reproductive system begins functioning, your genital organs gradually enlarge. Hair begins to grow around your genitals. Again, this is perfectly normal.

At the same time, you may experience a spurt in growth. Fat and muscle tissue are added to your body. You become bigger, stronger, your shoulders broaden. Your

physique is gradually becoming less childlike and more manlike in appearance.

Another interesting change involves the growth of hair on your legs, chest, face, and under your arms. This too is spurred on by the hormone testosterone. The book *Changing Bodies, Changing Lives,* by Ruth Bell, quotes one youth as saying: "When I was fourteen I went around for about two weeks with this dirty smudge on my upper lip. I kept trying to wash it off but it wouldn't wash. Then I really looked at it and saw it was a mustache."

By the way, how much body hair you end up with has nothing to do with how manly you are; it is simply a matter of heredity. In other words, if your father has a hairy chest, the odds are strong that you will too. The same goes for facial hair. It usually takes until your late teens or early 20's, though, for you to have to shave regularly.

You will have your moments of embarrassment, for sure. Boys too find that their sweat glands step up their activity. You may have to be particularly concerned about personal hygiene in order to avoid odor problems. You too may experience an outbreak of acne due to oilier skin.

IN OUR NEXT ISSUE

What Happened to the Dinosaurs?

▪

Do You Have Difficulty Making Decisions?

▪

Debt! Getting In —Getting Out

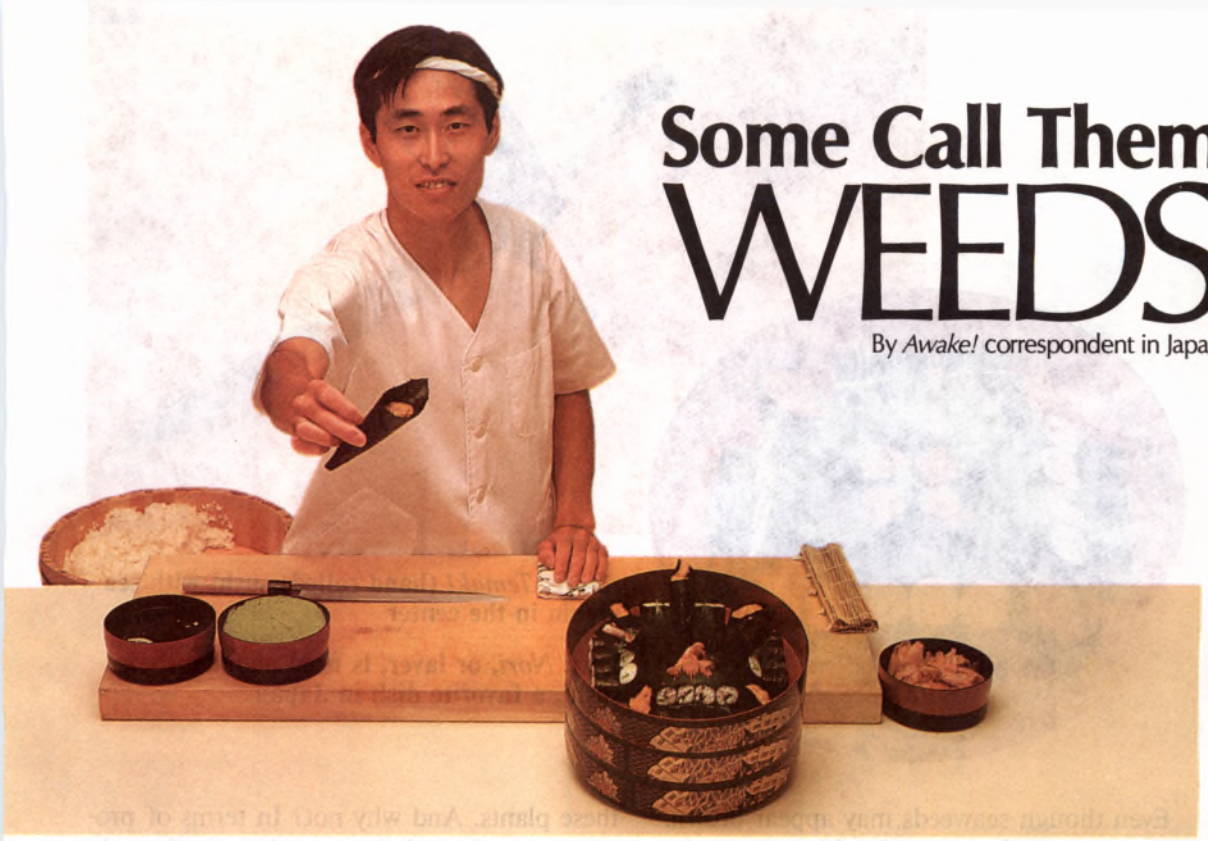
During your mid-teens, your larynx will enlarge; your vocal cords will thicken and elongate. As a result, your voice will deepen. Some boys experience an amazingly fast transition from soprano to baritone. But for others, the voice changes gradually over an agonizingly long period of weeks or months. Rich, deep tones are punctuated by humiliating cracks and squeaks. Relax, though. Your voice will smooth out in due course. In the meantime, if you can laugh at yourself, it helps minimize the embarrassment.

The Most Important Growth

Growing up is wonderful and exciting! It can also be embarrassing and scary. One thing is for sure: You can neither speed up nor delay the process of growing up. So rather than greeting the changes wrought by puberty with hostility and fear, marvel at them, accept them graciously—and with a sense of humor. Realize that adolescence is not the end result but merely a phase. When the storm of puberty is over, you will emerge as a full-grown man or woman!

Never forget, though, that your most important growth involves, not your height, shape, or facial features, but your growth as a person—mentally, emotionally, and spiritually. Said the apostle Paul: "When I was a babe, I used to speak as a babe, to think as a babe, to reason as a babe; but now that I have become a man, I have done away with the traits of a babe." (1 Corinthians 13:11) It is not enough to look like an adult. You must gradually learn to act, speak, and think as an adult. Don't become so concerned about what's happening to your body that you forget to take care of "the inner man."—2 Corinthians 4:16, *The Jerusalem Bible.*

Still, some aspects of puberty may be particularly distressing. How to deal with them will be the subject of future articles.



Some Call Them WEEDS

By *Awake!* correspondent in Japan

SEAWEEDS—the very name suggests a sense of contempt and annoyance. To most people, they are just the slimy, entangling nuisance that spoils their fun at the beach. But are they so worthless?

In Japan they are viewed in a quite different light. The islands of Japan are skirted by both warm and cold currents of the ocean. For this reason, there is an abundance of seaweeds of many kinds in the surrounding waters. Over the years the Japanese people have found many uses for these marine plants.

More Than Ten Thousand Species

One reason for their many uses is the great variety—more than ten thousand species have been identified! They flourish in waters from the icy polar regions to the warm tropical seas. Scientifically, they are what biologists call marine algae, the simplest form of plant life, although the term "seaweed" generally refers to the larger varieties. Their "roots" are only for anchorage; seaweeds take in minerals and water through the surface of the entire plant. Their leaves and stems, properly called fronds, are soft and pliable; they can sway back and forth with the waves without breaking, as in a graceful ballet. Some seaweeds have small balloonlike swellings on their fronds that keep them afloat on the surface of the water.

Within this general family resemblance, however, there is an endless variety in their appearance. There are seaweeds that look like tender lettuce leaves or fussy moss or beautiful red corals. The masses of brown gulfweeds floating in the North Atlantic Sargasso sea are so enormous that they generated legends of fearsome sea monsters and lost ships, dreaded by ancient mariners.

Above: *Temaki* (hand rolled) sushi with sea urchin in the center

Left: *Nori,* or laver, is used abundantly in sushi, a favorite dish in Japan

Even though seaweeds may appear brown, red, or green, they contain chlorophyll, the substance that enables them to carry on photosynthesis to produce their own food. It is estimated that these simple marine plants along with microscopic algae carry out about ten times as much photosynthesis as all land plants put together. It is not surprising that a host of marine creatures find their favorite shelter in seaweed beds, where there is an abundant supply of oxygen and nutrients.

Not for Fish Only

Seaweed is attractive not only to fish; in Japan some 200,000 tons of marine algae is served annually as food on the dinner table. "Sea vegetables are low-caloric, highly nutritious foods that help promote health and longevity," says the book *Vegetables From the Sea,* by Japanese authors Seibin and Teruko Arasaki. Incidentally, the writers' choice of the term "sea vegetables" rather than "seaweeds" is a clear indication of their high regard for these plants. And why not? In terms of protein, minerals, and vitamins, there are few other foods that can compare with these 'vegetables from the sea.'

Consider, for example, one of the favorites, *nori.* When processed, this seaweed looks like sheets of dry, greenish-black paper and is prized for its aroma. Some 8,500 million sheets of it are consumed each year, which works out to about 70 letter-pad-sized sheets per person. What is so remarkable about *nori?* From 35 to 40 percent of it, by dry weight, is good protein that is easily digested. It is also a storehouse of vitamins. Compared to spinach, *nori* has 8 times more vitamin A, 9 times more vitamin B_1, 15 times more vitamin B_2, and 1.5 times more vitamin C. In addition, it is one of the few foods that is rich in vitamin B_{12}, and it contains six other types of B vitamins.

Seaweeds are richer in minerals than almost any other food. It is calculated that from 7 to 38 percent of the seaweed's dry weight is

made up of "the minerals required by human beings, including calcium, sodium, magnesium, potassium, phosphorus, iodine, iron, and zinc." For instance, *wakame,* another favorite, contains 13 times more calcium than milk does. Anemia sufferers will be interested to know that the iron content of edible marine algae is from two to more than ten times that of egg yolks or spinach. And the iodine in seaweeds may be the reason why the thyroid disease goiter is rare among the Japanese.

There are still other benefits. The fibers of marine plants are softer than those of land vegetables. So they are good for intestinal regulation. Japanese scientists have recognized *laminin,* an agent that prevents high blood pressure, in seaweeds. They are also investigating certain ingredients in seaweeds that are found to lower blood cholesterol and lipids in animal tests.

Virtues Unsung

Even if you think you will never be able to stomach seaweed, every time you gulp down a spoonful of ice cream or yogurt or pour on your favorite syrup or savor your favorite cheese, you may well be doing just that. Moreover, every time you dispense a dab of facial lotion or toothpaste or swallow a fast-release tablet of some kind, you may also be benefiting from the lowly seaweed.

This is so because the cell walls in most brown seaweeds contain a substance called algin, or alginate. This substance has a number of very special properties that help it find its way into a wide range of consumer products. It is a good stabilizer of emulsions and suspensions. So it is used in soft foods, cosmetics, and pharmaceuticals. Alginate is also used in the manufacture of water-based paints, textiles, paper, and so on.

Kelp can be fermented to produce methane gas, and researchers believe that as much as 10 percent of Japan's energy needs could be filled from this source. Agricultural chemical makers are investigating an agent found in red seaweed that is highly effective as an insecticide, yet completely harmless to humans. Japan's biotechnology industry is developing a novel biopaper from alginate that can be used as artificial skin and in other medical uses. Animal feed, fertilizers, antibiotics, and a host of other products are being made from seaweeds.

So the next time you see the slimy, troublesome nuisance on the beach or entangled around your feet, just remember that there is a storehouse of goodness in these lowly marine plants that is waiting to be explored and utilized. After all, they are not so worthless that they should be called weeds!

Delicious Ways to Sample Seaweeds

Various kinds of seaweeds may be purchased from Japanese, Korean, or Chinese grocery stores, health-food shops, or even some of the larger grocery markets. They usually come in packages of dried sheets. Some stores may sell them marinated in soy sauce. The most common varieties are *wakame, nori,* and *kombu.*

The easiest way to try *wakame* is to add them to your salad or soup. Simply soak them in water, rinse off the salt, cut them in small pieces, and toss them in. Marinated seaweed may be added to steamed rice or other dishes.

The very popular sushi is simply rice wrapped in *nori,* with the addition of cucumber, egg, or different seafoods—tuna, salmon, shrimp, lobster, and so on. If you find the raw fish a little too much, try rolling cheese or cucumber sticks in seasoned sheets of *nori.*

Children will enjoy the crispy, deep-fried *kombu.* Wipe off the salt, and dip it in oil at medium temperature for a second or two, or simply toast small pieces of it until they become crispy.

WATCHING THE WORLD

DISASTERS STRIKE UNITED STATES

Two disasters devastated separate regions of the United States during September and October 1989. First, Hurricane Hugo, with 135-mile-per-hour winds, swept through the southeastern part of the United States, leaving a trail of destruction. On October 17, an earthquake measuring 7.1 on the Richter scale jolted the San Francisco Bay area, killing scores of people and causing damage estimated in the thousands of millions of dollars in that western section of the country. Coincidentally, during the following two days (October 18, 19), a series of earthquakes, with a magnitude of about 6 on the Richter scale, rocked northern China. At least 29 people were killed.

'UN TO PLAY A CENTRAL ROLE'

Diplomats attending the 44th United Nations General Assembly stated that the three most important world issues crying out for a solution are debts of developing countries, drug trafficking, and environmental protection. There was broad consensus that the UN must become involved in solving them. The president of the General Assembly said that all members had "underlined the need for the United Nations to play a central role as mankind's last hope for peace and justice."

SMOKING BAN ON ALMOST ALL FLIGHTS

U.S. lawmakers have agreed to ban smoking on almost all domestic commercial airline flights. Every day there are about 16,000 flights within the United States. The law would allow smoking on about 20 of those flights, claimed a lobbyist for the Association of Flight Attendants. "We've now gotten it down to the point where we have virtually banned smoking on airplanes," said one senator.

"AUTHORITATIVE" PARENTS BEST

"Parents who are not harshly punitive, but who set firm boundaries and stick to them, are significantly more likely to produce children who are high achievers and who get along well with others," states *U.S.News & World Report.* Such parents are termed "authoritative" ("do it for this reason"), as opposed to "authoritarian" ("do it because I'm the parent") and "permissive" ("do whatever you

want"), disciplinary styles that produced children with behavioral traits that were markedly different. The studies, which spanned two decades, showed that authoritative parents were more likely to have children who were stable, contented, self-controlled, and self-reliant, and who were less likely to experiment with drugs. "Authoritative parents are not bossy," says University of California psychologist Diana Baumrind, who conducted the studies. "They make it their business to know their children, how they're doing in school and who their friends are. Their control reflects a high level of commitment to the child, and they are not afraid to confront the child."

GREED PUSHES MANKIND TO BRINK

At a recent conference in Vancouver, Canada, Digby McLaren, president of the Royal Society of Canada, stated: "We see man as the destroyer and upsetter of our whole world." Sponsored by UNESCO (United Nations Educational, Scientific, and Cultural Organization), the conference of international scientists and scholars concluded that the quest for material wealth has led mankind to the brink of destruction. Mr. McLaren added that scientific and technological advancement has triggered a preoccupation with material prosperity, to the neglect of cultural and spiritual values. The group called for mankind to set aside national, racial, and religious boundaries in order to cooperate in restoring the earth.

ELEPHANT—NOW AN ENDANGERED SPECIES

The Convention on International Trade in Endangered Species, meeting in Lausanne, Switzerland, last October, put the African elephant on its endangered species list. That action bans trade in ivory. The convention hopes that this move will stop poaching by ivory hunters. It is estimated that the population of African elephants has been cut in half during the last decade. In 1979 there were 1.3 mil-

lion elephants on that continent. Now there are about 625,000.

MAN-EATING LIONS

South Africa's Kruger National Park is a strip of land stretching about 200 miles along the border with Mozambique. To escape civil war, many Mozambicans have fled through the park at great risk to their lives, since the park is full of lions and other dangerous animals. Generally, lions avoid humans. However, it is suspected that the refugee movement has given lions a taste for human flesh, since they can easily overcome people who are unable to keep moving and who fall down exhausted. Recently, three people in South Africa were killed by lions, and two of these attacks occurred within the Kruger National Park. Therefore, park rangers have been instructed to track and kill all the lions that have become man-eaters.

ADDITIONAL THREAT

Another dimension has been added to the current drug plague: destruction of the rain forests. "Driven by American and European demand for cocaine, Peruvian coca growers have chopped down large stretches of Amazon rain forest and are dumping millions of gallons of toxic chemicals into its highlands and headwaters," notes *The New York Times.* According to the report, the coca growers "have invaded two national parks and two national forests, deforested most of a fragile cloud forest known as the 'eyebrow of the jungle' and destroyed an area estimated at well over 500,000 acres of tropical forests." Coca leaf is now the largest crop being cultivated in the Peruvian Amazon. In their rush to grow cocaine, the farmers have abandoned their ancestral farming practices that prevented topsoil erosion.

CIVILIZED BUT DEPRESSED

Does modern civilization bring people more happiness? A recent study assembled the results of surveys from all over the world, and it showed that in a group of developed countries, depression rates have soared since World War II, in some cases even doubling. The young are often hit the hardest. On the other hand, in poorer countries with more traditional social structures, the rate of depression has grown only slightly in the same period. Why? According to *The Boston Globe,* the researchers in the study speculate that the trend toward city life in these advanced countries, coupled with increased mobility, have led to looser family ties and social networks. The study's lead author concludes: "Depression seems to be the price of civilization."

MAKING DESERTS BLOOM

In an ambitious plan to reach self-sufficiency in food production, Saudi Arabia is making the desert bloom. Dotting the Saudi

desert are hundreds of green circles, each up to 200 acres in size, irrigated by water pumped from far below. But the cost of turning the desert into productive land does not come cheap. The government has already spent thousands of millions of dollars on the project. "Growing wheat in Saudi Arabia is as expensive as growing melons under glass at the north pole," says *The Economist.* And even though money available from petroleum production may seem unending, the water supply is not. Most of the water used comes from deep aquifers of trapped "fossil" water that is not renewable. If water consumption continues at its present rate of growth, it is feared that the aquifers may be exhausted in from 10 to 20 years.

FIRST MOSQUE IN ROME

Benito Mussolini, Italy's Fascist ruler of World War II days, is reported to have refused to allow a mosque to be built in Rome, saying that he would allow it only when a Roman Catholic church was permitted in Mecca. Times have changed. Not only is a mosque under construction some three and a half miles northeast of the Vatican but it is described by its architects as the largest in Europe. "Even if it is not the largest, and there is a question about that, it is the most important mosque in Europe," says Abdul Qayuum Khan, director of the Islamic Cultural Center in Rome. "The simple fact is that it is the only one located in the heart of Christianity, in the Mecca of Catholicism, you might say." Nevertheless, the official Vatican position is said to be favorable.

HOMEGROWN MARIJUANA

Efforts to curtail the use of marijuana in the United States have more than failed—they have backfired. *The New York Times* reports that although the federal budget to enforce antimarijuana laws ballooned from $526 million in 1982 to $968 million in 1988, all that money reduced neither the drug's availability nor its use. Instead, use of extra potent, domestically grown marijuana is on the rise. In *The Medical Post* of Canada, Dr. Andrew Macnab warns that such homegrown marijuana can have up to 350 toxic compounds.

FROM OUR READERS

Lateness I greatly appreciated the article "Are You Always Late?" (June 8, 1989) You recommended anticipating waiting periods and bringing along reading material so as to be productively occupied while waiting for others. Your suggestions have proved to be practical indeed.

I. D., Nigeria

Bullies Although I don't get threatened with getting beaten up in school, I do get picked on a lot because my mom comes from a different country and looks different. Your article on school bullies (August 8, 1989) told me to ignore them, and that has helped me. I also realize now that a lot of those kids come from broken homes and are passing on their frustration to other kids. I'm so glad you are able to understand the younger generation.

M. D., United States

Oil Spill When I saw the title "Oil Spill!" (September 22, 1989) I was a little skeptical. I had read much about the spill in the newspapers and magazines and wondered what *Awake!* could possibly add. Well, after reading the fact-filled, freshly angled article, the wondering stopped. You also went beyond where newspapers and magazines go and showed that the true answer to mankind's problems will be in God's new world.

C. K., United States

Special Needs I am almost 14 and just wanted to thank you for the August 22, 1989, article on helping those with special needs. When I was in elementary school, we had three deaf children in our class, and people acted as if they didn't exist and would talk about them because they couldn't hear. So some of us got together and learned how to communicate with them. When the other kids saw how neat it was to do that, they started too! I hope one day to interpret for the deaf at conventions of Jehovah's Witnesses.

A. B., United States

Religious History I am grateful for the series "Religion's Future in View of Its Past." I come across many people with varied religious backgrounds. These articles will help many to trace religion from start to present.

D. S., United States

I'm reading the series on religious history. I sure have learned a lot, more than I ever did in school.

B. J., United States

Dying Children My ten-month-old granddaughter came down with diarrhea. The hospital sent her home, and she got worse each day. I remembered your article on saving children by using a formula for Oral Rehydration Therapy. (September 22, 1988) I followed the instructions, and the next day she began to regain her strength. The diarrhea stopped, and she completely recovered.

R. M., United States

Pet Care I work at an animal shelter and often give lectures to educate the public in the responsibilities of pet care. I was thrilled to receive your article "Can You Really Care for a Pet?" (June 8, 1989) the day before a big school presentation. My colleagues were very impressed with the article and would like to use it in our fall newsletter. Too often people choose a pet because they are caught up in the emotion of the moment. It was impressive, though, the way you presented the realities and responsibilities a person must weigh *before* choosing a pet.

C. S., United States

H. Armstrong Roberts

The Walrus and the Drug Trade

IT WOULD be hard to think of two big mammals more different than the walrus and the elephant. But the massive, lethargic seals lounging on the ice floes of the Bering Sea have a problem in common with the lordly roamers of the African veld: Their most precious possession often means their untimely death. They both have tusks.

Perhaps even more than the elephant, the walrus lives by its tusks. When it dives to the seafloor to look for food, it skids along on its tusks as with its lips it sucks up clams and oysters. When it wants to clamber up onto an ice floe to bask in the sun, it uses its tusks as grappling hooks to haul its 2,000- to 3,000-pound bulk out of the water. A mother walrus will use her tusks to fight to the death any predator that threatens her young.

But sadly for the walrus, its tusks are also valued by humans. Man has an endless thirst for ivory. And a 10- or 12-foot-long walrus lazing in the arctic sun is not a difficult target for a man with a semiautomatic rifle. So it is not uncommon for some Alaskans to prowl the Bering Sea in small boats, slaughter the beasts wherever they come upon them, and return home with a boatload of tusked heads, hacked off by chain saw.

Thus far the tale sounds all too familiar, but it has a bizarre twist this time: drugs. Young Alaskan Eskimo, it seems, are using walrus tusks to finance their drug addiction. And as *Newsweek* magazine notes: "The rate of exchange is appallingly cheap." A special agent for the U.S. Fish and Wildlife Service told the magazine that black-market dealers can buy a pair of tusks —worth as much as $800—for six marijuana cigarettes.

The law offers the hunters more protection than the hunted. It allows Alaskan natives to hunt the walrus for the food it provides them. Of course, they may keep the tusks as a by-product to use for native craftwork. The law sounds fair, but it is a haven for the unscrupulous. Some non-native ivory traders have moved in with Eskimo women just so that they can claim that their hoard of tusks is earmarked for native crafts.

As the slaughter continues, concern is growing. Those who hunt walrus legally and those who actually use the ivory for craftwork feel their livelihood threatened. Older Eskimo find the burgeoning plague of drug addiction among their youths appalling. And the walrus? There are yet some 250,000 of them in the Pacific, so they are not considered endangered. But their headless carcasses drift ashore by the hundreds. So many have washed up on Siberian shores that the Soviet Union has urged the United States to stop the slaughter. But how long will the walrus be safe from extermination when its tusks mean money for the greedy and drugs for the dissolute?