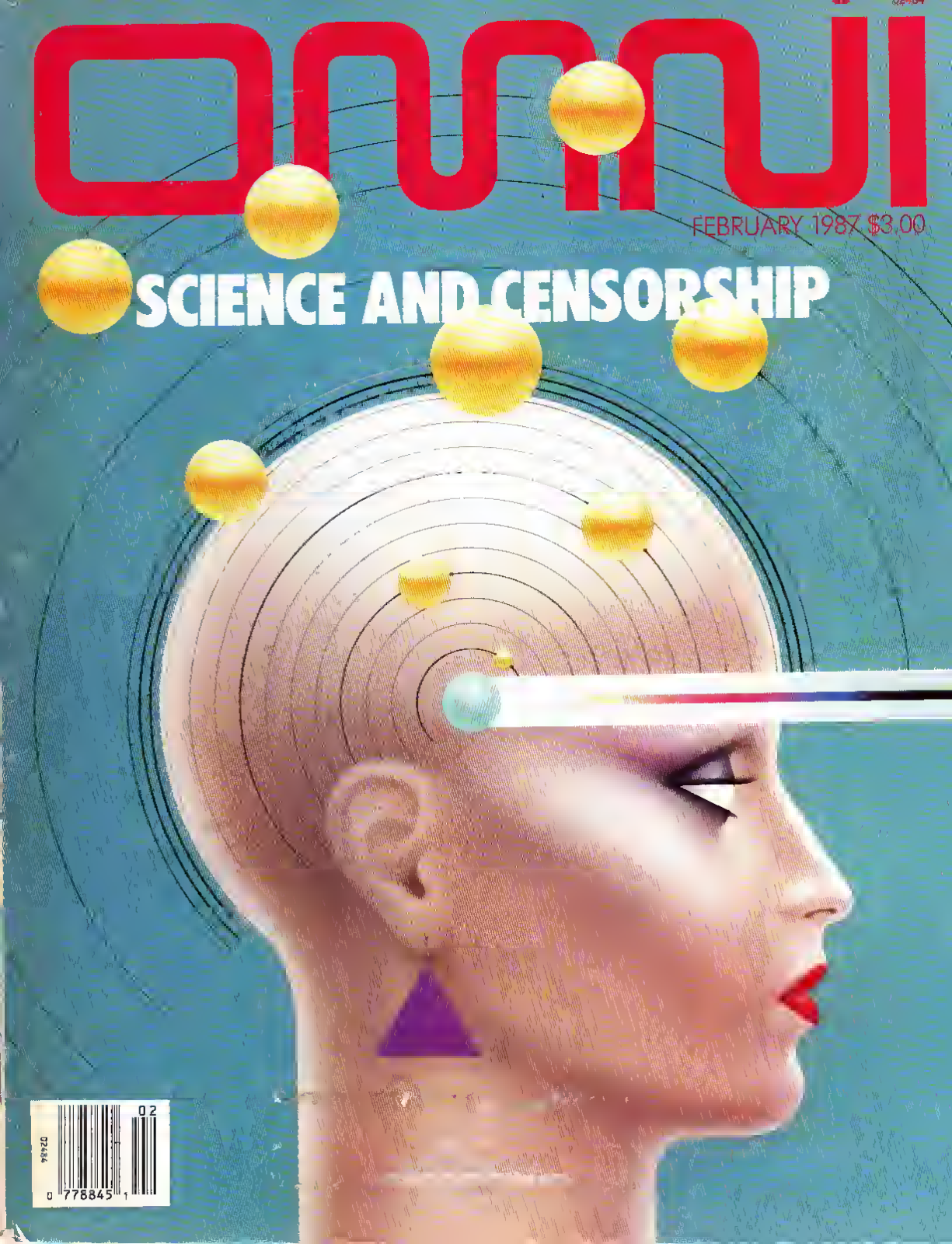
OMNI

FEBRUARY 1987 $3.00

SCIENCE AND CENSORSHIP



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VOL. 9 NO. 5 FEBRUARY 1987

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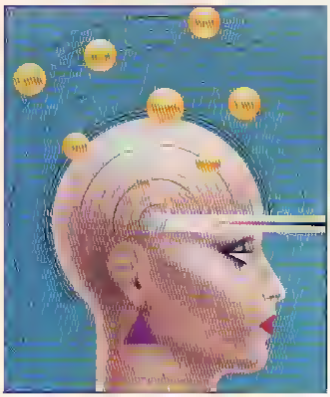

Stanislaw Fernandes, a New York-based artist, painted Equilibrium I. *A humanoid stares coldly at a mirror image of herself—just out of view. Her expressionless face never betrays the array of emotions she is attempting to communicate telepathically*

OMNI (ISSN 0:19-8711) is published monthly in the United States and Canada by Omni Publications International Ltd., 1965 Broadway, New York, N.Y. 10023-5965. Second-class postage paid at New York, N.Y. and at additional mailing offices. POSTMASTER: Send address changes to Omni Magazine, Post Office Box 3039, Harlan, Iowa 51537. Volume 9, Number 5. Printed in the U.S.A. by Meredith/Burda Corp. and distributed in the U.S.A., Canada, U.S. territorial possessions, and the world (except the U.K.) by Curtis Circulation Company, 21 Henderson Drive, West Caldwell, N.J. 07006. Distributed in the U.K. by COMAG, Tavistock Road, West Drayton, London, UB7 7QE, England. Entire contents copyrighted. Nothing may be reproduced in whole or in part without written permission from the publisher. Any similarity between places or persons mentioned in the fiction or semi-fiction and real places or persons living or dead is coincidental. Subscriptions: U.S., APO—$24 one year; Canada and elsewhere—$26 one year. Single copies: $3.00 in U.S., APO and Canada. Telephone: 1-800-247-5470 in Iowa: 1-800-532-1272. The publisher disclaims all responsibility to return unsolicited matter, and all rights in portions published thereof remain the sole property of Omni Publications International Ltd. Letters sent to Omni or its editors become the property of the magazine.

FIRST WORD

By Murray Gell-Mann

Attempts to impose "creation science" on American public schools recall the situation that existed in the Soviet Union under Stalin and his immediate successors

I am one of 72 U.S. recipients of the Nobel prize in science who recently filed a brief in the U.S. Supreme Court asking that it uphold the decision of a lower court to throw out a Louisiana statute mandating the teaching of "creation science." We are probably the largest group of such prizewinners ever to sign any document together. Why are we so concerned? Why were we joined by a large number of state academies of science? Why did the prestigious National Academy of Sciences file a similar brief?

The statute, like others introduced elsewhere, would require that in public schools the teaching of certain parts of science (which concern "origins" and thus appear to conflict with the claims of particular religious sects) would be selected for special pejorative treatment and would have to be "balanced" by the teaching of something called "creation science." It is shown in our brief that this expression can mean only one thing, a pseudoscience based on the literal interpretation of certain Bible stories. It preaches that the universe and the earth are both young (thousands instead of billions of years old) that animals and plants were created in immutable "kinds," that fossils are to be explained by a universal flood such as that associated with Noah, and so on.

I should like to emphasize that the portion of science that is attacked by such statutes is far more extensive than many people realize, embracing important parts of physics, chemistry, astronomy, and geology as well as many of the central ideas of biology and anthropology. In particular, the notion of reducing the age of the earth by a factor of nearly a million, and that of the expanding universe by an even larger factor, conflicts in the most basic way with numerous robust conclusions of physical science. For example, fundamental and well-established principles of nuclear physics are challenged, for no sound reason, when "creation scientists" attack the validity of the radioactive clocks that provide the most reliable methods used to date the earth.

If the requirement envisaged by the statutes is imposed on our public schools, graduates may be ill equipped to deal with problems of health, agriculture, industrial production, environmental quality, and national defense. (For example, we may ask ourselves, only half in jest, whether we really want radioactive-waste disposal to follow principles of creationist nuclear physics, or exploration for oil to proceed according to creationist geology.)

It has often happened that science has had to defend itself against the forces of ignorance and superstition. Attempts to impose "creation science" on American schools recall in some ways the situation in the Soviet Union under Stalin and his immediate successors, when the authorities interfered with the teaching of biology and promoted the pseudoscientific doctrine of Lysenko, with adverse effects on agriculture as well as on teaching and research.

All scientific conclusions are subject to revision if new discoveries or new, convincing arguments arise. When there are serious competing hypotheses, they are discussed and compared in scientific papers in refereed journals, in serious textbooks, in seminars, and in science classes. By contrast, "creation scientists" who are members of the Creation Research Society have to subscribe to a statement of belief that begins as follows: "(1) The Bible is the written Word of God, and because we believe it to be inspired throughout, all of its assertions are historically and scientifically true in all of the original autographs. To the student of nature this means that the account of origins in Genesis is a factual presentation of simple historical truths. (2) All basic types of living things, including man, were made by direct creative acts of God during Creation Week as described in Genesis. Whatever biological changes have occurred since Creation have accomplished only changes within the original created kinds." A leader of the Institute for Creation Research writes, "The only way we can determine the true age of the earth is for God to tell us what it is. And since He *has* told us, very plainly, in the Holy Scriptures that it is several thousand years in age, and no more, that ought to settle all basic questions of terrestrial chronology."

The general public should understand that there is no significant support in the scientific community for the "creation science" construct, which is not suggested by the observational evidence but is advanced by people (including some with Ph.D. degrees) who start from religious positions such as those cited above and then look around for "scientific" arguments to try to discredit the findings of modern science about the history of the universe, the earth, and living things, including human beings.

One particularly robust finding is the evolution of life on Earth. This idea especially infuriates "creation scientists," who frequently quote out of context from the lively disputes among biologists and other scientists about the mechanisms of evolution so as to give the false impression that there is disagreement, or reason for disagreement, about evolution itself.

We are dealing with attempts by lobbyists and legislatures to force entry into science classrooms on behalf of a particular kind of fundamentalist religion dressed up as science. Fundamentalists have a perfect right to their beliefs but no right to control the teaching of science in the public schools.

Murray Gell-Mann is Robert A. Millikan Professor of Physics at the California Institute of Technology. He won the Nobel prize in physics in 1969.

CONTRIBUTORS

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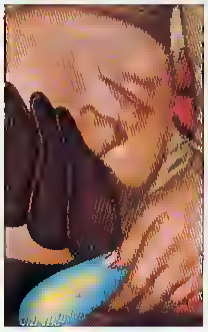
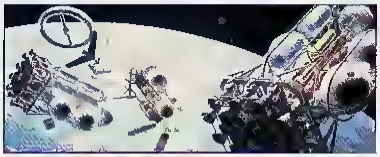

CENSORING SCIENCE


LUNAR FANTASIES


SCHULTZ

MAGLICH


KINGDOM COME


EMSHWILLER

While researching her story "Censoring Science" (page 42), *Omni* staff writer *Kathleen Stein* found herself in an eatery in downtown Selma, Alabama. "From outside it seemed like an old-fashioned local diner where I could get an inexpensive Southern meal," she recalls. "Inside, however, the walls were cluttered with crosses, religious mottoes, and prayers. It looked like a born-again fast-food restaurant—but it was soulless." Any charm it once possessed had been stripped away, replaced by a long metal counter and a Plexiglas partition that separated employees from patrons. "Behind it grim fat white ladies slaved over vats of hot grease, almost mass-producing fried chicken and biscuits."

Although the Selma restaurant may not have been a quintessential experience, it did impress upon Stein the importance of religion in states like Alabama and Tennessee. "They're intensely committed to their faith," she says. "And religious activists I met were often friendlier than their foes and didn't act like they hated anyone. They just believe my scientists are pagans and should be pitied."

Stein's story stems from these crusaders' efforts to censor science education—rejecting, for example, the theory of evolution as heresy. In its place they want to install creationism, what physicist *Murray Gell-Mann* (First Word, page 8) calls "a pseudoscience based on the literal interpretation of certain stories in the Bible." Television producer *Norman Lear*, cofounder of People for the American Way (Mind, page 30), argues that censoring school textbooks will result in a generation of scientific illiterates.

"I've investigated some really exciting scientific research, and I thought creationists' efforts were a joke, a surreal dream," Stein says. "But after meeting these people, I viewed it much more seriously, and it frightens me."

Fiction writers, of course, have also experienced censorship, sometimes for seemingly outlandish reasons. *Jean Auel*'s books have all been attacked because they make basic assumptions about evolution (Books, page 22). Writer *Carol Emshwiller* ("The Circular Library of Stones," page 74), however, has confronted only minor instances of censorship *before* publication—certain editors have sometimes suggested she "tone down" words. But she says, "I deliberately try to get students in my creative writing classes to accept everything. They should consider only whether scenes and language work for the *story*."

At the beginning of this school year science-fiction writer *Bruce McAllister* ("Kingdom Come," page 60) and his university colleagues were instructed to question the identity of any strangers in their classrooms. These uninvited auditors, they were told, might be plants—representatives from Accuracy in Academia, an organization that monitors college lectures for content it deems too liberal.

Censorship also comes in the form of underreporting or the complete lack of coverage, according to writer *Phil Patton*. In such suppression, he says, "new technological paths are often neglected in favor of the mainstream." In "Getting Nuked" (page 82) Patton reports on just such a case. Physicist Bogdan Maglich struggled for years to find acceptance—and funding—for "aneutronic" energy, a cheaper and safer alternative to nuclear power that produces no radioactive waste material.

Censors suppress anything that threatens their belief systems. Born-again Christians who would reject Big Bang cosmology because it contradicts the biblical story of creation, for example, would also attack astronomer Bradford Smith's discovery of a new solar system. "His evidence," says Smith interviewer *Ron Schultz* (page 66), "destroys their belief that we're the only life forms in the universe. They would rather deny evidence and remain ignorant of the facts."

While creationists want to prevent the dissemination of knowledge, the pictorial "Lunar Fantasies" (page 50) demonstrates the unbridled imagination that inspires progress. Creative and intellectual processes propel us into the future and must be nurtured. So in this issue we've included a preprinted postcard for readers to demonstrate *their* concern and opposition to the censorship of science. Mail your cards in to us, and we'll forward them all to President Reagan. OO

LETTERS

COMMUNICATIONS

Give Peace a Chance

As a member of the Great Peace March for Nuclear Disarmament, I have been walking across the United States for the last several months. It was a pleasure to open your November issue and find the strong pro-disarmament article by Bernard Lown and Evgueni Chazov [First Word] and the space drawings by children from the USA and the USSR ["Artists of Detente"]. Both articles stress the need for peace and cooperation among the peoples of the world.

Uldis Ohaks
Seattle

I'd like to answer the question posed by Drs. Lown and Chazov in First Word: How is it possible that a quarter century of arms negotiations has not resulted in the dismantling of even a single nuclear weapons system? The answer: The dismantling of modern nuclear weapons systems is not a good idea.

Now I have a question: How is it possible that a quarter century of antinuclear, antiwar demonstrations has not resulted in a single practical suggestion on how to eliminate the threat of war?

Wallace L. Haynes
West Valley, UT

Beasts Unburdened

Certainly some of the more conservative members of the scientific community will be upset by Robert Weil's article "Inhuman Bondage" [November 1986]. But you are making people aware of the dark side of animal research. The issue of animal rights is a moral "black hole" for most people. The bold actions of the animal-rights movement challenge the notion that mankind must rip apart nature in order to learn from her.

Robert S. Kimball
Natick, MA

Although I disagree with some of the tactics of the Animal Liberation Front (ALF), the tapes they stole will make people more aware of the brutality to laboratory animals. I am outraged by the treatment animals receive—supported by my tax dollars. I do not, however, support the abolition of laboratory experimentation.

Neil B. Morley
Albuquerque, NM

I enjoyed meeting ALF member "Valerie," who was intelligent and inspiring. It must have been difficult for her to carry out the task at hand with Weil and his extensive psychological baggage in tow. He attacked Valerie's choice not to have children, implying there was something wrong with her. May I suggest that there is something refreshingly right about her.

K. J. Wahl
San Francisco

While I understand Weil's desire to produce a balanced, noninflammatory account of the ALF, I note the conspicuous absence of one word from his piece: *terrorists*.

Wouldn't the ALF's purpose have been served as well by merely taking and reproducing the tapes of Dr. Gennarelli's experiments, without destroying his lab? Or does the ALF lack faith in the ability of the truth, standing alone, to influence public opinion?

Tom Nessinger
Los Angeles

If these "animal lovers" were even slightly concerned about animals, they would know that without the use of animals in research, medical benefits to animals themselves would cease. And if they really did care for animals, they would not discriminate in favor of primates and bunnies—so popular with the press.

I have spent 30 years among researchers and have never known of any willful, needless cruelty to any living organism.

Charlotte Levin
Española, NM

Hair Today, Gone Tomorrow

I just finished reading "The Girl with the Vita-Gel Hair" by Thomas Disch [December 1986]. Now my preholiday "blues" have totally disappeared in giggles and laughter. What a terrific Christmas gift!

Janice den Uyl
Chicago

WHAT'S SCARING STEPHEN KING

FORUM

Every book that I've ever had published with the exception of two has been banned from one public-high-school library or another. *Cujo* has been banned so often now that it is on the ACLU's list of the top ten banned books. And I'm very proud of that, because I'm never going to win a Nobel prize or a National Book Award. But being on that list of banned books, I'm in the company of greats: Flannery O'Connor, Harper Lee, J. D. Salinger, and John Updike.

When it comes to censorship involving high-school libraries, I love it, man. Somebody writes me a letter and says, 'Do you want to come and defend this book?' I say 'Absolutely not—let them jerk it. Just make sure to tell the kids that whatever is taken off the shelves is probably what they need to know the most.' That will get their asses running to a public library or a bookstore. When a book gets banned, kids will read it.

When it comes to anything else, I draw the line. I'm not going to let them take my books out of public libraries or bookstores. There are bumper stickers that say, YOU'LL TAKE MY GUN WHEN YOU PRY IT FROM MY COLD, DEAD HANDS. I'd like to have one that says, YOU'LL TAKE MY BOOK WHEN YOU PRY IT FROM MY COLD, DEAD HANDS. Nobody tells me what to read; nobody tells me what I can look at.

Censorship is justified, I think, in any kind of situation in which an organization is in loco parentis for minor children. When I used to teach school, we had a procedure for parents who objected to books that we used in curricula or in the school library. The parents had to be very specific about what they found offensive, and their objections had to be sent to the school board. But I haven't been in loco parentis to anybody but God for a very long time now, and I resent people who take the attitude that says, "I know more about this than you do, sonnybuns. I'll tell you what you can read and what you can't read.' That's fascism.

My book *The Shining* may be pulled from library shelves because people believe it's bad for children to read a story about how a father ends up hunting down his own son. But 'Hansel and Gretel' is all right for children, a story in which a stepmother orders her husband to disembowel his two children and bring her their hearts. The father decides to leave the kids in the woods to starve to death instead of killing them outright—which we're supposed to interpret as kindness. The children arrive at a witch's house, and it's stated she's going to fucking eat them! That's cannibalism! *The Shining* is not all right for kids, but "Hansel and Gretel" is—it's staple reading.

I remember seeing *Night of the Living Dead* at a Saturday matinee in the company of a large number of four- and five-year-olds. There we were, watching people eat each other and watching a little girl kill her mother with a trowel and eat her intestines. The kids left the theater white-faced and crying. It was *wrong* to let those kids see that movie. On the other hand, when little E.T. dies, the reaction is just as bad—if not worse.

I feel sorry for parents who can't or won't exercise any kind of judgment or who won't spend the time to make responsible decisions about what their children may see and what they may not see. I don't want those decisions taken out of my hands.

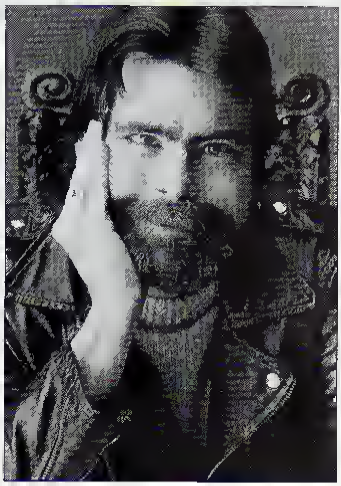
There are a number of films that have been made from my own books that I've simply put on the shelf. My children have never seen *Carrie*, for instance. I think its content is far too disturbing, the way that *E.T.* and *Bambi* are disturbing for young children—stories in which a parent–child conflict ends in death.

The most disturbing event that happened in national politics in the last year is not this business about the diversion of funds and arms from Iran to the contras, but the fact that the Attorney General jawboned a number of chain stores into pulling magazines that the administration considered offensive. It's political terrorism. It's not right.

That's not to say that there aren't areas that are very gray. You have stuff that is legal and stuff that is illegal. For example, if I were to exhibit a real snuff film in which someone was killed, that would be illegal. On the other hand, if I were to show a make-believe snuff film, a film that suggests the act but in which it doesn't actually happen, that may be objectionable, but it's not illegal. There's a movie called *Maniac* in which a guy scalps and rapes women. Those kinds of films are censorable, but I don't believe they should be censored. If you start censoring, you never stop.

There's always been a cutting edge. Let's say you have a magazine that shows two women making love. Many people find that objectionable, but I say it's got to stay. If we start censoring material like that, we've got problems. What's down the road for us? On "Crystal Night" in 1939, when people started getting rid of the decadent literature in Berlin, they ended up burning all the philosophy books and then went on to destroy all the bookshops run by Jews, and from there they decided they might as well go for the music shops and all the rest of it. That's what's always down the road when you begin to censor. Crystal Night.

—Stephen King



King: "Nobody tells me what to read."

FORBIDDEN FACTS

SPACE

By Paul Bagne

Jeffrey Richelson looked over the paper on satellites, spy planes, seismic sensors—technologies the military uses to monitor events all over the world. He was getting ready to present it at a symposium on arms control when he received a message. An agent from the Office of Special Investigations (OSI) had seen a copy of the paper. It had been seized from a former colleague of Richelson's and passed on to the OSI. The agent claimed that the paper could not be presented. It contained sensitive data on the Keyhole spy satellite.

"It wasn't about Keyhole," Richelson says. "They had the wrong paper!"

The agent said that since it was on the same subject, he still had problems with the paper. Richelson presented it anyway. A short time later he was contacted by the Justice Department and questioned about the paper's content.

This happened in 1984. In America.

"You have the most right-wing administration in quite a while, and they are letting loose people who want these kinds of restrictions," says Richelson, assistant professor of government and public policy at American University.

In the name of national security, 44 separate federal offices, spurred on by Executive Office memos and Pentagon directives, have entangled research in more and more red tape. It has had a chilling effect on the free exchange of scientific information and ideas among scientists working in space studies and other technological fields.

Government officials fear that our scientists may be unwittingly giving valuable information to our adversaries. In late 1985 Secretary of Defense Caspar Weinberger released an intelligence report claiming that Western technology is being acquired by "intricately organized, highly effective collection programs specifically targeted to improve Soviet military weapons systems."

According to defense intelligence agencies, there is an office in the KGB, called Directorate T, that controls 300 "collectors," or spies, planted in Western countries. Their mission: to steal technologies. They infiltrate universities and pose as harmless researchers attending meetings on space, electronics, computers, lasers and other topics. According to the report, they have managed to find out the digital mapping secrets of our cruise missiles and the formula for the fuel that powers them.

The collectors have also made use of our databases to get information about spacecraft materials, airframe designs and space-shuttle propulsion systems and flight computers.

There have long been protective mechanisms to safeguard top-secret information. Some projects and the information about them—blueprints for nuclear warheads, for example—are "born" classified. Additionally, according to long-standing rules enforced by contracts—and embraced by scientists since the days of the Manhattan Project—research funded by the Department of Defense (DoD) is reviewed and, whenever necessary, classified.

This authority to classify material and control work under DoD contract already puts the military in control of astounding quantities of technical data. The budget allocation for the Strategic Defense Initiative (SDI) already exceeds $2 billion and involves 1,500 prime contracts. With $1.3 billion authorized for the next four years—for basic research—SDI is quickly emerging as the primary source of research funds for many universities and industries. All SDI-related research—on computer memories, lasers, alloys, infrared imaging—is subject to military review and censorship.

Speak no evil—or no science. It's the law.

Yet the Reagan administration has been seeking additional control. It is trying to restrict information presented in millions of documents published in journals. Many of these fall into a gray area. They are not so vital as to require classification but, says the administration, sensitive enough to warrant restricting.

Weinberger and others in the administration have decried what they call the "hemorrhaging" of sensitive technological information. To stop it, the government slipped an exemption into the Freedom of Information Act as part of a 1984 authorization bill. It allowed the DoD to withhold from the public any technical data with "military or space application."

Two years later, just before he was dismissed for the Iranian arms deal, National Security Adviser John Poindexter granted federal agency heads the power to label nonsecret information "sensitive" and thus keep it out of electronic databases. As added reinforcement, government officials have been invoking two other laws, the Arms Export Control and the Export Administration Acts. The government identifies certain critical military technologies as "munitions of war." If a scientist presents a paper on these technologies to foreign nationals, he is subject to arms export laws.

The intent was to stop the export of data with military potential, like spacecraft heat-shielding studies by NASA. Instead, the acts have prevented students and researchers from sharing information on space technologies.

Today at engineering and technical conferences the front pages of some of

CONTINUED ON PAGE 56

SUPER CYCLOTRON

STARS

By Dr Michio Kaku and Jennifer Trainer

In the Twenties physicists studied elementary particle physics by examining cosmic rays (radiation emanating from outer space). The process meant sending photographic plates carried by large balloons into the upper atmosphere, reclaiming the plates, developing the film, and then spending months examining the emulsion for possible tracks left by high-energy cosmic rays.

All this changed in the Thirties with the invention of the first atom smasher, the cyclotron, by Ernest Lawrence of the University of California at Berkeley. This new machine could create made-to-order beams of cosmic rays right in the lab. The first cyclotron built by Lawrence was only a few inches across and produced a feeble beam of energy, but over the decades this blossomed into a technological genre that promises to produce the largest piece of scientific equipment ever built: the Superconducting Super Collider, or the SSC.

The SSC has been proposed by the Department of Energy, which is now considering proposals for the site. One Nobel laureate called it "one of the most ambitious projects ever conceived by our species." Because of its scale and cost it has even been compared to the building of the pyramids.

The goal is to build a device that will allow physicists to explore whether the four forces of physics—electromagnetism, gravity, the strong force (holding protons and neutrons in the atomic nucleus), and the weak force (behind radioactive decay)—were originally one.

The SSC will be the most expensive and the biggest machine ever constructed. Most proposals call for a ring *60 miles* in diameter, so large it could swallow the Washington Beltway, which encircles the nation's capital. Its magnetic coils will produce magnetic fields of 6.6 teslas, or about 130,000 times stronger than the earth's. It will consume thousands of megawatts of power, enough to light up a large city. The narrow, circular tunnel will be about 20 feet wide, 200 miles long, and will run underground to absorb the intense radiation created by the machine. Inside this long tunnel will be a series of powerful magnets that will bend the path of particles as they race around the ring.

Cost estimates for the SSC are upwards of $6 billion. A machine of this magnitude and cost will provide a bonanza in jobs, construction, housing, and labor (a staff of about 3,000 scientists and engineers is needed). Already communities throughout the United States have submitted bids to have the SSC located in their state.

Illinois, for example, has argued that the SSC should be located near Chicago, where the pool of scientific talent at nearby Fermi National Laboratory is available. Governor James Thompson of Illinois has spent $500,000 on geological site surveys and is preparing to spend $7 million more on a campaign to win the SSC. (One logical place for the SSC, near the Brookhaven National Laboratory on Long Island, has been nixed because the island is not *wide* enough to accommodate the machine.)

Scientists hope to test a host of new theoretical ideas with the SSC. The easiest will be the electro-weak theory, which attempts to explain how weak and electromagnetic forces are related. Specifically, scientists also hope to discover the elusive "Higgs particle," believed to give the W-particle, which theoretically carries the weak force, its mass. Further in the future scientists hope to find clues that could help us understand grand unification theories, or GUTs, which attempt to find a common bond among the four fundamental forces.

Even with the SSC we are fast approaching the practical limit to which nations on this planet can delve into the realm of subnuclear physics.

But other options are opening up all the time. One is to launch orbiting laboratories to peer into the hearts of faraway galaxies and search for the remnants of the Big Bang. We may have to use echoes of the creation itself as the "laboratory" in which to collect our data. ☐

FermiLab's accelerator. Will it soon be joined by a bigger, better, and more powerful mate?

Adapted with permission from Beyond Einstein: The Cosmic Quest for the Theory of the Universe, *by Dr. Michio Kaku and Jennifer Trainer (Bantam Books, 1987)*

THE REAL FAHRENHEIT 451

BOOKS

By Marion Long

Because dozens of books have been pulled from the shelves of public libraries and school rooms in the past few years, *Omni* asked some famous authors to talk about the wrath of the censor.

Arthur C. Clarke: I know that at least two of my books were banned by school boards. My first reaction was bafflement, then hilarity. If their action against me had been effective, however, I would have fought with every weapon at my disposal.

It is easy to blame the increase in censorship activity on the Moral *Minority* and a lot of crackpots, but there are a lot of very sick things in our society, and many decent people feel very strongly that certain things shouldn't be permitted.

I do feel censorship is justified in certain circumstances, but it becomes very difficult to draw the line. The best thing, I think, is not to censor ideas but to expose them to ridicule. In the long run I believe that education is the only answer. I realize that is taking a wildly idealistic view, but I stand by it.

Harlan Ellison: These would-be censors are monsters. And they will always be with us because the two most common things in the universe are hydrogen and stupidity.

Anyone who deludes him or herself into thinking that these people are not the biggest danger we face—on the level of our day-to-day lives—is living in la-la land. We may survive the military–industrial complex—I am convinced we won't have a nuclear war—but we can *never* survive these people who seek to drive us back into the Dark Ages.

We have to stop fighting them politely. This is one reason why the ERA failed. Women were afraid of looking like bulldykes when Phyllis Schlafly came out in her flouncy dress, so they tried to "out flounce" her. They stuck a hideous Smurf smile on their faces the way she does and tried to beat her at her own game. And you cannot do that and win. You must battle these people and reduce them through ridicule.

They will never be satisfied. If they are not going after rock music, they are going after television. If not television, books. If not books, magazines; if not magazines, comic books, for heaven's sake.

There is no protection from these people. They are everywhere, and they can never be satisfied. I suggest that their concerns are not really God, people or morality. Their aim is power. They like the taste of power, and it is self-regenerating. And if they take writers or musicians or artists or any of us down in the process, that is not their concern. They will always be able to justify it in their mad visions by claiming that we were only the hand tools of the Devil.

Ray Bradbury: The roots of this rising desire for censorship are not necessarily political or religious. We've gone too far with certain kinds of films and publications and productions, some of them are simply outrageous, and this provokes reaction, even among liberal people. Two of my daughters have been raped. That doesn't make me feel very liberal about certain kinds of people in society, does it? A lot of this "censorship" feeling is not so much about censorship at all, really, so much as it is a reaction to the failure of our judges and criminal system to promote some sort of fairness about victims and criminals. So you get a reaction about all sorts of crime, and you get an overreaction to pornography. I don't think pornography has a thing to do with anyone raping anyone; in fact, if anything, it should serve as a release for sexual desire.

I can hardly think of any circumstances in which censorship is justifiable. You don't mess around with children. But you think about censoring only in extremely rare sorts of circumstances because censorship is a disease that spreads. If you start censoring pornography, the next thing to be censored will be certain political books, and then certain religious books, and then certain aesthetic books. Just 20 years ago in Red China they burned virtually all the books and half the librarians, too. Tens of thousands of books were destroyed, and thousands of teachers were killed. And we forget all about things like that and about how lucky we are.

Jean M. Auel: Attempts have been made to censor both *The Clan of the Cave Bear* and *The Valley of Horses*. Recently I got a letter from the librarian of the public library in Dastrop, Texas, saying there were three people who had come to the library who said they were from the Moral Majority and wanted *The Valley of Horses* pulled off the shelves because there was nothing in it of value, and besides that, there were "a few passages of prurient interest." The librarian went on to say that there were already 18 people who had signed a petition to ban my next book, *The Mammoth Hunters*, which had not yet even been published.

I took the time to write a long, careful, comprehensive letter to the people involved in the Dastrop situation. I included three or four letters I'd received from readers. These were people—one of them was eighty-four years old—who loved reading and who mentioned that they were unable to afford to buy books and had to get them from the library. I wanted to make the point that this is the kind of person they are really depriving. ∞

What you don't know can hurt you

MIRACLE NUTRIENT?

BODY

By Gerald L. Hunt

The patient was in her early fifties. Because of rapidly degenerating heart function, doctors gave the woman no more than a couple of weeks to live. Today, two years later, she is alive and well; her heart is strong, and she's remarkably active.

The woman participated in a University of Bonn study conducted at the Hospital of Rehabilitation in Bornheim-Merten, West Germany. She was so desperately ill that her cardiac output—the total volume of blood being pumped from the heart—had dropped to life-threatening levels. Traditional medications like digitalis, beta-blockers, and vasodilators had no beneficial effect. Coenzyme Q10 supplements, vitaminlike supplements, were then added to her diet. Within five weeks her cardiac output rose to the point where her heart was again pumping healthy amounts of blood (4.5 liters per minute).

The recoveries of ailing heart patients are only a small part of the story of coenzyme Q10 (CoQ for short). Dr. Karl Folkers, director of the Institute for Biomedical Research at the University of Texas-in Austin, claims that the nutrient is being considered in the treatment of many other serious diseases.

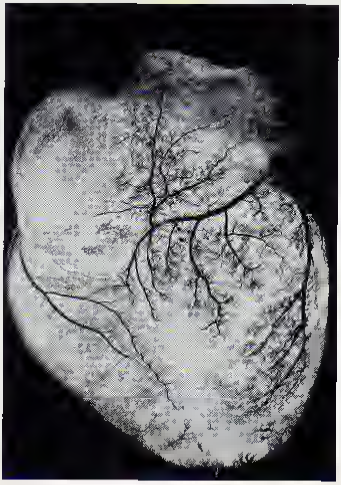
CoQ is a biochemical found in such foods as beef, sardines, spinach, and peanuts—yet paradoxically, it is a compound that many humans may be deficient in. "CoQ is an essential nutrient that supplies the biochemical 'spark' that creates cellular energy. Without it, various mechanisms in the body quickly begin to fail, exposing us to a host of major medical problems," explains Dr. Emile G. Bliznakov, who is president and scientific director of the Lupus Research Institute and author of the book *The Miracle Nutrient Coenzyme Q10*.

Although CoQ is relatively new to medicine, it is old to science. The compound—also known as ubiquinone—was first isolated by Dr. Frederick Crane and his associates at the Enzyme Institute of the University of Wisconsin in 1957. Crane found that CoQ controls the flow of oxygen within individual cells.

The nutrient has become the subject of intense study worldwide. To date, hundreds of papers extolling the benefits of CoQ have been published in Japan, the Soviet Union, Europe, and more recently, the United States.

Last year the prestigious *American Journal of Cardiology* featured research on CoQ's effects in combating the painful heart problem angina pectoris. This study, conducted by researchers from the Department of Internal Medicine at Hamamatsu University in Japan, states that "CoQ is a safe and promising treatment for angina pectoris."

Researchers at the Free University in Brussels have demonstrated that CoQ boosts the performance of the heart, even after cardiac disease has reached a severe stage. A six-year study at the University of Texas found a 75 percent three-year survival rate among congestive-heart-failure patients who took CoQ while undergoing conventional therapy. This is compared with a 25 percent survival rate for those receiving just traditional therapy. A combined study between the Center for Adult Diseases in Osaka, Japan,



CoQ: Can it help patients with heart disease?

and the University of Texas found that CoQ had the ability to lower high blood pressure. When CoQ supplements were taken by people suffering from hypertension, their blood pressure fell—without dietary changes or medication.

Presently, more than 12 million people in Japan—where most of the pioneering research on CoQ has been conducted—take daily doses of CoQ, prescribed by their physicians as the "medication of choice" for prevention and treatment of heart and circulatory diseases.

"CoQ is no panacea. There's still more research to be done," cautions Dr. Michael Walczak, associate editor of the *Journal of Applied Nutrition*. "However, CoQ is certainly showing action against a wide range of problems. It is a fascinating discovery that has already generated a considerable amount of interest and study." The American Medical Association, too, is aware of CoQ research but has yet to review the studies.

Folkers, however, has gone on to quantify the importance of CoQ to human life. (His findings have been substantiated by other scientists around the world.) According to his projections (based on autopsies of diseased human hearts, biopsies from healthy hearts, and other organ and tissue samples), once internal levels of CoQ drop below 25 percent of normal, disease may ensue. And if levels drop to a 75 percent deficiency, death may follow as a natural course.

Folkers explains, moreover, that his latest research suggests the body's ability to "extract" sufficient CoQ from food sources appears to decline with age and may "turn off" altogether at some point. "The next puzzle is discovering why this happens—and when," says Folkers.

CoQ is available over the counter in the United States. And the Food and Drug Administration is currently reviewing CoQ studies. Until it pronounces acceptance of CoQ's benefits, however, no claims can be made for the nutrient as a medicine. Folkers predicts, however, that CoQ will one day be accepted as an effective supplement to other types of medical therapies. ∞

ARTIFICIAL INTELLIGENCE

By Steve Ditlea

It would be the perfect alibi. Suspects in a bank heist produce a photo proving their whereabouts at the time of the robbery. They were at a ball game miles away from the scene of the crime. No amount of examination of the photo can reveal any doctoring—at one time easily detected when the tampering was done by hand. But this photo is a silicon fake, a technological original.

Although the computer technology to produce such photos is already in everyday (though far from widespread) use, the next generation of personal computers will have the graphic resolution and memory capacity necessary to make the technology commonplace. This month IBM will probably introduce its first microcomputer with the new Intel 80386 chip. Its extraordinary processing capabilities will give home computer owners the power to doctor their own photographs. To do so, they will need a scanner to read the photographic information into the computer, a high-resolution monitor, and either a laser printer or a camera to record the results. And IBM is by no means the only company bringing out machines with the 80386 chip. Compaq, in fact, already has a similar machine on the market, although without the graphics capability. The adage that a picture never lies soon may have to change.

A magazine cigarette ad illustrates the technology's versatility. It depicts a team of cowboys herding cattle in a cloud of dust. The scene is a composite of nine different photos seamlessly blended together by digital processing. A cowboy has the body of one model and the head of another. Several of the longhorn steers were electronically cloned and added to the pack. To even the most discerning eye there's absolutely no way of telling that the scene wasn't shot on the wild plains of America.

"The majority of images that you see in advertising are no longer real," says Raphaele, the Houston-based electronic retoucher responsible for this ad and others like it. "In the old days there was a lot of touching up of photos, but with computers it's much easier to do and completely undetectable," she says.

Both the custom-made system that Raphaele uses and the more common, but still very expensive, Crosfield and Scitex digital image processors work in a similar manner. Original photos are scanned and translated into a pattern of binary numbers. The basic unit of each image is a picture element, or pixel, which is electronically categorized, indicating its color and intensity. When displayed on a monitor screen, image areas or individual pixels can be easily altered, moved, or substituted by the console operator using a hand-held instrument similar to a mouse. The result can be a set of color-separation negatives ready for printing, or a transparency that's an original in its own right.

But as revolutionary and appealing as digital processing was for designers, it has not been without its drawbacks. It has, for instance, made life more complicated for numerous lawyers. New York artist Nancy Burson has used digital processing frequently for her artwork and several times for the FBI (she once artificially aged the faces of missing children to aid the agency's search). When a lawyer prepared her for possible questioning in a landlord–tenant suit for which she had photographed an apartment building, he asked (without even realizing that she specialized in digital processing), "Are these the actual images that you saw through the lens?"

"I can see why there would be suspicion of photo evidence," says Burson, "especially from someone like me."

So far no criminal cases have involved digital faking. "This kind of crime hasn't come into play yet," explains Gerald B. Richards, unit chief for document operations and research at FBI headquarters in Washington, DC. "There are few crimes in which photographic evidence is the deciding factor. But," adds Richards, "as digital image processing gets easier to use, people may find ways to apply it to crimes. What we'll do then, only time will tell."

Phantoms of the optical: computers that can manipulate photographic images

WHY JOHNNY CAN'T THINK

MIND

By Norman Lear

When it comes to science education, my personal experience—and now my worries for the future—may be typical of my generation.

I'm a man in my sixties. I learned a little about science in school, several decades before the era of spaceflight, computers and genetic engineering. During World War II, I had the opportunity to study applied aerodynamics as a radio operator/gunner in the Air Force. For the past three decades, I've been a television writer and producer and have learned something about the daily miracle of TV production and broadcasting.

In other words, when it comes to science, like most people of my generation, I might charitably be classified as marginally literate.

Here's what worries me. The generation of Americans that's growing up now will need to cope with a world much more technologically advanced than the one I entered. But they're even more ill prepared than I was. And I fear that the inadequacies of the science education that they've received are typical of their schooling in other important subjects as well.

Recently, I've had the opportunity to learn about the state of science education—and education in general. Through my work in People for the American Way, I came to learn about how textbooks and curricula have deteriorated, largely as a result of pressure by the religious right and other groups to avoid mention of controversial subjects.

It came as a little bit of a surprise to me that more than six decades after the Scopes trial, the teaching of evolution is still on trial. For a scientific theory to be banished from the textbooks and banned from classrooms—not because it has been disproved but because it offends some people—is an alarming indication of the state of science education.

Many educators have told me that alarm *is* warranted. Our textbook reviews have discovered that the censorship of evolution is typical of the declining quality of science textbooks. Instead of serving as intellectually stimulating classroom materials that encourage students to learn for themselves about the natural world, science texts have degenerated into pedagogical pabulum that encourages memorization and rote learning.

These facts explain why we may be in the process of producing a generation of scientific illiterates. Consider these recent news stories:

- In a survey conducted for the National Science Foundation, only one third of the public understood what a molecule is, fewer than one third understood radiation and only one sixth understood DNA.
- The same study found Americans suspicious of science and embracing pseudoscience and even superstition. Fifty-three percent declared scientists are dangerous because they know too much, 46 percent rejected the theory of evolution, 43 percent believed UFOs carry visitors from outer space, and a significant number expressed a belief in astrology.
- During 1986, Japan—a country half our size—graduated twice as many science Ph.D.s as the United States did.

Not only science, but also hundreds of controversial subjects have been downplayed—or eliminated entirely. Censorship by organized pressure groups—and self-censorship by textbook publishers—affect treatment of such tragic chapters of history as slavery, the Holocaust, the Great Depression, and even such literary classics as *Romeo and Juliet*.

Curiously enough, there's one issue on which I find myself agreeing with Jerry Falwell and Pat Robertson. Textbooks and curricula *do* shortchange the subject of religion. This view was confirmed by a review of high-school textbooks conducted by a panel of historians and educators for People for the American Way; they found history texts minimize the important role religious people, religious values, religious leaders, and religious institutions have played—and continue to play—in American life.

What's lacking in science curricula is lacking in education in other subjects as well—not only specific information but respect for the spirit of free inquiry, which is at the heart of the scientific method and any education worthy of the name.

For anyone to be denied an education is a personal tragedy, but if this generation grows up uneducated, it will be a national tragedy as well. Today's high-school students will inherit awesome responsibilities: to revive our stagnant industrial base and develop new industries; to find a way that the world's nations can live in peace at a time when a growing number of countries have the capacity to destroy the world; and to preserve and expand our democracy at a time when an anxious people may be vulnerable to demagogues preaching a politics of scapegoating and simple solutions. These challenges will certainly overwhelm a generation cheated of the opportunity to study modern science, to read the classics, or even to think for themselves.

Thirty years ago, when the Soviet *Sputnik* launch started Americans thinking about the failures of our educational system, there was a popular book called *Why Johnny Can't Read*. Three decades later, a similar book might be entitled *Why Johnny and Janey Can't Think*.

Is Darwinism an endangered species?

CONTINUUM

CENSORING THE PARANORMAL

Unter Charles Fort called them 'the damned." Debunkers call them superstitious nonsense that threatens to undermine the fabric of science. Christian fundamentalists call them satanic manifestations that undermine faith in God. Other people simply call them anomalies.

Anomalies are things, or alleged things, that don't fit. They can be minor oddities, of no interest to anyone except a scientist in a highly specialized discipline. Or they can be something else: something hinting at dramatic possibilities and attracting widespread attention and controversy: a UFO sighting, a psychic experience, an encounter with a poltergeist, a report of an unusual animal not known to conventional zoology. Anomalies are nothing new. As long as there have been human beings, people have claimed experiences with phenomena that, according to the prevailing religious or scientific orthodoxy, were not supposed to exist. Some, such as those unfortunates who made such claims during the Inquisition, were burned at the stake for it. Today the burning goes on, if only metaphorically.

In 1977 a group of prominent academics and journalists—few of whom had firsthand experience with anomaly research—formed the Committee for the Scientific Investigation of Claims of the Paranormal (CSICOP). The committee, whose members included such luminaries as Carl Sagan and Harvard zoologist Stephen J. Gould, declared as their mission nothing less than the salvation of Western civilization from "irrationality" and "dangerous sects," which, because they accepted the reality of anomalies, opposed science—or so CSICOP charged.

Not long afterward CSICOP complained to the Federal Communications Commission about an NBC documentary that treated paranormal phenomena more sympathetically than the debunkers liked. Although CSICOP alleged that the point of view the documentary represented was harmful to the public, the FCC, unimpressed, refused to act.

In one strange incident CSICOP official Philip J. Klass, learning of a forum on anomalies research that the University of Nebraska was sponsoring, called the school to protest that CSICOP's views were not being represented and that, moreover, in questioning the United States government's word on the nonexistence of UFOs, speakers at the conference were seeking "what the Soviet Union does—to convey to the public that our government cannot be trusted, that it lies, that it falsifies." As a patriotic American, I very much resent [this]." After Klass threatened legal action against the university, it canceled its sponsorship of future conferences of this kind. Klass withdrew the threat and pronounced himself satisfied with the university's action.

Since then satellite groups of debunkers have proliferated all around the country, determined to do battle with "pseudoscience" real and imagined. Not content simply to argue the issues on their merits, they have harassed colleges and universities into dropping (usually noncredit) courses in parapsychology, conducted vituperative campaigns against anomaly proponents, and done—in the words of Philadelphian Drew Endacott, one of their number—"anything short of criminal activity" to get "the point across to people who have no demonstrated facility to reason."

As the antianomaly hysteria has escalated, even some skeptics have begun to express alarm. Psychologist Ray Hyman, a respected critic of parapsychology, speaks of a "frightening fundamentalism" in all this, a "witch-hunting" mentality that has nothing to do with real science. CSICOP cofounder Marcello Truzzi, a sociologist who left the organization when he grew concerned that it was becoming an "inquisitional body," says that some debunkers have gone "berserk."

In fact, many scientists do not share these skeptics' certainty that all anomalies are bogus. In 1969 the Parapsychological Association was accepted as an affiliate of the American Association for the Advancement of Science (AAAS). Ten years later the AAAS's newly elected president, Kenneth Boulding, declared: "The evidence of parapsychology cannot just be dismissed out of hand." In recent years polls of scientists and academics have revealed a considerable degree of open-mindedness on the subject. And in 1976, when physicist Peter Sturrock polled the members of the American Astronomical Society, fully 80 percent agreed the UFO phenomenon deserves scientific attention. Several of the astronomers described their own UFO sightings.

If history is any guide, most supposed anomalies will eventually be explained in conventional terms, either as delusions or as misinterpreted, mundane events—and a few will prove rather more interesting than that. Meanwhile, it's time to defuse the hysteria and get back to the serious business of dispassionate investigation.—*JEROME CLARK*

CONTINUUM

PROFESSOR SPLAT

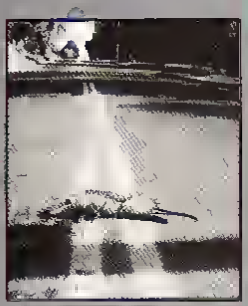
Part satire part scholarship *Common Animals of Roads, Streets and Highways A Field Guide to Flattened Fauna* describes familiar ground—road kills

This antiecosystem is the academic niche of Roger Knutson biology professor at Luther College in Decorah, Iowa His field guide covers mimicry—how to distinguish hubcaps from squashed turtles Tips on collecting dead fauna include the suggestion to merely take pictures and leave most fur pies which may have fleas or rabies, safely on the pavement As for the behavior of road kills it's limited, notes Knutson to 'an occasional wing flap from the breeze of a passing truck "

Some creatures are bound for the road Porcupines and skunks are recruited when they greet approaching cars with waving tails Roads appear to bats as just another river until big fast objects blow their circuits Toads meet the tread in a hunkered position Stupid habits like these translate into classic frozen poses that motorists can readily spot Knutson shows tracts and positions in photos and silhouettes—photocopies of the real thing

Ten-Speed Press will release the tome in time for this summer's motoring

—William Mueller



Flattened fauna Their behavior is typically limited

The absence of blue pigment in blue jays was documented more than 60 years ago by naturalists who suggested that light scattering was responsible for the feather colors Now that theory has been proved

THE COLORLESS JAY

If there's no blue pigment in the feathers of the blue jay—and there isn't—then why is the blue jay blue?

The blue jay, a physicist recently revealed, is blue for the same reason the sky is blue In the barbs of blue jay feathers, tiny, boxlike transparent particles—called alveolar cells—bounce blue light toward the observer while allowing other longer wavelengths of light to pass through In the sky the same phenomenon called Rayleigh scattering occurs via tiny molecules of gas that scatter blue light through the atmosphere

Leonard W Winchester, Jr of Science and Technology Corporation in Hampton, Virginia, and his former student Raymond Leonard of Fairfield University in Connecticut put two spectrometers and a computer to the task of proving that Rayleigh scattering accounts for the blueness of blue jays as well as bluebirds blue herons parakeets and even peacocks Using blue jay feathers collected for them by the Connecticut Audubon Society the experimenters demonstrated both the scattering of blue light and the transmission of the other wavelengths

Indeed, Winchester says not only are blue jays resplendent without blue pigment but no part of any vertebrate—not even the blue eyes of Frank Sinatra or Paul Newman—contains any blue pigment.—Dava Sobel

TO WEIGH A MOTE OF COMET DUST

The challenge from NASA is to create a scale tiny enough and sensitive enough to weigh a particle of dust in a comet's tail—an item guesstimated at about one trillionth of a gram.

Physicist/inventors Harvey Patashnick and Georg Rupprecht propose to accomplish this feat in zero g with a microbalance they devised that relies on inertia instead of gravity to measure mass. They have already used the patented device to quantify particles of smoke, diesel exhaust, and other vanishingly small substances in environments as harsh as the tail pipes of automobiles and the smokestacks of power plants.

"What we're trying to do now is refine the instrument," explains Patashnick. "When we're through, we'll have the most sensitive microbalance ever made."

Their invention goes by the unwieldy name of tapered element oscillating microbalance, or TEOM™ for short. It consists of a tapered hollow tube and accompanying electronics. In operation, a feedback amplifier sets the hollow tube to vibrating like a tuning fork. When the collection surface at the tip of the tube encounters a mote of dust, the frequency of the tube's oscillation slows, and a microprocessor translates the frequency change into a measurement of the particle's mass.

In their long collaboration, Rupprecht and Patashnick have published experimental and theoretical papers about the nature of the ice in comet heads, testing their theories by creating miniature comets in the laboratory. Now they hope NASA will use their TEOM™ to dog real comets in solar orbit and to scrutinize the dust in the tail for clues to the origin of the solar system. —Dava Sobel

"The censor is usually a man who has been severely repressed as a child, practices self-repression as an adult, and wants others to suffer as he did and does."
—Eli M. Oboler

Rupprecht (left) and Patashnick examine the hollow, tapered tube at the heart of their new TEOM™ comet-dust weighing machine.

The more archetypes you see, the healthier the dream.

RECURRENT DREAMS

A recent study by psychologists Ronald Brown and Donald Donderi indicates that our dreams do indeed have something to tell us—and recurrent dreams may be the most telling of all.

The researchers studied 30 people who were having recurrent dreams, 18 who had had recurrent dreams in the past and no longer did, and 19 who had never experienced a recurrent dream. Two questions were investigated: Did having recurrent dreams have anything to do with psychic well-being, and were there any differences among the ordinary day-to-day dreams of the people in the different groups?

The subjects filled out six questionnaires that measure such aspects of well-being as depression, adaptability, and neuroticism. They also wrote down the dreams they remembered every morning for two weeks. The dream reports were given to outside raters who rated the dreams for factors like hostility, friendly and aggressive interactions, success and failure, positive and negative emotions, anxiety, and archetypality. Archetypality is a concept developed by psychoanalyst Carl Jung, who believed that certain symbols—archetypes—represent inner parts of the personality that need expression.

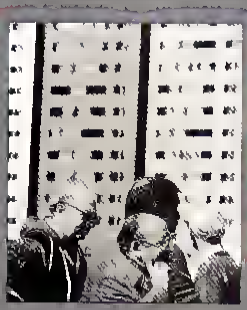
Both the questionnaires and the dream ratings showed the same differences among the three groups. The people who had had recurrent dreams but no longer did were happier and had happier, more archetypal dreams than the people who *had never experienced* recurrent dreams. The latter were happier and had happier, more archetypal dreams than the people presently having recurrent dreams.

"You feel the way your dreams suggest you feel," Donderi says. The data seem to confirm the observation of Jung that recurrent dreams often indicate some unresolved personality difficulty. Since the former recurrent dreamers were the happiest group and had the most archetypal dreams, the study also lends support to Jung's belief that the healthiest people are those with the most access to the part of the unconscious that generates archetypes.

The data don't explain why former recurrent dreamers should be happier than people who've never had a recurrent dream, but Donderi is willing to speculate. "It may be that working out a recurrent dream represents some truly positive self-realization," he says.

—Leah Wallach

CONTINUUM



Bettors Computing seven variables to pick a winner

RACETRACK SMARTS

The old concept of horse sense has just been given new respectability by a pair of researchers who've taken to hanging out at racetracks In fact say psychologist Stephen Ceci of Cornell University and sociologist Jeffrey K Liker of the University of Michigan, the complex analytical ability necessary to pick winning horses has little or nothing to do with the kind of intelligence measured by I Q tests

Ceci and Liker selected 30 middle-aged and older habitués of a harness-racing track in Delaware Individual I Q 's in the group ranged from a high of 130 to a room-temperature low of 80 Yet the men's ability to pick winning horses ranged from a highly respectable 33 percent to an almost unbelievable 93 percent

To further analyze the components of this horse sense Ceci and Liker designed 50 hypothetical races, then had their subjects pit their odds-making ability against that of professional handicappers In doing so, the researchers found the gamblers used an extremely complicated analytical system, computing as many as seven different variables (track condition, length of race, skill of driver, and so on) just to predict how fast the horses would run the last quarter mile Again, Ceci says "the low I Q 's did just as well as the highs All were equivalent in the complexity of their thinking." Ceci thinks that I Q tests may be incapable of measuring this kind of complex "real world" intelligence

—Bill Lawren

NOISAR

Out there in the great celestial zoo, along with the pulsar and the quasar is a new object tentatively termed a *noisar* by John Middleditch and Bill Priedhorsky of Los Alamos National Laboratory in New Mexico

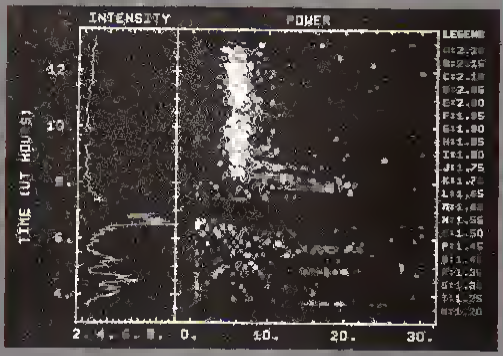
The premier noisar is located in Sco X-1, the first discovered and most familiar X-ray source in our galaxy It is distinguished by its unusually noisy signal and astrophysicists are scrambling to interpret what its senseless message means

The noisar is a rarity Only a few hundred X-ray sources are known to exist in the 100-billion-star Milky Way Of these, a mere handful have been identified as noisars Middleditch who coined the term as an improvement on *quasiperiodic variable X-ray source* explains that the object in question is undoubtedly a pair of stars orbiting each other in a binary system One must be a neutron star—an ancient, collapsing star of superdense material

The X rays are generated by the dynamics between the two stars The companion star spews material (mostly hydrogen and helium) into space, where it falls toward the powerful gravitational pull of the neutron star As the matter strikes the surface of the neutron star at high speed, the collision releases tremendous energy some of which flies out into space in the form of X rays

The question for Middleditch and other astrophysicists now is, What is the nature of these noisy neutron stars? And why is their signal so incoherent?

"At any rate," quips Middleditch "they're not dullards"—Dava Sobel



Power-density contours are shown in this X-ray image of Sco X-1 home of the first noisar to be discovered in our galaxy

NATIVE-AMERICAN MASONS

As a thirty-second-degree Mason photographer and former newspaper publisher John "Doc" Loughran is well versed in the symbolism and traditions of Freemasonry So he was amazed when, ten years ago, while photographing some ancient Anasazi archaeological sites in the West he noticed remarkable similarities between the Indians' men's temples and his own Masonic lodge

"The furniture was placed the same [way], and the area where the main rituals took place seemed eighty percent identical to the Masonic lodges in America now," Loughran recalls "The only difference was that these temples were round Then I did some research and found out that in northern Africa the Masonic temples started out round"

Loughran theorizes that if Native Americans practiced some sort of Freemasonry, then the prevailing belief that North American Indians never possessed a written language has to be wrong

John 'Doc' Loughran's photograph of an Anasazi men's temple. Loughran claims the arrangement of furniture and the shape of the temple is similar to that of Masonic temples found in northern Africa

"Masonry is built on learning. So these people *had* to have writing," he insists.

Calling himself a "prehistorical detective," Loughran began searching for the lost writings of the Anasazi. He explains that by using his knowledge of Masonry to decipher symbols left by the Indians, he was able to recognize a locator device that in turn led him to a hidden, ancient Indian library.

Loughran refuses to divulge just where he made this discovery three years ago, except that it was "in the western United States, on private land." He claims, however, that he has in his possession approximately 50 rock and clay tablets, which he dates between A.D. 1000 and A.D. 1200. Describing the tablets as ranging in size up to two feet by one foot, Loughran says the most startling part of his discovery is the language the Indian "books" appear to have been written in—Arabic.

—Sherry Baker

"As it is an ancient truth that freedom cannot be legislated into existence, so it is no less obvious that freedom cannot be censored into existence. And any who act as if freedom's defenses are to be found in suppression and suspicion and fear confess a doctrine that is alien to America."

—Dwight D. Eisenhower

1,200-MPH GARDEN

Eighty-four-year-old inventor Lawrence Stanhope has one of the more bizarre gardening theories of the century. He has patented what he calls "perpetual sunshine," a one-acre space garden planted on a platform that will zoom west at precisely the same speed as the earth rotates east.

Stanhope, who lives in Lakewood, Florida, says his garden would fly at about eight miles above the earth, moving at some 1,200 miles per hour, a feat that is plainly going to be quite expensive. The inventor frankly acknowledges that there are going to be technical problems and admits the whole contraption might end up costing more than $1 million. "But what's a million dollars? It's nothing," he says.

Stanhope is well aware that plants need darkness about as much as they need light to flourish. That's why his one-acre space garden has four rotating levels involving direct sunlight, fluorescent lighting and darkness in varying degrees.

Stanhope's scheme does, of course, raise some obvious questions. Wouldn't it be dangerous, for example, to fly a one-acre plot at an eight-mile-high altitude, only a few thousand feet above commercial aircraft lanes? How would the gardens be launched? And how would you power them along at 1,200 mph?

Stanhope's reply: "I'm not a technologist. I leave that sort of thing to NASA or the people at the Jet Propulsion Laboratory. They're the experts."

—George Nobbe

Flying fruits? That's what one spirited inventor wants

CONTINUUM

Assortment of Stradivari violins. The secret behind the dulcet tones of these ultimate instruments might be a slimy, microscopic water fungus that grew in the spruce and maple lumber that was used

STRADIVARI'S SECRET

The secret behind the dulcet tonal quality of music from the violins of Stradivari and Guarneri has little to do with the genius of their makers, says a Texas A&M professor of biophysics and biochemistry. He insists most of the credit belongs to a slimy, microscopic water fungus that grew in the spruce and maple lumber from which seventeenth- and eighteenth-century craftsmen fashioned their magnificent instruments.

Joseph Nagyvary says the great violin makers used wood from logs floated downstream from monasteries in the Tyrolean Alps to the Italian towns where the instruments were made. The river water was rich in calcium, potassium, and sodium and contained fungi that ate away the gummy material in the wood—thereby pitting it, making it lighter and drier and forcing the cell walls to separate.

Nagyvary, using an electron microscope, has detected pitted holes in the wood of the instruments made by Stradivari and Guarneri. But his theory, while embraced by many modern violinists, has not endeared him to violin manufacturers and dealers, who believe that dry wood—then as now—was used.

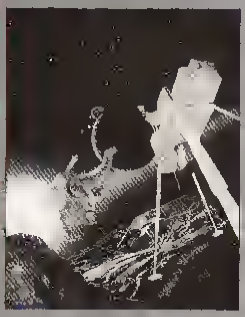
Says he, "They deny it because it is terribly embarrassing to admit that most violins were made of the wrong wood during the last one hundred and fifty years. For the aficionado, it is hard to accept that the missing secret ingredient behind the Stradivarius tone is not human ingenuity but merely a fungus." —George Nobbe

LUNAR HELIUM

Pundits once dreamed of precious metals to be mined from beneath the lunar surface. But the first Apollo missions seem to have spelled the death of those dreams. Analysis of lunar rocks revealed no gold, no uranium—indeed, nothing to strike the miner's fancy. Now, however, a team of nuclear engineers from the University of Wisconsin at Madison has come up with a new reason to revive the old idea, in the form of a rare gas known as ^{3}helium (a form of helium with one less neutron).

^{3}Helium, explains team leader Gerald Kulcinski, has long been of interest to physicists as a potential fuel for nuclear reactors that are based on fusion (the process that ignites the sun) instead of fission (the process that ignites atomic bombs). The gas would be ideal, experts believe, because it can be converted to energy far more efficiently than deuterium (the present candidate for fusion-reactor fuel) and because its waste is so low in radioactivity that it could be buried near the earth's surface. Unfortunately, the experts know, ^{3}helium is almost nonexistent on Earth.

But recently Kulcinski and colleagues happened to read an Apollo-era NASA list of the components of lunar soil. Their eyes lit up when they saw that one of the



One day we may mine the moon for a rare form of helium

major gaseous components was ^{3}helium—enough of it, they calculated, so that the moon's surface could ultimately supply America's electrical needs 500 000 times over. Kulcinski estimates that apparatuses to collect ^{3}helium could be in place on the moon by 2015 "which would just about coincide," he says, "with the building of the first fusion plants on Earth."—Bill Lawren

RETURN OF THE TASMANIAN TIGER?

Is the Tasmanian tiger really extinct? Not according to Kevin Cameron, an experienced Australian aboriginal tracker.

Cameron was hired by the Australian government to investigate sightings of the Tasmanian tiger (also known as the Tasmanian wolf, or thylacine) on the mainland of Australia, where it is believed to have been extinct for 1 000 years. (The last known living specimen was captured in Tasmania in 1933 and died in a zoo in 1936.) Cameron claims he saw at least four separate animals in the dense forest, each displaying the tiger's characteristic "drunken" gait. The authorities remained skeptical of Cameron's findings, however, so he went back for more concrete evidence.

Fascination with the legend of the Tasmanian tiger has stirred innumerable searches, but there has never been any proof that the creature still exists. Cameron's second trip produced photographs of a creature about the size of a large dog, with dark bars

The extinct thylacine. Hiding out on the mainland of Australia?

stretching across its rump. "This is a distinct characteristic of the tiger," says Athol M. Douglas, retired senior experimental officer at the Western Australian Museum in Perth, who was brought in to examine Cameron's findings, which include casts of footprints. "The prints show the forefeet with five toes and the hind feet with only four toes," says Douglas. "And the tracks were made in damp soil while the animal was stationary, so the impressions were very clear." According to him, this difference between the front and back toes is also a typical trait of the tiger.

Douglas, who is also a renowned bushman, has been chasing reports of the Tasmanian tiger for 55 years. He believes Cameron's sightings are authentic, even though accepted scientific knowledge indicates otherwise. Douglas estimates that there are six or so tigers living and says it is just a matter of time before a specimen is discovered for certain.—Cathy Spencer

YOUTHFUL RINGS

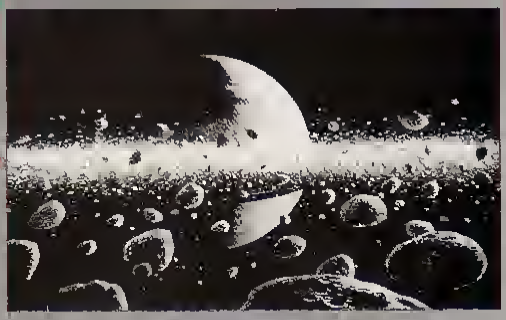
Planetary rings are not as eternal as they look from Earth. Closeup views from the *Voyager* spacecraft show "young and dynamic" rings, says University of Colorado astronomer Larry Esposito.

Astronomers have long believed that Saturn's bright rings are as old as the solar system. Most thought the rings discovered more recently around Uranus and Jupiter were also very old until they looked closely at data from the *Voyager* spacecraft.

Thin, massive rings like Saturn's bright inner B ring may have been around for all of the 4.5 billion years since the solar system formed. However, Esposito believes the outer A ring (the one outside the gap visible in any photo of the rings) is only about 10 million years old, a mere youngster in geologic time. The A ring is several times thicker yet much less massive than the B ring.

The rings around Jupiter and Uranus seem even younger—and are in constant flux. The dust particles from micrometeorite impacts that form these planetary rings can be lost in as little as a century. Pictures that *Voyager II* took from behind Uranus provide some evidence that the particles forming the rings are being destroyed at a pretty high rate," Esposito says.

The next piece of the puzzle awaits *Voyager II* when it visits Neptune on August 24, 1989. Ground-based observations indicate Neptune may have partial rings, which have to be young. *Voyager* will see what's really there.—Jeff Hecht



Artist's vision of Saturn's rings. Once believed to be as ancient as the solar system itself, one ring may be a mere 10 million years old.

One can well understand why regimes that seek to exercise total control over life mistrust works of fiction and subject them to censorship. Emerging from one's own self, being another, even in illusion, is a way of being less a slave and of experiencing the risks of freedom."

—Mario Vargas Llosa

CONTINUUM

MARS BALL

They call it the Mars Ball although it's really not a ball at all. In fact, with its spindly axle, its hot-water-bottle wheels and its miscellany of protruding instruments, it looks like a combination of a caveman's hot rod and a Rube Goldberg hangover. But if a group of students at the University of Arizona has its way, this unlikely vehicle may well become the first to actually roll across the surface of Mars.

The Ball, which grew out of a student project in the University of Arizona's planetary science department, has a simple but ingenious propulsion system. Wedge-shaped air bags in the two wheels are inflated in series by an onboard air pump, then partially deflated to impart motion. Theoretically, the Ball can climb 25-degree slopes, roll over obstacles one meter high and tumble continuously without injury. Equipped with a bevy of instruments in its axle, it could take photographs, do surface analysis, and even collect rocks. The current model will soon be tested in the deserts of northeastern Arizona, which, according to group spokesman Daniel Janes, "are an excellent analog to Martian terrain—minus the cactus, of course."

NASA has been interested enough to fund the project twice for a total of $70,000. If successful, the Ball could simply be dropped on the surface of Mars via parachute, eliminating the need for the costly retro-rockets that landed the 1976 *Viking* probes.—Bill Lawren

The Mars Ball: A student project destined for the red planet?

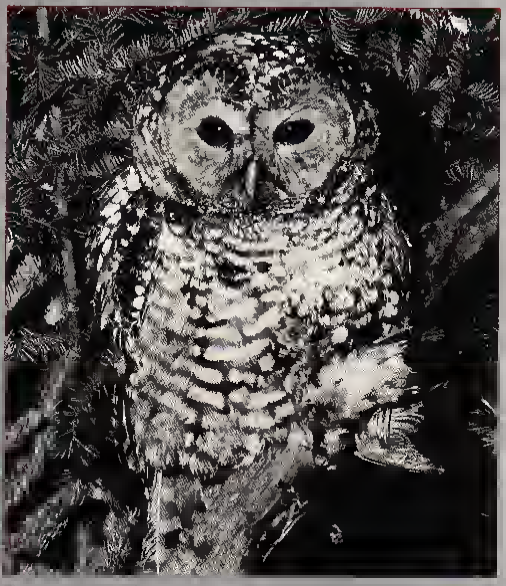
"If I loosen my bridle on the press, I shall not stay in power for three months."
—Napoleon

THE POLITICS OF OWLS

Most conservationists would agree that the best way to ensure the preservation of an environmentally threatened animal is to get the animal officially listed with the Department of the Interior as an endangered species. Yet one animal, the spotted owl of Washington and Oregon, could eventually go the way of the dodo because prominent conservation groups are reluctant to have the owl declared endangered. The reason? According to Florida State University ecologist Dan Simberloff, it's a pure case of political pressure.

There are about 4,000 pairs of spotted owls left in the ancient forests of the Pacific Northwest. Each pair needs almost 4,000 acres of forest to survive. But timber interests, which Simberloff says stand to make up to $10 billion by logging these currently unprotected areas, have cast a covetous eye on the owl's habitat. The only agency presently standing in their way is the U.S. Forest Service, whose most recent proposed management plan would protect no more than 2,200 acres per owl pair. "Even they admit," Simberloff says, "that at that rate the owl will be extinct in one hundred years."

Yet some environmentalist groups fear that if they press the owl's case, the resulting flak will give the powerful timber lobby and its congressional allies an excuse to hobble the Endangered Species Act or even to repeal it altogether. The prestigious Audubon Society, for example, has *not* recommended that the owl be listed. "It's an explosive political situation," says Audubon Society spokesman Daniel Taylor, "and our awareness of that does breed a certain caution." On the other hand, says Andy Kerr of the Oregon Natural Resources Council, "why have an Endangered Species Act if you can't use it?"—Bill Lawren



The spotted owl: Clearly endangered, but environmental groups, including the Audubon Society, will not recommend it for protection

"Censorship reflects a society's lack of confidence in itself. It is a hallmark of an authoritarian regime."
—Potter Stewart, U.S. Supreme Court

CENSORING SCIENCE

BY KATHLEEN STEIN

The creationists want to remake science in their own image and likeness. They haven't got a prayer. Or have they?

PAINTING BY CARLOS REVILLA

God's already healing people here tonight!" The preacher's voice arches through the TV, his bulky body, in a polyester maroon jacket, pumping back and forth across the stage. The camera pans over an audience that's busy working up a sweat. "Born-again Christians have a right to be happy," he bellows, his eyes locked in a blank, riveting gaze of excitement. "If I were going to hell I would not be happy."

Everyone's feeling good. I'm beginning to feel good, too, even though I'm confined for the night in this converted freight depot of a hotel in Montgomery, Alabama, on a Sunday. Cares fall away; the brain ceases

to question The comfort of eternal redemption warms like a softly heating electric blanket

The old black woman fishes on the banks of the slow-running Alabama River Her bamboo pole is only about five feet long and her line only another four feet so when she casts, it doesn't go out very far Behind her, lazy freight trains roll past the edge of Montgomery all afternoon in the hazy heat they roll monotonously like thick blood through an artery "I like the Holiness Church" Bertha Lee maintains steadfastly, comparing it with all the others she has been or could go to "I like that church because it makes you feel joy Other churches make you feel dead When I feel joy I feel in the service of the Lord." She has gained special solace from the Holiness Church since her granddaughter was murdered by a jealous lover on a white lady's lawn

In 1965, after he won the Nobel prize in medicine and physiology, the great French biochemist Jacques Monod became increasingly preoccupied with the consequences of science on society's most deeply felt beliefs He wrote in *Chance and Necessity* "Modern societies have accepted the power that science laid in their laps But they have not accepted—they've scarcely even heard—its profounder message the defining of a new and unique source of truth, and the demand for a thorough revision of ethical premises Armed with all the powers enjoying all the riches they owe to science, our societies are still trying to live by and to teach systems of values already blasted at the root by science No society before ours was ever rent by contradictions as agonizing"

In 1986 one could hear the sound of cultures clashing in American courtrooms Last fall three cases focusing on church–state disputes were in various stages of litigation In October Federal Judge Thomas G Hull ruled that public schools in Hawkins County Tennessee must excuse fundamentalist Christian children from reading classes so that they might avoid ideas that violate their parents' beliefs, such as the literal interpretation of Genesis or a strict adherence to an ordained hierarchy—God–man–woman–child The verdict has been appealed to the Sixth U S Circuit Court of Appeals in Cincinnati

At the end of the year the Supreme Court heard arguments on the constitutionality of a 1982 Louisiana law requiring public-school teachers to allow equal time for biblical creationism—whenever they teach evolution This legislation first caught national attention only when a group of 72 Nobel prize-winners hurriedly affixed their names to a friends-of-the-court brief supporting plaintiffs Don Aguillard *et al* who challenged the law

And in Mobile Alabama U S District Judge W Brevard Hand is expected to rule soon on a case challenging 46 textbooks as espousing secular humanism a label creationists stick on anything they think has the earmarks of an "atheistic" philosophy—one devoid of absolute morals The tenets of secular humanism—its "sacred articles", offensive to creationists—include evolution rationalism the scientific method of inquiry criticism of government feminism Big Bang cosmology global government and other ideas that lean toward open-mindedness According to creationists secular humanism is "the religion of the irreligious" If that sounds like a contradiction in terms, try the word *paganism* The public schools cry the fundamentalists, are churches of paganism

In Tennessee when other children open Holt Rinehart & Winston's *Riders on the Earth*—a book that describes Neil Armstrong and Buzz Aldrin's 1969 moon landing and refers to Earthlings as "brothers on that bright loveliness in the eternal cold"—fundamentalist children in Hawkins County may leave the room Presumably to read the Bible With mental straitjackets securely buckled, the imaginations of these children are no longer endangered by the wicked thrills of creative stimulation

> "Mrs Frost's list of offensive information includes the story of Leonardo da Vinci (as epitomizing the spirit of the Renaissance), The Wizard of Oz, and Cinderella."

Mrs Vicki Frost a Hawkins County housewife who initiated the case, thinks *Riders* promotes "sun worshiping" and "internationalism, or one-world government" She told the court that "we cannot be tolerant of religious views on the basis of accepting other religions as our own I am a born-again Christian, and the word of God is the totality of my belief" Frost's list of offensive information includes the story of Leonardo da Vinci (as epitomizing the spirit of the Renaissance), *The Wizard of Oz*, and *Cinderella* During the trial the list of unacceptable tomes grew so long that at one point defense attorney Timothy Dyk threw up his hands, saying "There's no way this woman could attend public school and not be offended"

The Tennessee case, dubbed Scopes II, and Hand's case in Alabama both represent a new round of skirmishes in the forever war between fundamentalist religion and secular society Although many people may have assumed the controversy over separation of church and state had been put to bed once and for all in the aftermath of the first and only Scopes trial in 1925, apparently the issue was just lying dormant If some have believed evolution is an established fact, they don't know the law against teaching evolution in Tennessee was struck down only in 1968 Evolution may be a foundation of all sciences—physics, chemistry, astronomy, and geology as well as biology—but it is considered satanic heresy by the religious right

In the sultry Gulf Coast city of Mobile, in Judge Hand's courtroom where air conditioning was unable to keep out the noxious odors from a local paper mill, an eighth grade teacher testified that his First Amendment rights were thwarted because he was not allowed to teach the biblical view of creation My contention is that my rights as an American citizen and a Christian have been violated because I am not allowed to express my particular perspective within the public arena" complained tall mustachioed Douglas T Smith, for nine years a science teacher at Cloverdale Junior High School in Montgomery "When I walk into a classroom I have to assume whatever the state says is the way I have to think" Smith objects to evolution being taught as fact rather than as secular humanist propaganda He would settle for equal time for "opposing points of view" The plaintiffs in *Smith* v *the Mobile County Board of Education* are involved in a class action suit This means Douglas T Smith *et al* represent all the teachers in Alabama who "believe in God"

Smith is not a lone voice Recent polls show that between 50 and 75 percent of Americans favor that biblical creationism be taught in the public schools And a survey released last November disclosed that out of 1,000 college students in California, Texas, and Connecticut, more than 500 were creationists These creationist students, the study said, were less likely to read books and did less well on exams than those who advocated evolution

Periodically throughout American history intolerance has reared its pea-brained head This time the strangely archaic, irrational upwelling of fundamentalist fury is taking the form of textbook censorship, banned library books, challenged school curricula, TV and radio harangues, and lawsuits Not only are religious fundamentalists forcing school libraries to strip their shelves of offensive texts like those that teach evolution, they have even reportedly banned Merriam Webster's College Dictionary in Florence, South Carolina The minds of children are the battlefields, the schools, the factories of indoctrination

The mainstay of fundamentalism is censorship "Censorship is the strongest drive in human nature" columnist Nat Hentoff reports hearing from a seasoned newspaperman "Sex, a weak second" Censorship of books and school curricula has increased by 35 percent between 1984 and 1985 alone So says a report by People for the American Way (PAW), a Washington-based organization founded by TV pro-

SIGN OUR CENSORSHIP PROTEST CARD

Note the postcard below, at right. It contains a message protesting various actions aimed at banning scientific textbooks from the classroom, as described in this article. If you agree with the statement on the card, please sign the postcard, write your address in the space provided, and mail the card back to us at *Omni* (the card is pre-addressed, just attach a 14-cent stamp). We will then forward the cards to the White House. We urge you to pay special attention to the quote from Thomas Jefferson contained in the text on the postcard. If you agree with Jefferson's sentiments, sign the card and mail it immediately. The future of America may depend on it. —The Editors

ducer Norman Lear (see page 22). Almost sixty percent of the incidents were attempts to censor ideas, information and teaching methods in the classroom," says PAW president Anthony Podesta. "Censors today don't just ban books, they want to ban ideas that differ from their own."

A study of 18 high-school biology texts found that half of the books failed to provide adequate coverage of evolution, and one sixth didn't mention evolution at all. In some, the only reference to evolution is something obfuscatory and confusing—citing such vagaries as "universal change" or "changes over time." Human evolution is called "human history."

"A biology textbook that fails to discuss evolutionary theory is no better than a chemistry text that omits atomic theory," said Wayne Moyer, science director of PAW and author of the study. Moyer also noted many instances of outright factual errors in the texts as well as inadequate explanations of the scientific method and the meaning of "theory." His report, made with the support of PAW, was prepared in order to assist the Texas Textbook Committee in their attempts to get out from under the fundamentalist thumbs of retired oil-company clerk Mel Gabler and his archzealot wife, Norma.

Texas, one of the largest textbook buyers in the country, purchases by a statewide adoption procedure. Unless a textbook is centrally approved at Board of Education hearings, it is not bought. If Texas has tended to dominate the textbook market, the Gablers have dominated Texas—and the publishers. In a sense, Gabler set the stage for the current exudations of censorial piety. Originally attempting to purge school texts of "barnyard morals," the Gablers harangued, harrassed, threatened and escalated their attack to include demands that have contributed to the "dumbing down" of science texts throughout the country.

Pressure against the Gablers has loosened their stranglehold. The rules of the textbook adoption hearings have changed, for one thing. Previously a person could only protest a textbook; now people can advocate as well. And there used to be no time limit on speakers. "Mel would talk all morning," recalls Gerald Skoog, professor and chairperson of secondary education at Texas Tech University in Lubbock and an authority on the history of evolution in textbooks. "And Mrs. Gabler would talk all afternoon; they might go till the next day. Now I believe the speakers are limited to fifteen minutes."

To some people all this righteous indignation and true-believer business—where legions of creationists see a satanic rite in Jack and Jill dancing, while ranting prime-time preachers whip crowds into wild frenzies for Jesus—is the latest surreal joke in a deranged world. Others however see this increasing activity from the religious right as the most insidious threat to civil liberties since the McCarthy persecutions. McCarthy, at least, was out-front with his paranoia. But 20,000 books can be removed from library shelves when no one is looking—as they were in Sarasota, Florida, and a teacher may casually skip the chapter on evolution in a state authorized science text. Indeed, passive avoidance of the subject of evolution is rampant in classrooms around the country.

While book banning and censorship are the most expedient ways to control the flow of "dangerous" information, the equal-time argument is the strategy of choice for today's more sophisticated fundamentalists. And the curious paradox is that educational plurality—equal time—is something liberals find irresistible. Why not present all views and let the kids choose for themselves? Yet the very essence of fundamentalism is a Manichaean absolutism: good versus evil—nothing in between. Any explanation not derived directly from the Bible is derived, in fact, from the Devil. Ergo, Satan himself is the author of evolution. Creationists, of course, really don't want equal time. They want to abolish evolution. Equal time is just a foot in the door.

Why are these people so frightened of an open mind? It is into the fervid heart of the Southern beast I travel to seek a rational appraisal—disco Jesus on the car radio, steam rising from hot, swampy fields. I'm going to visit Delos McKown, chairman of the department of philosophy at Auburn University in Alabama. As a nineteen-year-old, McKown preached around the country on weekends the same way teenage musicians play rock and roll gigs in seedy dives today. McKown, who also has a degree in theology, is the author of a stinging indictment of Evangelicalism, *With Faith and Fury*, a novel about a fundamentalist empire under the direction of a chubby blond faith healer who calls herself "the Handmaiden of the Lord."

McKown sits in his office at the football-obsessed university—a wiry, energetic man in his mid-fifties. He has an enormous sense of humor, but there is a sharpness in his blue eyes that suggests a bird of prey—a shadow of a threat that mindless superstitions and illogical arguments, like furry little rodents, will be pounced on and taloned without mercy.

"What the creationists don't know," he begins, "is that if all the secular humanists disappeared tomorrow, science and science education would easily survive and plague authoritarian, dogmatic religion as usual. The creationists' biggest enemy is science and scientific inquiry. Institutionalized religion is based on mystery, authority, faith, the supernatural, the transcendent - beyond - experience - thus - incomprehensible. If something conflicts with the articles of faith, it must be rejected. Science admits to many mysteries in the cosmos, but it harbors no transcendent mystery. It has no place for authority and little use for faith. Personal convictions don't play a big role."

According to McKown, the creationists are just beginning to have problems. "This evolution business, something that came along one hundred and fifty years ago, is as ancient as Methuselah. Science is going to shock the living hell out of the creationists. Already brain research is demonstrating an utterly physiological concept of a human being. We're eventually going to start thinking of man as Francis Crick says

as a neuronal machine The more we come to that awareness, the less of a place there's going to be for the concepts of free will of the soul Before long we'll realize that mind, as it's traditionally been considered, is nothing whatsoever except a word for some things the brain does I'm forecasting shock after shock after nasty shock

McKown gesticulates like a revivalist on a Saturday night By the end of the century there are going to be such enormous advances in mapping the genome understanding heredity predicting the condition of the fetus—where is the soul going to hang out? The *fundagelicals* [McKown's personal term for the fundamentalists and evangelicals] don't even know this stuff is happening Wait till that hits! Then there'll be a hue and a cry! Will they demand equal time for free will in the psychology courses? Equal time for the mind in neurology class? Where is the sacred person?

McKown sees society drawn into a 'titanic struggle' between traditional wisdom sanctified by scripture and institutionalized religion and science and technology The struggle is going on now, fueled by money and whetted by political appetites The stakes are big

Behind the grass-roots, often naive efforts to control classroom activities and texts are immensely powerful, sophisticated national groups on the religious and political right PAW has noted that 43 percent of the censorship efforts were efficiently organized by such politically shrewd groups as Concerned Women for America headed by Beverly LaHaye wife of prime time preacher Tim LaHaye Phyllis Schlafly's Eagle Forum, the National Legal Foundation, founded by presidential contender Reverend Pat Robertson, the National Association of Christian Educators and others There are fundamentalist communities like Jerry Falwell's Virginia empire and even fundamentalist fun parks

And most recently born-again toys have appeared on the market Florida-based Praise Unlimited's child-size Full Armour of God—including the Shield of Faith, the Breastplate of Righteousness and the Helmet of Salvation—for $24 Grace the pro-life doll which when squeezed says "God knew me before I was born" and a Baby Jesus doll wrapped in a blue blanket with a snap-on nontoxic luminescent halo and a card that reads MY NAME IS JESUS JESUS LOVES YOU I AM YOUR FRIEND PLEASE LOVE ME The doll is available in Anglo black and Hispanic models

Prime-time preachers most notably Pat Robertson control multimedia conglomerates of near-awesome proportions As recently reported by *New York Magazine* Robertson's Christian Broadcasting Network brings in $230 million a year His own talk show *The 700 Club* beams out to 4 4 million Americans and countless millions more in foreign countries

Other fundamentalist organizations have highly lucrative publishing houses devoted to pumping out strategy ideology and rhetoric to the folks There are more than 50 creationist associations in the United States The leading think tanks are the Creation Research Society in Ann Arbor Michigan the Creation Science Research Center in San Diego and the Institute for Creation Research These establishments generally employ 'researchers' who spend their days figuring out ways to dispute evolution and find 'empirical evidence' to turn against science

Meanwhile there are more than 1 5 million scientists in the United States, including 400 000 life and 80 000 earth scientists, according to *Science and Creation* published by the American Association for the Advancement of Science And investigators in these disciplines have shown their overwhelming acceptance of evolution Creationists with comparable professional credentials number about 700 Yet this tiny zealous band is represented at every school-board hearing curriculum meeting or textbook-adoption proceeding

> *"Almost 60 percent of the incidents were attempts to censor ideas, information, and teaching methods in classrooms. Censors don't just ban books, they want to ban ideas."*

Tireless Christian soldiers go armed with the tenets of creation science

Like the latest detergent McKown says, fundamentalism has been put out in a new and improved package It's called creation science and it's selling well Creation science was born in the early Sixties when it became apparent that nothing in secular society was going to inhibit the teaching of evolution Led by biochemist Duane Gish's Institute for Creation Research (ICR), creationists carefully stripped their texts and public writings of references to God Satan the Holy Ghost and Jesus They presented scientific creationism as a scientific-sounding model of the origin of life on an equal footing with evolutionary biology

The model creation science bill that was circulated and passed in Arkansas in 1981—and was subsequently shot down by the Supreme Court—was drawn up by Paul Ellwanger, a respiratory therapist In modified form it still stands with the following points 1) the sudden creation of the universe, energy and life from nothing (by a creator) 2) the impossibility of mutation and natural selection in bringing about the development of living things from a primal organism 3) changes occurring only within fixed limits of originally created 'kinds' of plants and animals (a myth that ignores the living evidence of different species) 4) separate ancestry for humans and apes 5) explanation of the earth's geology by a global flood—what McKown refers to as the 'big wash' or the 'wall-to-wall water' theory 6) a relatively recent beginning of the earth and its creatures—6 000 to 10 000 years ago

Some creationists backing off under pressure maintain that the 'sudden appearance' of life forms is the only essential premise of 'scientific' creationism But as anyone with half a brain can figure out once they slip a stripped-down model into the school systems they'll quickly be back to promote the whole sideshow

Quaint as these ideas may seem they are immensely popular and reassuring But scientists don't realize that Laurie Godfrey, anthropologist at the University of Massachusetts at Amherst, expert on the lemurs of Madagascar and editor of *Scientists Confront Creationism* describes her rude awakening when she taught her undergraduate class in human evolution Some students who'd been won over by creationist literature began arguing with her Godfrey recalls 'I love a good argument and I asked to see what they'd been reading It was pretty outrageous 'Godfrey put together a questionnaire to find out what the average college anthropology student knew about evolution "The results were appalling," she said Curious she carried the study further Passing out some creationist pamphlets—'bad antievolutionist propaganda'—she asked the class to analyze the arguments, agree or disagree, and tell her why "They couldn't take apart the simplest and most absurd antievolutionary arguments They were snowed by them They'd say 'I know this is wrong because it's not what I've been taught all along but I don't know why it's wrong.' "

It was then that Godfrey began to scrutinize the creation science texts and call on experts in various disciplines to set up guidelines to confront the streams of humbug coming from the creationists Since the publication of her book more publications have come to the aid of embattled scientists engaged in debunking creationthink 'Creation science is a distortion of scientific evidence from start to finish,' Godfrey says It's a distortion of explanation but also a distortion of evidence Most people don't have enough command of the material to know where the distortion is'

She cites the example of a friend of hers from graduate school at Harvard who debated ICR's Duane Gish 'He didn't do his homework and was astounded by the level of the distortions He survived but it was a lesson to him—for all the academic community It's extremely difficult for be on top of this stuff when it's going to be distorted the way it is from one discipline to another

Gish, a master of debate has been corrected countless times on very simple dis-

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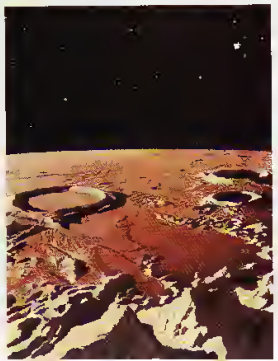


LUNAR FANTASIES

The story of the first great moon expedition—of 1978

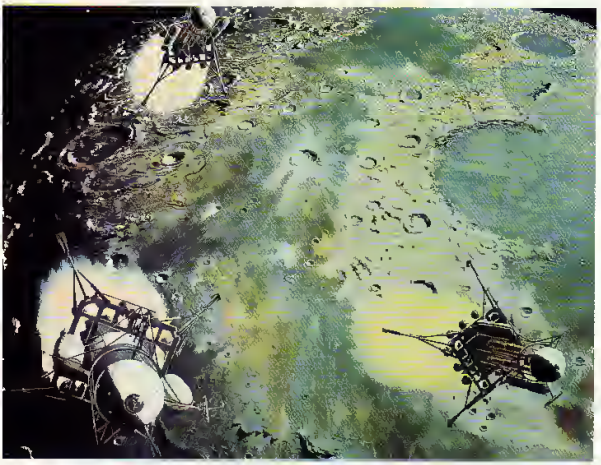
BY RON MILLER
AND FREDERICK C. DURANT III

To those watching from Earth, the flash of 90 rockets looked like "the sudden birth of a new, short-lived star," said space visionary Wernher von Braun. Man's next great adventure—the trip to the moon—had begun.

The year was 1978, and the world's first full-scale expedition to the earth's satellite had gotten under way. This scenario describes the second phase of Von Braun's master plan for the conquest of space, a plan revealed in a series of articles that ran in the mid-Fifties in *Collier's* magazine (see "Days of Future Past," *Omni*, October 1986).

Initially Von Braun and a panel of *Collier's* experts had thought a space station would be built by 1963, with a landing on the moon possible by 1964. (They later changed the moon-landing date to 1978.) The editors envisioned a fleet of three enormous spaceships—each taller than the Statue of Liberty—constructed in Earth orbit. The project would require a tremendous space lift: three shuttle launches every 48 hours for nearly eight months.

Each moonship was a spindly looking assembly of spheres, with 30 rocket engines clustered at its base. The topmost sphere featured a five-level personnel area where the crew would live and work. One ship, a cargo craft, would carry the equipment, supplies and provisions needed for 50 astronauts to make a six-week sojourn on the



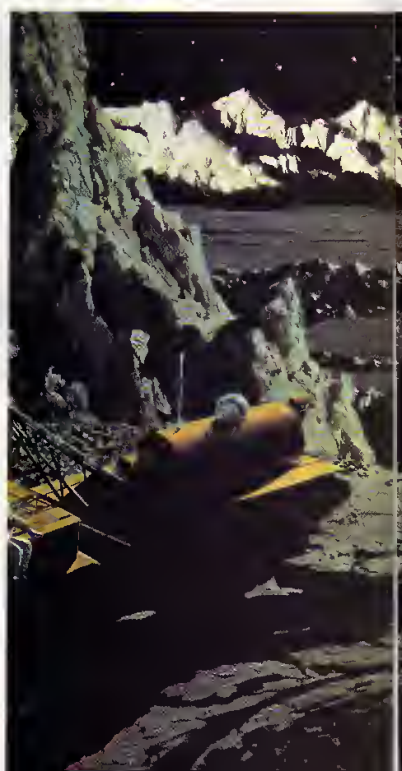
"The long, frigid lunar night would be relieved only by the blue light of the earth."

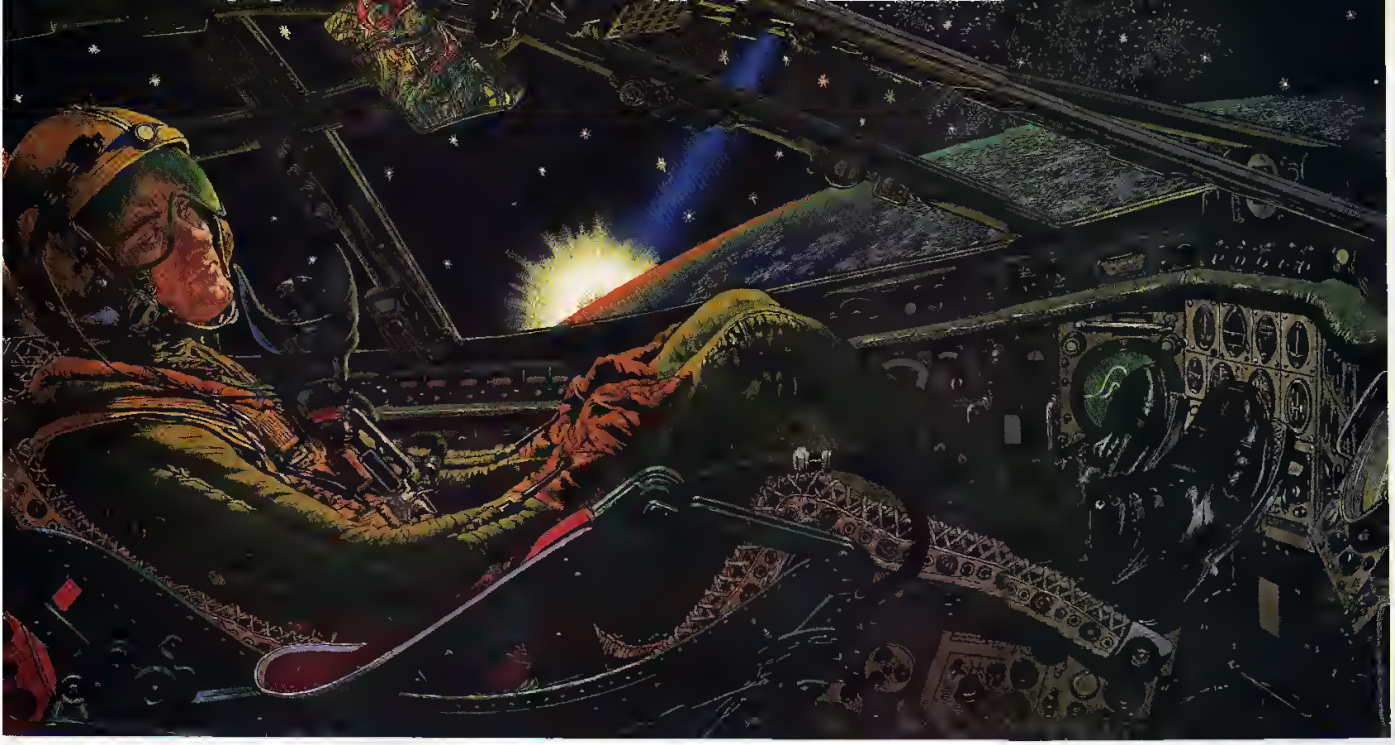
moon. The landing site chosen for the fleet was the Sinus Roris, a "bay" to the north of the mountainous region surrounding the Mare Imbrium.

As the ships glided closer to the moon, gravity would draw them to its surface, and the craft would turn 180° to land tailfirst.

"The rocket flames splash against the baked lunar surface. . . . The broad, round shoe of the ship's first telescopic landing leg digs into the soft volcanic ground. . . . Then the four outrigger legs slide out to support the weight of the vehicle. . . . The other two ships settle in like manner. The whirring of machinery dies away," wrote Von Braun. "There is absolute silence. We have reached the moon."

Two of the artists commissioned to realize this vision of *Collier's* were Chesley Bonestell and Fred Freeman. Bonestell showed the moonships' landing (far left), Earth rising over the moon (near left), and lunar tractors being deployed (bottom two illustrations). His drawings give an astronaut's-eye view of the moon as the 1978 landing party might see it (small picture opening pages). Once on the surface, the astronauts would have

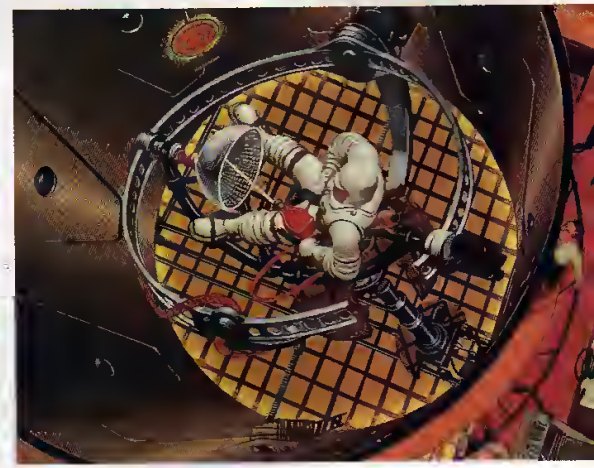




to unload three surface vehicles and construct a moon base from cannibalized parts of the cargo ship. Von Braun predicted that some astronauts would climb into two of the three tractors to explore the crater Harpalus, a nine-day round trip from the landing site. Others would collect moon rocks and perform such surface tests as firing off sounding rockets to do seismic studies of the moon's crust.

Freeman portrayed various stages of the whole mission: the training on Earth (far right), the drama of an in-flight emergency (large picture, pages 50 and 51), and the landing on the moon, the sounding-rocket experiments, and the departure at lunar dawn (top right, near right, and above, these pages). Leave-taking would commence when the Harpalus expedition returned. By then the long, frigid lunar night—two weeks of darkness relieved only by the cold, blue light of the earth—would be rapidly approaching. After rocketing off the lunar surface the two remaining moonships would begin their long glide back to the space station. But the *Collier's* team had only just begun. Next stop: Mars ◻◻

"In the glow of one last lunar dawn, the astronauts leave the moon base behind."



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the papers to be presented carry a sticker that reads "THIS DOCUMENT CONTAINS INFORMATION FOR MANUFACTURING OR USING MUNITIONS OF WAR." In giving it to a foreigner, warns the sticker, a scientist violates traffic-in-arms laws and is SUBJECT TO A PENALTY OF UP TO TWO YEARS' IMPRISONMENT AND A FINE OF $100,000. The statement on the sticker also means that whenever a foreign national attends a symposium or is in a lab, the paper cannot be discussed. The DoD has dubbed this policy NOFORN.

The policy has sometimes backfired. In a mix-up last summer, several French researchers were mistakenly excluded from a meeting under the rules of NOFORN. Now there are stories of Europeans mulling over whether to initiate a retaliatory NOAMER policy to exclude Americans from technical meetings in Europe.

James Harford, executive director of the American Institute of Aeronautics and Astronautics (AIAA), believes this issue might harm delicate relations with the Europeans in building the space station. "We've asked them to put up two billion dollars, and now we're not letting them look at our technology in areas like composites and other potential material for large space structures," he says. Besides being bad politics, the NOFORN rule is also bad science, he notes. "They [the Europeans] have got a lot to bring to this project. They've done some very good work."

Harford's comments are backed by years of experience. He has directed the institute for 33 years—through the McCarthy era, *Sputnik*, the space race, and the missile gap. In all that time he has never seen anything like this campaign to stifle scientific interchange.

Among the most zealous in enforcing the restrictions are Assistant Secretary of Defense Richard Perle and aide Stephen Bryen. Even NASA has not been immune to their criticisms. When James Fletcher, the director of NASA, proposed a cooperative space mission with the Soviets, Perle opposed the idea, arguing that the Russians would steal what technology they could, as they did with the Apollo–Soyuz mission in the mid-Seventies.

As required by Congress, Bryen drew up a list of "military critical" technologies classified as "munitions of war" under the export laws. Should a scientist want to present even a paper about a critical technology at a conference attended by any foreigners, he must submit his paper for DoD review to see if he needs to apply for an export license.

The Catch-22 in the process came when scientists first tried to see the list of technologies deemed critical. They were told they could not get a copy. The reason: It was a classified document itself. Finally it was released, and scientists were appalled to find it was a directory, hundreds of pages long—a catalog of virtually every modern technology.

Armed with this newly concocted authority to censor exportable information, DoD agents headed for San Diego, where a symposium of optical engineers was in session. Claiming that Russians were attending the conference, the DoD agents seized copies of 100 sensitive papers. The operation kept unspecified "valuable information" and one paper on satellite-to-submarine communications from falling into Russian hands, Bryen claims.

A few months later, Air Force agents forced scientists from Texas Instruments Inc. to withdraw a paper from an international conference. The electronics firm later protested, saying the paper did not fall into the newly designated "sensitive" category. The military admitted there had been an "administrative error" in squelching it.

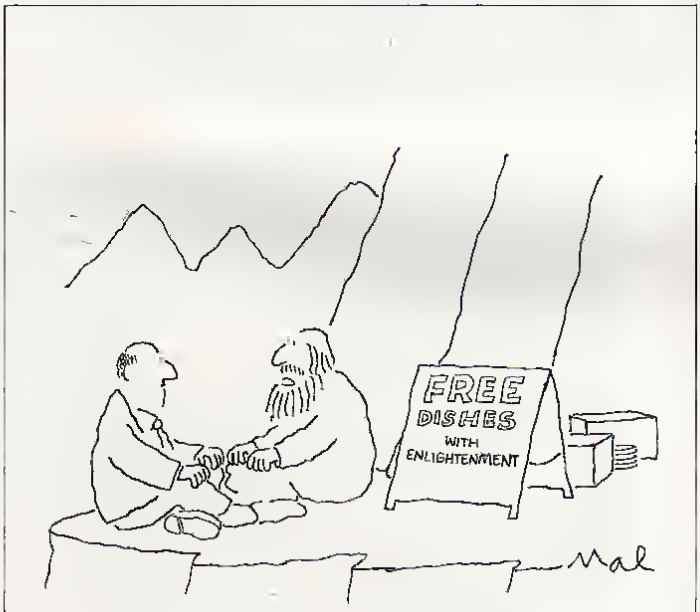
Sponsors of both conferences were outraged. So Bryen promised to "do a better job in setting up the standards for what should be censored." His solution was to set up a committee in the Pentagon to screen prepublished work of scientists working under DoD contracts. And he proposed to scientific and technical societies what he calls a DoD system. Sensitive papers can be presented in limited-access sessions. Participants must sign a statement promising to keep information secret. Any foreign nationals who want to attend a limited-access meeting must get clearance from the Pentagon.

Not only is the policy "tragic," says the AIAA's Harford, but the way it is enforced can sometimes be "ludicrous." At one meeting, he recalls, government agents accepted a driver's license from some attendees as proof of citizenship.

"We can't seriously expect to find foreign spies this way," Harford says of the DoD system. "The way to withhold information is to classify it, place it in a meeting under government sponsorship, and hold it in a secure facility."

Few are pleased with the extra layers of regulations. "There are just too many controls," objects Roland Schmitt, who is chief scientist at General Electric and chairman of the National Science Board. "I must have access to [foreign scientists] in critical areas like computer science and electronics. To have these people excluded from technical exchange will adversely affect our ability to develop new technology." As for specifics, "Guys like Steve Bryen and Richard Perle are not technical people. They don't understand the value of open communication."

Adds Harford, "I don't have any argument with people who are sitting on top of classified information and keeping the lid on in the traditional way. But when they start mucking around with unclassified literature and asking us to restrict foreign nationals, I think we ought to tell the government we're just not going to do it."



"I was hoping it would help pick up my business."

FICTION

KINGDOM COME

BY BRUCE McALLISTER

Inside a New York apartment a mysterious force struggles to save a besieged family

His wife shouted from the kitchen, while outside, angels died. He was working in the corner of their apartment's small living room, and he paid no attention. She shouted again, saying "Jesus *Christ*!" and at the word *Christ* there was an explosion, a shattering of glass. He got up and padded his way across the flattened pile of the aging Day-long rug. The shag had once been a smooth Eldorado Gold. Now it was mottled with broad, dark smears from months of sugary drinks and other spills. *Nothing ever changes*, he told himself. *Nothing ever changes in here, even with the world outside what it is.* He tried not to think of it, but long white wings flashed behind his eyes, and he couldn't help himself. It was always there. He came up behind her and sighed, letting the sigh lead into his first word. "What's the matter?" The shards of one of their last water glasses lay glittering at the base of the kitchen wall.

She turned her head slowly, the muscles and tendons taut on her neck, one blazing eye coming into sight first, then the other, her mouth in a sneer. "I'd tell you—if I thought you could understand," she said. The same childish sarcasm. Too many years with kids.

He looked away and closed his eyes. It was beginning again. All the lines they'd used before—one version or another—and went on using, even with the world outside being what it was. The pale wings. The great door. The greater shadow.

He could feel her glaring at him, and he waited for the whisper of shoe

PAINTING BY H. R. GIGER

on linoleum as she turned her back on him It came He opened his eyes and watched her move to the sink, where she began to tumble with something as if purposefully

He felt his jaw tighten as always "What are you talking about?

She said nothing He stared at the back of her head at the wisps of dark hair at her neck which he still found beautiful. He wondered what an angel's neck was like

He looked around the kitchen slowly seeing the leaking faucet the fire-blackened wall above the stove Neither was new Then he saw the big black finger prints on the wall five or so feet above the glass shards as if an oversized child had put them there He tried to remember how—why—he had put his hands up there like that

I'm sorry about the fingerprints on the wall" he said "It's generator oil"

"It's not just the fingerprints Jerry." She didn't pause "By themselves—taken alone" she went on, loving the sound of it "big black fingerprints on the wall are almost pretty On a lovely white wall like that"

He had closed his eyes again, dizzy with the familiarity of it all

Was this simply how they coped—in the face of it? Wings shadow jaws The sounds just beyond their walls

"The baby craps in her diapers" the voice was saying "but you're watching a blank TV screen so I clean it up You smear the walls so I clean it up Do you want to know why?"

Still blind, he knew she was turning He opened his eyes She stood before him with the can opener raised like a little ax mouth open, words ready

"Because you've trained me well, Jerry Sometimes I'm even *happy* doing it"

He thought of the creatures dying outside. *All right!* I said I was sorry about the damn fingerprints and I'm sorry about everything else, too Let's drop it I've got two hours left on the generators

She was staring at him, shaking her head in slow motion She wasn't saying anything, she was just shaking her head It drove him crazy as always

You're pathetic" he whispered

"I'm *what*?"

"You're pathetic" he heard himself say again "Go ahead Shake your head while you think of something wonderful to—"

The Swing-a-way can opener left her hand and moved in slow motion past his head—close enough for sincerity but without any pretense of aim He turned and watched it fall short of the drapes in their small dining room He stared at it

Even this tiny gesture of violence was familiar It had been a plate the last time a coat hanger before that a fork—all offered in the same way

A cry came from the stairwell but neither of them stopped

The old rage began to fill him

You bitch, he told her

He was glaring at her and as he glared the kitchen brightened as if a ball of ragged light had suddenly come through the walls His eyes were wide open His mouth was twisted It had him now the script, and he remembered his decision

"Jerry I'm sorry

As always the voice had changed The eyes had changed

"Dear God" he spat How could anyone who'd run a preschool for seven years be so goddamn weak?

Jerry please" She was pained "she didn't want him angry at her anymore

Why do I ever listen to your bitching?" he was saying "It's over in five minutes, but I listen I take you seriously I worry"

He began to move—toward the living room the hallway toward his decision

Jerry" The voice was loud plaintive

"The window" she pleaded As far away as she was as frightened as she was it sounded like a whisper "*Please*"

He stopped in the middle of the living room He didn't want to This time he just didn't want to But there were times when

> *"The pale wings would flicker in and out of darkness. The bodies would twist, writhing, disappearing, and reappearing. A few would regain flight, flapping back to their world."*

she didn't want to either and she went ahead and did it didn't she? If *she* could do it he could, couldn't he?

He felt a slab of old affection and then nothing He turned to her did not look at her eyes, and took one end of their Danish-plaid sofa She took the other end, and they began to move it

They moved it from the wall where the feathery crack in the plaster had begun to creep down behind the sofa They arranged it so it faced the floor-length drapes in the living room He turned off the light She opened the drapes

When they sat down they did not touch But once again—for the moment—they were on the same couch nearly touching looking out and wondering whether the scratchings at the door the moans and cries and wordless pleas that sometimes came to the hallways outside would interrupt them It had happened before

Together they looked out at the world the dream and nightmare of it

Central Park was gone In the perpetual twilight that held everything they could see down toward Ninety-sixth the dark swaths of the few remaining trees and paths Beyond that—reservoir museum lake and zoo—the park was gone From Columbus Circle to Ninety-sixth it was gone

The few trees and pathways that remained might have been comforting but they were too distant and dim In place of the park was what he had come to call The Door What his wife called it in her private thoughts he did not know They did not refer to it out loud they did not have to It was always there whether the drapes were open or not

Through The Door its great edges shimmering like a black mirage they could see the other universe—the dark towering cliffs and darker sea the eternal twilight the twin moons the spit of dim barren land that somehow bridged the two worlds

From the twilight of that other universe from the moons and towering cliffs the winged creatures streamed into their world Like flocks of great birds they caught updrafts banked and plummeted and soared again moving effortlessly between the two skies But more than that they played tumbling and teasing their bodies—all but the wings—so human their heads thrown back in what he felt sure was laughter the kind that children made

And then it would change Out of nowhere would come things barely visible not unlike the creatures own winged shadows, and darker than the twilight A pair of wings would be struck then another and another and each pale pair would drop through the twilight with its shadow feathers trailing as if torn by invisible jaws

The pale wings would flicker in and out of darkness The bodies would twist disappearing and reappearing writhing A few would eventually regain flight flapping injuredly back to their world or on into this one A few would fall to the earth streaming light, and he would see them later wandering the land bridge between the two worlds wingless and stumbling But most would simply disappear in the first tumble winking out into a darkness deeper than the twilight—as it taken

Seen through the window glass it was like a movie It reached them but it did not They saw the distant pairs of wings but did not feel the wind those wings made They saw the creatures struck but did not feel the jaws that tore them There was nothing to hear nothing to smell They took it in with their eyes and were safe As long as they remained in their rooms—his generators working for them the food and water and first-aid supplies replenishing themselves somehow in the storeroom he had built for them—they were safe

When the great shadow passed overhead, however it was different The glass could not protect them It was not a movie not at all Sometimes the thing came from the universe beyond The Door from the endless twilight and dark cliffs Sometimes it came from his own world as it returning from a long journey Whatever the direction both worlds shook—cliffs and buildings and skies and Door—and the twilight

CONTINUED ON PAGE 104

"There must be an enormous amount of life in the universe," says the astronomer who discovered what may be the birth of a planetary system around a star 50 light-years away

INTERVIEW

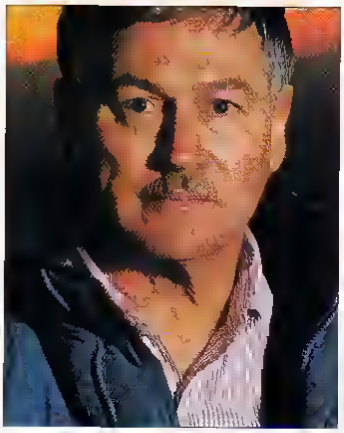
BRADFORD SMITH

On his ninth birthday Brad Smith got an astronomy book illustrating the positions of the celestial bodies. With this rudimentary guide he began to hunt down each star and constellation in the night sky. But something was wrong. The boy noticed a lot more stars in the sky than pictures in the book. So he began to construct his own map to fill in the gaps. Today Smith is still doing just that, but instead of tracking stars with the naked eye, he commands orbiting satellites to image such things as new solar systems and the rings and clouds around distant planets.

This scientific quest has taken Smith far from his Cambridge, Massachusetts, birthplace—to the deserts of Arizona and New Mexico, to the Chilean Andes, to the ultra-tech Voyager imaging rooms of Pasadena's Jet Propulsion Lab (JPL), to top-secret Soviet space facilities in Moscow and Budapest.

Born in 1931, Smith spent much of his adolescence

PHOTOGRAPHS BY ALAN LEVENSON



"The man-Mars mission should be done for science and for the spirit of human exploration. To have this first visit to another planet be an international effort could be expensive, but so is war and the military buildup."

at the Harvard University Observatory. Under the tutelage of comet expert Fred Whipple, Smith began plotting the light curves of variable stars, using nothing more than a powerful pair of binoculars. Although he always figured he'd be an astronomer, in high school Smith took a more earthly look at the dearth of opportunities astronomy then offered the newcomer. Opting for security, he chose a more conventional career and, in 1954, graduated from Northeastern University with a degree in chemical engineering.

During the Fifties the arms race escalated, and so did the Army's need for people with astronomy backgrounds. So Smith, with no professional training, went off to White Sands, New Mexico, to assist Clyde Tombaugh, the discoverer of Pluto. Smith helped Tombaugh calculate distances between points on the earth's surface using lunar occultation. (Bright and distant stars reflect light off the moon's surface. As the moon passes between the earth and a particular star, it throws a unique shadow over the earth's surface. The process of lunar occultation uses this shadow to pinpoint the moon's position at any time.) This information, in turn, enables the Army to target intercontinental ballistic missiles (ICBMs) with incredible precision over distances of many thousands of miles.

Tombaugh was also searching for small natural satellites. A satellite closer than the moon to the earth would yield a greater parallax (changing position of an object when viewed from two positions), so measurements of distances would be more accurate. Though he and Tombaugh found no small natural satellites, Smith became fascinated with the planets, and he continued to work with Tombaugh at New Mexico State University. In 1972 he got his Ph.D. in astronomy. And to this day he says, "I've never done any chemical engineering."

Three decades after joining Tombaugh, Smith is acknowledged as one of the world's foremost experts in imaging. Imaging is the process of taking the electronically encoded image data beamed back from a spacecraft and reassembling it into a picture—and then trying to figure out what you're looking at. Smith's skill at putting together and interpreting space pictures made him a prominent figure in the Voyager and Viking Mars explorations. Most recently he has headed the imaging team for *Voyagers I* and *II*, which soared by Jupiter, Saturn, and Uranus and traveled on to Neptune.

Currently Smith is a professor of planetary sciences at the Lunar and Planetary Laboratory and Steward Observatory of the University of Arizona in Tucson. His fifth-floor office is crammed with papers awaiting dispensation because Smith hasn't spent much time in his office in 1986. During the first months he was at JPL processing the *Voyager II* data on Uranus. Next he journeyed to Moscow and Budapest to play a key role on the *Vega* imaging team for Halley's Comet.

Even when he's relaxing at his Hawaiian island home, Smith's head is working astronomically. He may be delving into distant planetary atmospheres or circumstellar discs—such as the one he and Richard Terrile of JPL discovered around the star Beta Pictoris in 1985—or he may be contemplating new applications for the charge-coupled device (CCD), the greatest astronomical hardware innovation since the four-meter mirror for telescopes.

Electronic photoplates cooled by liquid nitrogen, CCDs enable astronomers to catch nearly 100 percent of a star's light. Thus light from a star that previously had been too distant or too faint to be seen is now being picked up by these fingertip-size chips for the first time. A highly efficient instrument, the CCD offers a stable medium and very low noise or interference. With the CCD astronomers have a very wide range. "You get both very bright stars and very faint stars all recorded on the same image," says Smith.

The combination of this state-of-the-art light-recording process and one invented more than 50 years ago, the coronagraph, enabled Smith and Terrile to be the first to detect an evolving solar system around a star other than our sun, Beta Pictoris.

Writer Ron Schultz spoke to Smith after the astronomer returned from Hungary and the *Vega*/Halley's Comet project.

Omni: What would you consider your ideal planetary project?

Smith: The next key mission is a man–Mars mission because it's truly within our technological grasp. It should be done both for the science and for the spirit of human exploration. To have this first visit of human beings to another planet be a truly international effort, with participation from all the peoples of the earth, would be an ideal mission. It is expensive, but so is war and the military buildup. And perhaps the efforts of many countries working together on a major project could do more to lessen the probability of war than the huge arms buildups that we're involved in now.

Omni: In the Mariner project, how did you decide where to focus the camera?

Smith: The difference between the rotation period of Mars and that of the earth is about forty minutes, so if you look at Mars at the same time each night, you see the face forty minutes earlier than the night before. Eventually the whole Martian surface comes around in front of you. On one side we could barely see anything, but on another these great dark markings, the "canals," seemed to come and go. We always looked forward with great anticipation to when that side worked its way around. Ultimately those were the regions selected for observation by *Mariners 6* and *7*. And they turned out to be the least interesting! The other great area—of which we got only a glimpse on the horizon—had all this enormous chaotic jumbled terrain with huge volcanoes. Oh, well.

Next I went on to *Mariners 8* and *9*, the

orbiters *Mariner 8* dived into the ocean but *Mariner 9* went on to Mars. Also, the Soviets launched two spacecraft in 1971, and we conducted a day by day survey of Mars as the three spacecraft moved toward it. Two months before the craft were to arrive we spotted a little bright yellow cloud that formed on Mars and started spreading out. Soon the planet was hidden by this enormous dust storm.

Because our craft went into orbit, we could point our cameras and look down through some of this haze to the polar regions. The Soviets, who didn't have that opportunity, were really badly wiped out by that dust storm. As we watched the dust clear we saw things resembling craters. One interpretation said these were large holes below the surface of the planet. That didn't make sense. Finally, we realized these were mountains so high we were seeing their summit craters sticking almost all the way up out of the dust. We had discovered four enormous volcanoes. The largest one is Mons, the highest mountain yet found in the whole solar system: eighty thousand or ninety thousand feet high.

Omni: Did you believe there was a chance that there had once been life on Mars?

Smith: Yes, because we believed Mars has gone through long-term climatic variations. The crucial issue for Mars is: Was there enough liquid water, and was it around long enough for this to happen? Nothing in the *Mariner 9* observations suggested that that was not a possibility. We saw evidence of enormous amounts of erosion having taken place in the past. We couldn't put any time scale on it, so we couldn't say just how long this liquid water had been around. It is certainly possible that small organisms could at one time have survived and replicated on Mars.

Omni: What were you doing when *Viking I* landed on Mars?

Smith: That was one of those great moments in history. I was both on the orbiter imaging team and in a small group assembled by NASA to research a safe place to put the *Viking* landers down. There was great political pressure to get that thing down for the Bicentennial, the Fourth of July. So the landing-site selection committee chose areas based on the best *Mariner 9* images, ground-based and radar studies. A few weeks before the Fourth, we got our first look at the areas selected. The *Viking* cameras showed the spot to be in a big streambed, with big boulders and stuff all over the place. *My God*, we thought, *there is no way we are going to try to land in that spot*. So we missed July fourth. Even the backup sites wouldn't work. Finally, we found a site that looked good. We were worried about all the rocks that could poke right up into the soft belly of the craft. There was no way you could really see small rocks or objects of that size. You had to infer their presence from surrounding geology and radar cross-sections of that region. After the descent had begun, there was a moment when we knew the thing was down. But because it takes about eight minutes for information to travel from Mars to Earth, it took eight minutes for the signal to confirm it. Those were some anxious moments. I was standing there with Hal Mazursky, the team leader on *Mariner 9*, who was in charge of the landing-site selection. When the first signals came back from the lander we knew it had survived. This enormous emotion just rippled through the whole place. When the first picture arrived, it started appearing a few lines at a time. It showed one of the little dishlike pads that sets down the lander. We could see it had some gravel inside. That was exciting, too. We were seeing Martian soil for the first time. Just as we were congratulating ourselves on how really well we had pulled this off and how we had selected just the right site, the first panorama came back. There were rocks and boulders all over the place. My knees got weak.

Omni: What sort of planning went into the *Voyager I* encounter with Jupiter?

> *"We're free to fly any orbit we want because there is nothing beyond Neptune. We can fly almost straight at Triton and, at the last moment, just sail on by."*

Smith: *Pioneer* had told us that Jupiter's environment was not hospitable—it has very strong radiation belts. So for our two spacecraft we had to choose trajectories past Jupiter. Naturally, we were very conservative with one and gambled a little bit more with the other. The ground rules were that they had to go by at distances that, at that particular time, would take them on to Saturn. We also had to consider the position of the planet's satellites. So we had to make an a priori decision about which of the four large Galilean satellites at Jupiter were most interesting. You stumble your way through on this sort of thing. And guess what: We made the same mistake as when we thought we knew which side of Mars was more interesting. Io was up there on our list. But of the remaining three Galilean satellites, Europa ended up at the bottom, so it got the poorest coverage of the four, yet Europa turned out to be a most fascinating object.

Omni: How did it feel to finally see Jupiter's Great Red Spot up close?

Smith: To finally see what you've been trying to understand for four decades is very rewarding. This is your technological response. Your emotional response sometimes goes in other directions. There's a feeling that the mystique is gone. You wondered, fantasized about the possibilities of what this object might be. And suddenly all the fantasies are gone. Here's reality staring at you. You feel ambivalent, even if it's an enormous scientific achievement.

Omni: What was the most profound discovery made at Jupiter?

Smith: The volcanoes on Io. That was just fantastic and absolutely unexpected. Io was going to be a Rosetta stone for me for the outer solar system. Ground-based observations showed the outer Galilean satellites to be covered with ice. We were concerned that if there was enough warmth just under the surface, the ice would flow, and all the topographical features would flatten out and disappear completely.

But Io was different. Its density told us that Io must be made of silicate. Because it is red, we expected to see a red version of Earth's moon. By counting crater densities and the rate at which material had fallen onto Io and comparing those with the moon's, we could see how the impact history of the outer solar system compared with that of the inner solar system. Io was the proof. We knew it didn't have an atmosphere, therefore no erosion, and a nice silicate body. But when the images came back, we never found a crater. It has the most active volcanic surface modification of anywhere in the solar system. We didn't get our Rosetta stone, but we found what's got to be one of the most bizarre objects in the solar system.

Omni: What did the *Voyagers* tell us of Saturn and its rings?

Smith: Expectations and reality on the rings were probably as far apart as anything we've looked at. We thought we understood the structure of the rings, so we weren't very excited about seeing what was in them. We expected to find just broad sheets of icy particles and hoped that maybe if we looked right on the very edge, we would uncover a few individual particles. But what did we find: that there were not just three rings but more than a hundred! We immediately tried to see if we could modify the *Voyager II* sequence to get more rings. With more than a year before the second encounter, we still weren't able to do everything we wanted.

Omni: Wasn't Miranda the jewel in the Uranus encounter?

Smith: Yes. I still find it very hard to explain such highly variable terrain in such juxtaposition. It is only five hundred kilometers across, yet within a few hundred meters it goes from regions looking very much like the lunar highlands—very, very old, worn-down terrain with gradual slopes—to others with peculiar stratified features. Here on Earth one sees regions like the Rockies where mountain building is actively going on. Then off in the distance lie the Great Plains, which have been quiescent for quite a while. These are distances of hundreds to thousands of kilometers apart, not a few

tens or hundreds of meters as on Miranda

Speculation has it that the weird character of the Uranian satellites is tied to the huge impact Uranus apparently suffered earlier on Because Uranus is tipped I believe such an event did happen Maybe material thrown out of Uranus itself was later incorporated into the satellites Or the strangeness of the Uranian satellites may be more a property of materials found in the outer solar system

Omni What might we find on Neptune?

Smith Terrile and I have been taking pictures of Neptune for several years and have seen clouds much more clearly than we ever could in Uranus's atmosphere Even from the earth we've been able to watch them go around So the prospects for studying atmospheric dynamics are probably better for Neptune than Uranus Neptune also has one large satellite that we know of Triton It's comparable in size to the very largest of the Saturn satellites I'm particularly interested in Triton because of its size and because the likelihood of our getting a good resolution on it is higher than anything we've seen, including Miranda We're free to fly any orbit we want because there is nothing beyond We can fly almost straight at Triton, keep getting better and better pictures and at the last moment just sail on by

Omni How did you and Terrile discover the planetary system around Beta Pictoris?

Smith Years ago we built a coronagraph [See the instrument Smith is holding in photo on page 66] The coronagraph, first developed in 1930, was used to look at the sun The instrument was virtually forgotten for about thirty years With it you can see all the prominences and clouds of hot gas without having to wait for a solar eclipse All the coronagraph does is to remove most of the light that's scattered within the instrument itself We built one here in Arizona to look at Saturn's very faint E ring It worked well, so we used it to view objects where scattered light was a problem

The very first images of Neptune's clouds were taken with a coronagraph in the Catalina Mountains in Arizona in 1979 Terrile and I then built an improved instrument and took it to South America to look at Uranus and Neptune to image the rings When the IRAS [Infrared Astronomical Satellite] discovered coal material around other stars such as Vega I decided to try for an image of the stuff I put the coronagraph on one of the telescopes here and took some pictures first of Vega next of Epsilon Eridani, and then of some other nearby stars that the IRAS team announced had infrared excesses Nothing showed up but conditions weren't good either So I took my coronagraph down to Chile for a run that Rich and I planned to make on Uranus and Neptune Normally when you're working with fairly bright objects like planets and working out in the very far red or infrared [end of the spectrum] moonlight isn't a serious problem So precious dark time is allotted to astronomers looking off into deep space But the time given to us was the first part of the evening when there was a bit of dark time Another one of those IRAS stars was up there so in just a few minutes over a couple of evenings, we grabbed a few shots of Beta Pictoris

We didn't know we had anything Terrile worked on images at JPL I worked here, and we compared results First we played around with the images from Uranus and Neptune which at the time seemed more important But when we pulled some of the Beta Pictoris images up on our processors here it was clear that a disc was there We had to determine whether it was real or just a peculiar reflection

Omni How did you realize that you might have the first visual evidence of a planetary system in the making?

Smith It was exciting because once the image was processed it was just really there! It was very, very clear For a while many of us thought it would turn out to be an artifact We spent a month checking out everything but we had enough sharp images of it to decide that no instrumental effects had produced it Clearly this material was associated with the star

"My guess is that the system around Beta Pictoris may have just formed It may already have some planets of significant size or may be creating planets right now"

But was this a very young system or a very old system? Was it a protoplanetary system still in the process of evolving? We'd hoped more of these things would turn up and that by looking at them in various stages of evolution we'd get a better idea of just what state Beta Pic was in But so far this is the only one to show up It's puzzling that if should be such an easy object for a ground-based telescope with a coronagraph to find and yet no other objects have shown up Is there something anomalous about Beta Pictoris or is it just that this phenomenon lasts for a sufficiently short time in a star's evolution that you have to be there at just the right time to see it? To answer that question we may need images taken beyond the earth's surface At present my guess is that Beta Pictoris is an extremely young solar system It may already have some planets of significant size or may be in the process of creating planets right now

We have some weak evidence and some models that suggest that the inner part of the system is cleared out of debris relative to the rest of it The model may not be just right, but planet formation is certainly one way of cleaning up debris in a protoplanetary system

Omni Is Beta Pictoris the exception?

Smith The norm All we can see in Beta Pictoris is this debris Either it's material from which planets are about to form or it's material left over after formation, which will be dissipated by the planets over the next few hundred million or so years Because debris tends to coalesce it's difficult to conceive of a mechanism of star formation that doesn't have this debris, which we call home around the star

Omni What impact could the discovery of this extrasolar system have?

Smith Even some scientists perhaps for religious reasons would like to believe that our own Earth/sun planetary system is unique within the universe In general they believe star formation doesn't tend to form planetary systems Yet the fact that we have seen one other planetary system blows those theories apart Because if there is one there must be more

It's sort of disappointing that we've found only one among the stars that we've looked at The list of good prospects is very short since we now can evaluate only relatively nearby bright stars And among these we are limited to ones with relatively strong infrared excesses as observed by IRAS Those stars within range of our coronagraph and telescopes are perhaps a dozen at most Or maybe those aren't exactly the right statistics because we haven't had the chance to look at all those stars under the same good observing conditions we had at Las Campanas in Chile If just one star in ten has this material around it, that still leaves an awful lot of stars It may be that when planets form, they tend to eliminate the unused material by sweeping it out So that if we were to look at Beta Pictoris in a few hundred million years all that stuff would be gone Planets would then be there, which we wouldn't see

Omni Do you have any idea what this system is composed of?

Smith We're trying to get a good reading on the color of the system This should tell us whether we are looking at ice or silicate material I'm pretty convinced it's ice that we're seeing the equivalent of a big comet cloud or something hanging out there

Omni Does this discovery suggest anything about extraterrestrial life forms?

Smith The materials that make up life are everywhere Water is one of the most common molecules in the universe and the light elements—carbon, nitrogen, and oxygen—are ubiquitous Many experiments have shown that from these very simple materials you can create the organic molecules for life It almost, then, becomes a statistical matter You put the right materials together with an energy source and things are going to regurgitate and percolate Eventually the chemistry becomes

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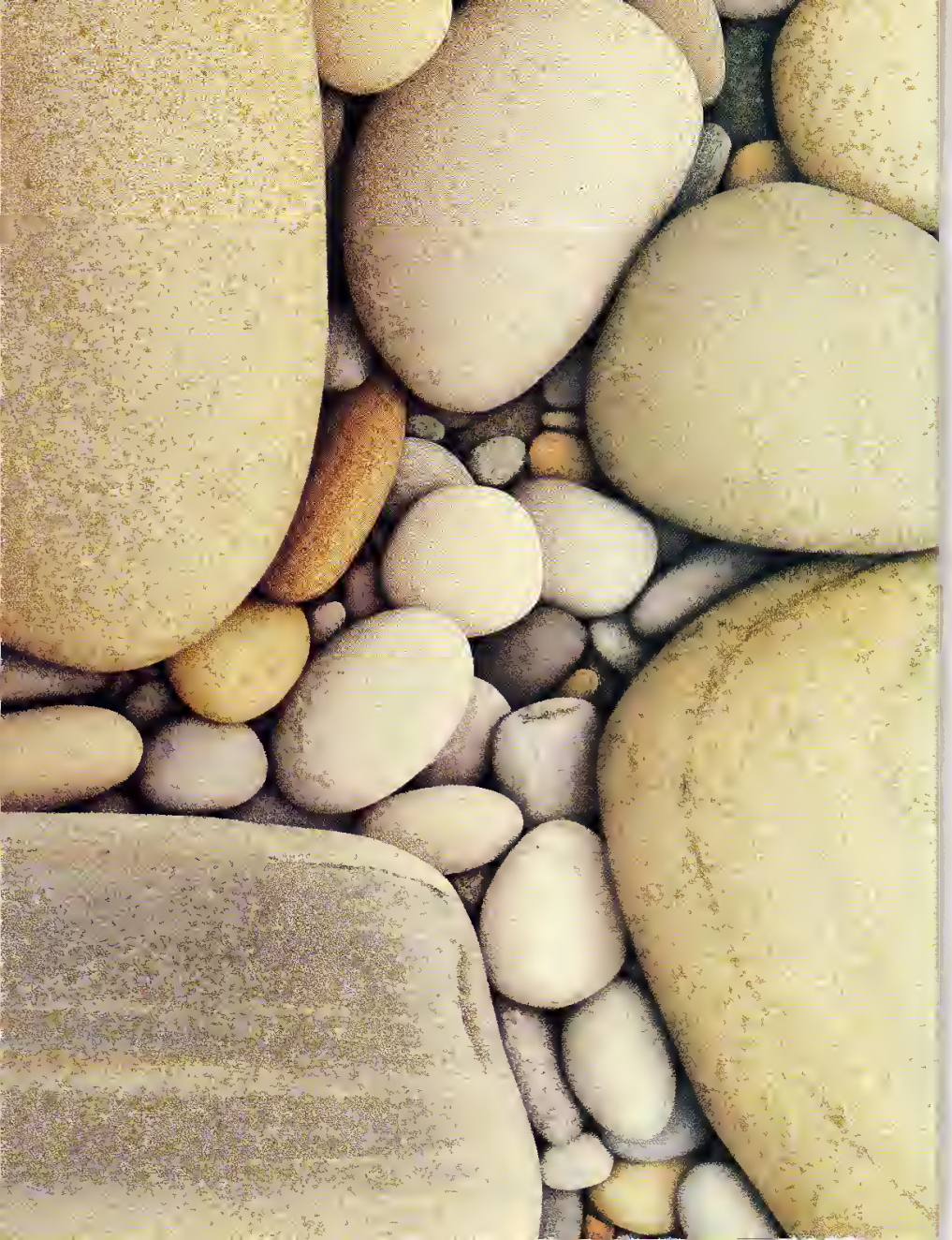


FICTION

Each pebble, every rock holds a secret. And most secrets are better left untold

THE CIRCULAR LIBRARY OF STONES

BY CAROL EMSHWILLER

They said all this wasn't true. That there had been no city on this site since even before the time of the Indians ... that there had been no bridge across the (now dried up) river and no barriers against the mud. 'If you have been searching for a library here,' they said, 'or for old coins, you've been wasting your time.'

For lack of space I had put some of the small white stones in plant baskets and hung them from the ceiling by the window. I don't argue with people about what nonexistent city could have existed at this site. I just collect the stones. (Two have X's scratched on them, only one of which I scratched myself.) And I continue digging. The earth, though full of stones of all sizes, is soft and easy to deal with. Often it is damp and fragrant. And I disturb very little in the way of trees or plants of any real size here. Also most of the stones, even the larger ones, are of a size that I can manage fairly well by myself. Besides, mainly it's the stones that I want to reveal. I don't want to move them from place to place, except some of the most important small ones, which I take home with me after a day's digging. Often I have found battered aluminum pots and pans around the site. Once I found an old boot and once, a pair of broken glasses, but these, of course, are of no significance whatsoever, being clearly of the present. Gaining access to their books! If I could find the library and learn to read their writing! If I could find, there, stories beyond my wildest dreams. A love story, for instance, where the love is of a totally different kind, a kind of ardor we have never even thought of, more long lasting than our simple attachments, more world-shaking than our simple sexualities. Or a literature that is two things at once, which we can only do in drawings where a body might be, at one and the same time, a face in which the breasts also equal eyes, or two naked ladies sitting side by side, arms raised, that also form a skull, their black hair the eye sockets.

For quite some time now I have had sore legs, so digging is an exercise I can do better than any other, and though at night my back pains me, the pains usually go away quite soon. By morning I hardly feel them. So the digging, in itself, pleases me. There is the pleasure of work. A day well spent. Go home tired and silent. But mostly, of course, it is the slow revelation of the stones that I care about. Sometimes they cluster in groups so that I think that here must have been where a fireplace was, or perhaps a throne. Sometimes they form a long row that I think might have been a wall or a bench. And I have found a mirror. Two feet underground, and so scratched that one can see oneself only in little fish-shaped flashes—a bit of an eye, a bit of lip, but for even that much of it to have been preserved all this time is a miracle. I feel certain that if they had a library, it's logical they would also have had mirrors. Or if they had mirrors, it certainly follows they could have had a library.

I keep the mirror with me in my breast pocket. (I wear a

PAINTING BY ALAN MAGEE

man's old fishing vest.) When people ask me what I'm doing out here, I show the mirror to them along with a few smooth stones.

At night I write. I shut my eyes and let my left hand move as it wishes. Usually it makes only scratchings, but other times words come out. Once I wrote several pages of nothing but *no, no, no, no, no* and after that *on, on, on* and *on*, but more and more often there are larger words now and more and more often they are making some kind of sense. Yesterday, for instance, I found myself writing *Let us do let us us do and do and let us not be but do and you do too.* And then, and for the first time, a whole phrase came out clear and simple: *Cool all that summer and at night returned to the library.*

Certainly I would suppose the library being built of stone, to be always cool in summer, always warm in winter. The phrase is surely then true and of the time. It is interesting that the library itself is referred to in this, the first real phrase I've written so far. That is significant. What I have been hoping to do is to reproduce some of the writings from the library, or reasonable facsimiles. Perhaps this is the beginning of one of their books.

The circle is sacred to all peoples except for us. We are the only ones that don't care if a thing is square or a circle or oblong or triangular. The shape has no meaning to us. A circle could be oval for all we care. I'm thinking about this because I think I have come across a giant circle. About a foot down I found what looked like a path of stones, and I dug along it all day thinking I was going in a straight line, but when I turned around to look back on what I had accomplished, I saw that although I had dug only a few yards, clearly I was curving. Though I had thought to finish for the day, I turned and vigorously revealed another yard of the stones, yet knowing full well it would be perhaps a month before I could uncover a really significant portion of the circle. I was thinking that probably here at last was where the very walls of the library had been and that, if true, this would be a great revelation of stones (even though done by an old woman, a useless old woman, so everyone thinks). I felt happy.

Happy and tired after that, and though I came home very late and my back hurt even more than usual, I sat down dirty as I was, at my little table, I shut my eyes and let my left hand write. *Let us oh let us do and do and dance and do the dance of the library in the cool in the sanctuary of the library.*

It rained that night and all the next day, and I knew it had filled up all my pits and paths with mud. I would have to do much of my digging over again, and yet I wasn't terribly unhappy about it. Such things come in every life. It's to be expected. (And doing is digging. Digging is doing. Do not be. That's my philosophy and it seems to be theirs, too.) And my latest discovery was momentous, to say the least. Who would have thought it: a great white stone circular library to be danced in!

Mostly on rainy days like these I do as the other old women do. I knit or make pot holders. I make soup and muffins. While I was there doing old-woman things and looking out the window, I thought *How nice if I found even only another stone with perhaps an O on it. People who search as I do must be happy with small and seemingly insignificant discoveries. People who search as I do must understand, also, that the lack of something is never insignificant, so even if there was nothing to be found, I was never disappointed, because that too, was significant—as, for instance, a library and only one stone with an X on it. Besides, the less discovered, the more open the possibilities.* I always console myself with that thought.

That night I let my left hand write. It took a long time to get from scratches to *X*'s, to *no, no, no*, but finally it wrote *Let us then stone on stone on stone a library that befits a library each door face the sun one at dawn and one at dusk. Many queens saw it.* (Perhaps they were all queens in those days. Or perhaps when they reached my age they became queens. I would like to think so.)

This was on my mind when I went to sleep and I dreamed a row of dancing women, all my age and all wearing crowns of smooth white pebbles. They were calling to me to wake up... to wake up, that is, into my dream, and I did, and I was still in my boots and fishing vest and my old gray pants. I didn't, in other words, dream myself to be one of them, as some sort of queen or other. I was my dirt-stained self, holding out my grimy hands. And it seemed that they gave me my mirror—the one I had already found, and even in my dream it wasn't shiny and new but just as scratched as when I found it. They showed me that I must place the mirror exactly where I found it in the first place so that I could find it—as I did find it—near the former riverbed and on a slight rise. This I did in my dream as the old women beat stones together with a loud *clack, clack*. And of course it's true, that's where I *did* find the mirror. It all fits together perfectly!

(All those old women lacked grace, but perhaps it's not required.)

My daughters... I suppose they tell me the truth about myself, though no need to. Why do they do it? Why feel free to say such things? Do I talk too much? Do I go on and on about it or about anything? Why, I've almost stopped talking altogether, wanting now other kinds of meanings. My argument is one Xed stone or a particularly smooth one or several in a row. I let them speak their ambiguities for themselves.

I showed my daughters my moonstone. I wanted to convince them. I said it came from the library.

"What library?

"You know. Out by the dried-up stream.

"You've always had that moonstone Grandma gave it to you."

"Well," I said. "I found it lying in the mud there." (I knew I was just making everything worse.)

"You must have dropped it yourself. What were you doing wearing that out there, anyway? You ought to be more careful."

I suppose I should have been. I know it will be theirs someday.

Later they told me about a place (I've seen it) where there's a doctor's office in the basement and art rooms, pot-holder rooms, television rooms, railings along all the halls. Everybody has a cane. I've seen that. I told my daughters no.

Just as crossroads, fire, seashells, oak trees, and circles have special meanings, stones have meanings, too. Some upright and lumpy on the hillsides are named after women. All the best houses are of stone; therefore the library also. Molloy sucked them (I have too, sometimes), found them refreshing. Stone doors into the mountain balance on a single point and open at the slightest caress. The sound stone makes as door is not unlike the rustling of pebbles on beaches. It is fitting that stones should be open to question, as my stones are. I liked letting them speak their ambiguities. When I was not out at my dig, I remembered stones. I dreamed them. I imagined I heard their *clack, clack*.

I warned my daughters that if I should be found awkwardly banging stones together on some moonlit night, it would be neither out of senility nor sentimentality but a scientific test.

But then I found a stone of a different kind and color: reddish and lumpy. Essentially nine lumps: two in front, two in back, plus one head, two arms, and two leg posts. I recognized it instantly. Fecund *and* wise. Big breasted *and* a scholar. Fat *and* elegant. I wanted to bring this librarian to her true place in the scheme of things. Restore her to her glory. Clearly, she not only had babies and nursed them, but she read all the books.

After this find, I dug in a frenzy. I knew I should be more careful of myself at my age, follow some rules of rest and recreation, but I believe in *do*, not *be*. Do! Though why should I so desperately want more ... more that is, than the mother of the library? (My daughters will call her a lumpy, pink stone.) Am I never satisfied?

Never! (My left hand has written *Stone on stone on stone on stone on stone* almost as though I were building the library out of the words.)

And then as I dug frantically, my eyes were blinded by the setting sun. Everything sparkled, and I thought I actually saw the library: all white with a great clear river before it and a landing where the books (stone books) were brought in on little ships with big sails. The glistening of the waves hurt my eyes, but I could see, even so, the librarians dancing on the beach in front of the sacred circle of the library. And they were all old. Old as I am or even older—wrinkled, hobbling women—I could see that their backs were hurting them too, but they kept on with the dancing, just as I kept on with my digging. And I heard the soft, sweet, fluty music of the library and felt the cool of it, for I, too, stood close to the western doorway. And we could see each other. I'm sure of it. I saw eyes meet mine, and not just once or twice.

I stepped forward, then to dance with them, but I fell—it seemed a long, slow fall—and as I fell, the sun was no longer in my eyes and I saw then my rocky ground and my dried-up streambed.

After I got up, I felt extraordinarily lucid. As though I had drunk from the ice-cold river. Clearheaded and happy—happier than I'd been in a long time (though I've not been unhappy digging here. On the contrary). I didn't want to go home and rest—I felt so powerful—but I forced myself. I had hardly eaten all day, and most important, if I tried to dig in the dark, I might miss something. I might toss away a stone like my important librarian and not see what it really was.

"As I dug frantically, my eyes were blinded by the setting sun, but I could see the librarians dancing on the beach in front of the sacred circle. And they were all old."

When I got home that night, I found that someone had been at my stones. They were all gone. I was so happy about my little librarian that I didn't notice it at first. It wasn't until I went to put her on my night table (I wanted her to be close to me as I slept) that I noticed there were no other stones there, not a single one. I knew right away what had happened. My daughters had decided that I'm being crowded out by stones. They think—because *they* would feel that way—that it must be uncomfortable to live like this. But I was brought up on stones; don't they remember that? I had geodes. I had chunks of amber. I had a cairngorm set in silver. Still have it somewhere, unless they took that off for safekeeping. They think I will lose it out there. Well, perhaps I already have, but if I did, it's been worth it many times over. And now even my hanging baskets of stones gone, and stones from every surface every shelf, all gone. Thank goodness I carry my most important ones with me in my vest pockets.

All these old stones. Mother wouldn't have appreciated them either. The work, yes; the care I've taken; the effort—she did appreciate effort and would have praised me for that, but she had no understanding of science and its slow, laborious unfolding. The care, the cataloging: she would have praised, but perhaps not when all this work involves merely stones. Back in those days she didn't even like my geodes (especially those that had not been opened yet). It can't be hoped that she would have liked my little naked librarian. Also, Mother disapproved of nakedness of any sort. I, on the other hand, want to stress the importance of childbearing librarians and so the importance of the bodies of the librarians, and so all the glory of their old-lady sexuality. (And I have seen it at the local library ... the woman in charge sitting with her breasts against the table.)

Coming in like that, then, and no stones, my little librarian in hand, I couldn't possibly sleep. I was both too happy and too upset. I sat down instead to draw my new find. If I am, someday in the future, to be judged for this work by someone who really knows what it's all about, I don't want to make any mistakes that will spoil the scientific accuracy of the study. I labeled all the parts: these slits, eyes that slit, the opening to the womb. (The look on her face was intelligent and self-sufficient.)

I hid the drawings under my socks. (Who knows what my daughters will think worth nothing?) I put the librarian in the top breast pocket of the vest, where tomorrow she will rest over my heart. Then I checked all the other pockets with my most important stones (all there, thank goodness) and went to bed. It was nearly morning.

Even so, the next day I woke still extraordinarily clearheaded. I fairly jogged out to my site. Worked hard all day but found nothing, saw nothing. Once or twice I did think I heard the sound of flutes and perhaps some drumming, but I knew that was just my imagination plus the beat of my own heart in my ears. I always hear that on hot days when I lean over too much or get up too fast.

When I got home I sensed again a change. (Why do they always come in the daytime when I'm not here? Why are they afraid to face me?) I couldn't see the changes this time, but I knew they'd been there and I knew things were gone. I checked my closet first, and yes, those few dresses I have that I hardly ever wear weren't there. Also the suitcase that I keep at the back on the closet floor. A pair of walking shoes were gone, and my best dressy shoes. Also a white sweater my daughters gave me but that I never wear except to please them once in a while to make them think I like it. Then in the drawers I found half my underwear gone and my jewelry, such as I have. (Probably my

cairngorm I didn t see it there)

They have already packed me up and taken my things off somewhere and I think I know where From the looks of what they thought I'd need there—dresses jewelry stockings—I knew what it would be like Dress for dinner sit on porches play cards watch TV sing entertainment every Saturday night Did they think I was so senile I wouldn't notice what was going on? I knew it wouldn t be long before they d come for me and I wondered exactly when that would be Perhaps very early in the morning before I was up and out at my dig Well I would just have to go back out there right away The thing was I wasn't ready yet Now I would have to make something happen before I really understood anything Before I went out though I thought I would sit down have a cup of tea and let my left hand write a bit I thought it might have something to tell me

Why not why not lie down and in the sanctuary of the library why not come cool all night and see the shores of the sky

(My daughters have never been interested in libraries nor in anything they can t put their finger on nor anything they can t understand the first time they see it)

Take a white string long and measure and dig in the center of the library a place to lie down with quilts and pillows

Nothing much else to do that I could think of right then I didn't wait I did as they said got white cord and quilt and pillow I didn t bring a flashlight The night was clear stars out but no moon I could see well enough to find the center of the library I dug a shallow grave just my size and lay down there facing up looking at the constellation Swan I kept my eyes on fhaf It took effort but everything worth doing takes effort Effort is what makes it all worthwhile so I held my eyes open and on the Swan her wings stretched out flying out there so high I knew I couldn t even conceive of fhe distance I forced myself not to sleep Pretty soon the Swan seemed to move and wobble and then began to swoop about the sky My God I d never seen anything so strange and wonderful as that swooping Swan of stars And then I heard—faintly at first—that *clack clack clack* of stones that meant all the librarians were there around me I didn't see them but I knew they were there I was afraid to turn my eyes away from fhe Swan Nor did I want to by then I liked watching it loop and tumble and glide And then it whizzed by directly over my head so close I felt the rush of air And after that there was the fat red Venus life-size sitting right beside me "Sanctuary" she said but she didn't need to say it I knew that 'Sfay " she said and all of a sudden I knew it was death death now and had been death all along But I thought *I could be working in the sanctuary ot the vegetable garden at the old ladies' home Or I might even be sitting on the porch, but I'd be alive if only for a little longer not much, but a little bit* "No " I said But she kept nodding and now I couldn t have turned away even if I wanted to and the *clack clack* of stones was loud and painful and right over my head

"Why not later?

"It s now or never "

I knew this was what I wanted but suddenly it seemed too easy I could hear by now not only *clacks* but the rush and rustle of the great river nearby I even heard the sound of a boat the bump of wood on wood as a skiff came up to the dock I heard the thump of stone tablets being placed upon the shore and I knew they were full of women's thoughts women's writings women's good ideas Even *old* women's good ideas Then the old women danced toward me with flowers and suddenly I was standing up on my white quilt and I was wearing my old white nightgown which I know I had not put on to come out here in (I know better than to walk around at night in nothing but that) And I worried because I wondered what had happened to my vest with all my best finds in it But the Venus read my mind "If you give us up,' she said "you have to give up those too You have to give up the proof that there were some little germs of sanity fo what you were doing " All the old women came one by one and looked me right in the eye then and smiled and all their eyes were blue every one of them the exact same blue I could see that they wanted me as much or more than I wanted them and that we would talk and it would be my kind of talk I knew that my left hand would write then many books on stones

"And they will be found here " the Venus said 'and will be deciphered and all in less than five years from now "

"Otherwise? I said

"Otherwise nothing No library no books no mirror no Venus "

"I'll take nothing " I said and the Swan swooped down and knocked me over I fell clutching feathers and I thought, *They lied to me I'm dying right now They lied to me and took me anyhow*

But it wasn t dying I woke up to voices and to the sound of a van and my daughters and two men They don t have to say anything I know where they re taking me and I know that I chose it myself I will go silently and with dignity I will walk like a queen I'm thinking that I'll find something there to make an effort for I'll find something so I can "do " I'll not just "be "

Odd thing though I pick up my vest lying there all torn it s as though it had been attacked in anger There's hardly an inch of it without a tear I check what s left of the pockets Everything is gone just as they said it would be—every single smooth white stone and all the other things—and I'm standing here like a crazy woman bare feet nightgown (I feel sure I didn t come out here like this) And I am surrounded by feathers white feathers When I move they float out all around me When I shake my head they flutter down

Don t bother Daddy while he's in a time warp dear

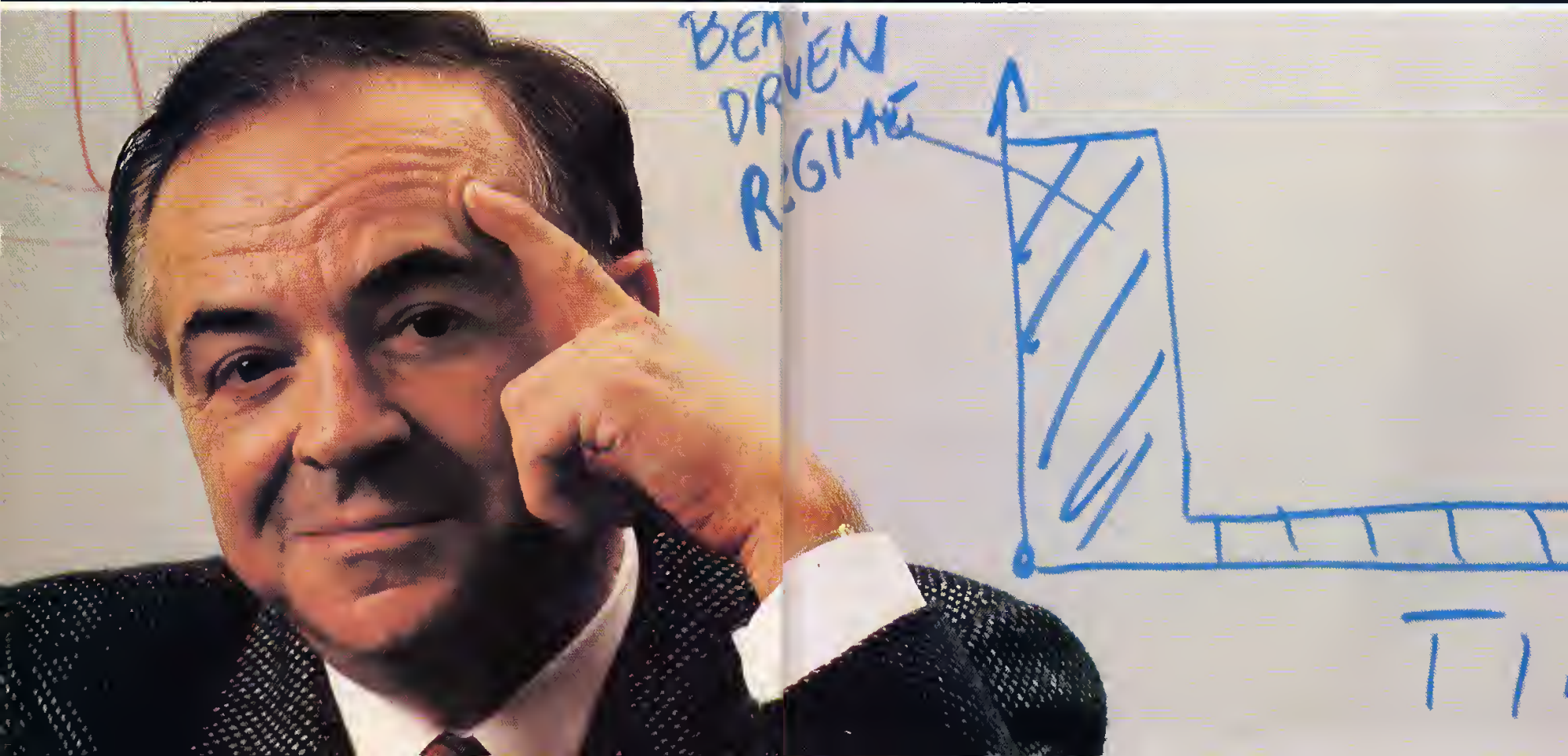
Bogdan Maglich knows how to make nonradioactive nuclear power, so why isn't he?

GETTING NUKED

BY PHIL PATTON

The university was almost brand-new—the showpiece of a newly independent African nation—and its faculty and students had proudly gathered to hear from one of the world's leading particle physicists, there under the auspices of the United Nations. The physicist showed slides of the great

PHOTOGRAPH BY DAN McCOY



copper coilings of particle accelerators in which atoms are smashed together. He told of the millions of dollars, pounds, marks, and francs that were being spent to look into the very heart of the atom. He told how physicists were learning the innermost secrets of matter—of quarks and mesons and the energy that holds all things together.

But when he had finished, instead of being awed by this display of technology of the First and Second Worlds, the scientists of the Third World were appalled. All this money, all these machines, and what did it do for the people? Why, one M.D. just out of school could do far more for a village than all those Ph.D.'s and their accelerators could.

The physicist was taken aback. Blushing and almost speechless, he was shocked into agreement. He told himself that as soon as he possibly could, he would turn his theoretical knowledge to practical applications. He would find a way that the great accelerators could change life in African villages.

Bogdan Maglich recalls that day, nearly 20 years ago, as he sits in his small, second-floor office above the yuppified storefronts—Laura Ashley, Benetton, Haagen-Dazs—on Nassau Street, the main street in Princeton, New Jersey.

The Yugoslavian-born Maglich has been fighting for a dozen years, trying to get a hearing—and funding—for a radically new form of nuclear energy. Maglich's nuclear power is not only cheap to produce, it is also incapable of fueling weapons. Most important, to a world still reeling from the Chernobyl disaster, Maglich's nuclear power is safe. Remarkably, it produces neither hazardous waste nor radiation. And its reactors come small enough to be of practical use in an African village. "It's a whole new approach that could revolutionize the production of energy," explains Maglich. "It has none of the problems of fission or fusion, and it produces more energy per pound of fuel than either of them."

Maglich calls the process "aneutronic" energy—from the absence of neutrons, whose impact in fission and fusion reactors is the major contributor to radioactivity. The source of aneutronic energy is a migma—from the Greek word for *mixture*—of beams of nuclei and protons bent so they collide with each other and release energy. Beautiful in theory, neat and clean in operation, inexpensive in production, migma looks like flower power beside the huge and treacherous installations of traditional nuclear power.

Maglich was sitting on the porch of his house in Princeton one day in 1972 when he realized there was a way to produce such nonradioactive nuclear energy. He was working out some calculations concerning self-colliding orbits (orbits that bend so as to send atoms crashing into one another). "Then," he recalls, "as I worked with my slide rule, calculating the energy limits, I realized that at a certain point more energy would be produced than was initially consumed. [That is the energy required to get the atoms to release their potential energy was less than the amount of energy the atoms produced.] And I thought of those villages in East Africa."

That day he could not have imagined that his efforts to create this new energy system would throw him into years of combat with the powers of the nuclear-energy bureaucracy. But while battling for his ideas and seeking funding, he was to be brought into direct confrontation with the fusion priesthood, the plasma physicists who controlled the direction of nuclear research. From a pillar of the academic community he was turned into a maverick.

Plasma physicists are a jealous and territorial fraternity, inhospitable to scientists from other backgrounds. They found it hard to believe that Maglich could have come up with a scheme better than the fusion systems that they had spent billions of dollars on. Surely migma must be unstable, they said. Surely it consumes more power than the atoms within the system can produce. Surely there must be *some* catch.

> *"Aneutronic energy is cheap to produce and incapable of fueling weapons. More important, it produces neither hazardous waste nor radiation."*

Instead of uranium or plutonium—the fuels used in fission reactors—or the hydrogen isotopes used in planned fusion reactors, Maglich's system relies on abundant nonradioactive helium, boron, or lithium. More important than the fuel, however, is the design.

In Maglich's migma, electromagnets are used as a sort of invisible piping, bending beams of protons and nuclei so that they loop back on themselves. The result of repeated bendings is a pattern that resembles the petals of a flower. At the center of this "flower," where the beams cross, the number of nuclei collisions is very high. The collisions release energy in the form of positively charged particles which can be collected and turned directly into electricity, without the intermediate step of heating steam for turbine-driven dynamos. Migma reactors, Maglich argues, can be built small, unlike fission or fusion reactors, and mass-produced for combination into power plants big enough to power a city.

Migma seems to delicately saute atoms, in contrast to the intense cookery that's envisioned by fusion scientists. In their planned fusion reactors, heat comparable to that of the sun's interior is applied to nuclei of the hydrogen isotopes deuterium and tritium. The rapid motion of the heated atoms in this stew, which is called a plasma, bashes the atoms together, fusing them and releasing energy.

The most promising type of fusion reactor, most experts feel, is the Tokamak, a huge cooker composed of electromagnets arranged in the shape of a hollow doughnut, or torus. One of the most famous Tokamaks—and one of the largest in the world—happens to be just a few miles from Maglich's home, at Princeton Plasma Physics Laboratory. Tokamak represents the orthodoxy, the state church of nuclear physics, and according to its tenets Maglich is an apostate.

Like an established church confronting a cult, the nuclear energy establishment has responded to Maglich's claims chiefly by ignoring them. Papers by Maglich's team of physicists are rarely quoted in scholarly articles, even when their findings are relevant. And Tokamak boosters who are asked about Maglich's work tend simply to ask in return, "If this thing is so good then why is nobody else working on it?" Maglich calls their terse response a "conspiracy of silence."

One critic who has been particularly outspoken is Marshall Rosenbluth, former top plasma physicist at Princeton Plasma and winner of the prestigious Fermi prize. Before Rosenbluth was lured to the University of Texas, he and Maglich used to bump into each other frequently in Princeton. And when they did, Rosenbluth would impart some new criticism of migma.

Once, in 1976, Rosenbluth became so insistent about one of his criticisms that he demanded to speak to Maglich's scientific steering committee, a panel of outside consultants. Maglich was worried that if Rosenbluth were convincing, the committee and then the board of directors might decide migma was all a waste of time. At the meeting Rosenbluth raised his point. He was convinced that Maglich's calculations were off by a factor of 100. It was a technical point but a challenge that jeopardized Maglich's predictions. Maglich and his theorists presented their calculations. By the end of the session, Maglich says, Rosenbluth agreed he had been wrong.

Perhaps in reaction to Rosenbluth and other critics—Maglich has been ridiculed as advocating "a reactor in every basement"—he sometimes makes the conflict sound like some elemental battle depicted in a science-fiction novel: migma versus Tokamak, the rebellion of Aneutronics against the empire of the Toroids.

"He is very confrontational," says one supporter. "And he can turn a confrontation into a shouting match," adds another.

By 1973, when he built the first aneutronic reactor model—Migma I, a device you could hold in your hands—Maglich had achieved just about everything a par-

ticle physicist could want. He was a full professor at Rutgers and he was involved with the accelerator owned by Princeton and the University of Pennsylvania. He had generous amounts of federal money to spend on research projects under his direction—$100,000 of "nonearmarked" funds. And he had grasped the key goal of his field. He had his own particle, the rough equivalent of an astronomer having a comet named after him or her. He was known as the discoverer of the omega meson, the first "heavy photon" and had been decorated for that achievement by President Kennedy. He had also helped invent sophisticated instruments for detecting particles, most notably the missing mass spectrometer.

Born in Sombor, Yugoslavia, in 1928, Maglich studied in England, received his doctorate at MIT, and did postdoctoral work at Berkeley. His curriculum vitae showed stints at the top research establishments: FermiLab, Brookhaven Lab, and CERN—the European nuclear research facility. In 1973 he and his colleagues at Rutgers planned to start a migma institute. Maglich carefully charted a plan. There would be five different stages of migma, each successive one greater in density (concentration of particles) and energy output than the preceding one. The final stage, Migma V, would exceed "breakeven"—that is, generate more energy than is required to get the process started in the first place.

But things did not go well with Rutgers. Maglich was a professor basically running a private company at the same time that he was teaching. Rutgers, under university policy, was entitled to rights on any patents developed by its faculty—a sure deterrent to outside investors in Maglich's company. After thinking it over, Maglich decided to resign his professorship.

Once he launched himself into the world of aneutronic energy—and into the world of fund-raising to support it—his reputation changed. Fusion scientists resented a particle physicist venturing onto their turf. And in a country that had committed the overwhelming bulk of its energy research funding to a single project—Tokamak fusion—he was an irritation. Was he the only right one and they were all wrong?

No doubt his talent as a salesman rubbed the Toroids the wrong way. Consider Maglich's skillful choice of nomenclature. At first he billed migma as a new way to achieve fusion. (Technically, what happens in aneutronics is part fusion, part fission, depending on the fuel.) But after Three Mile Island, no one wanted to hear anything about nuclear energy. "If you said *fusion* on Wall Street," Maglich says, "they would throw you out."

So he began to refer to the process as the creation of "aneutronic energy—emphasizing, after Three Mile Island and later Chernobyl, the nonradioactive nature of the process. He even changed the name of his company—first to Aneutronix and then, because no one could pronounce it, to United Sciences.

Maglich knew Dr. Vladimir Zworykin, the aging "father of television," and brought him in as a "cofounder" of the company. A photograph of Maglich and Zworykin still hangs in the Nassau Street office.

The new company leased lab space in an industrial facility on Route One outside Princeton, not far from Princeton Plasma Labs. "We had a billboard out front," Maglich recalls, "that referred to clean fusion energy. Congressional delegations on the way to Tokamak at Princeton Plasma would see it and ask about us. The Tokamak people didn't like that much."

One passerby who saw the billboard was a Merrill Lynch investment analyst named Phillips Bradford. He stopped by on his way to work one day to find out the story behind the sign. Soon he linked Maglich to Al Hammel, a Merrill Lynch vice president who helped him find what the Securities and Exchange Commission calls "sophisticated investors"—private citizens with enough net worth to write off an investment if it comes to nothing.

"The only way a reactor can win public confidence today is if Mike Wallace shoots a bazooka through it on Sixty Minutes *and it keeps running."*

Among the investors Hammel brought in was Saudi prince Mohamed al Faisal, an important figure in the Saudi government and, Maglich says, the only one in the royal family who was interested in science.

The prince was impressed. He noted that one of the fuels Maglich proposed to use in the migma was borax, a substance Saudi Arabia possesses in abundance. Perhaps he saw migma as a form of energy that would do for his country in the twenty-first century what internal combustion had done for it in the twentieth. In any case, soon after they met, Al Faisal wrote Maglich's company a check for $1.5 million—enough to help build Migmas II and III. As featured in a film the company made in 1976, which Maglich still shows to visitors, Migma II looked like an industrial clothes dryer linked to wires and pipes carrying liquid nitrogen to cool its electromagnets to four degrees above absolute zero, for maximum conductivity.

Strangely enough, the film was made for none other than Howard Hughes. Not long before his death he had heard about migma and had dispatched top executives of the Summa Corporation to check it out. They came to Princeton to look, referring to Hughes as "the Stockholder." They were impressed enough to ask for a film to show the reclusive billionaire. But then Hughes died, and the executives fell to quibbling about whether the Stockholder would have invested in the corporation and if so, at what stage—Migma I, II, III, or IV? Nothing more came of it.

What did come were five agonizing years with no funding, no experiments, no real progress. The prince's money could be stretched only so far. Eventually the Route One facility was closed, most of the staff let go. "We have never had technical problems," Maglich hastens to say. "Only funding. Whenever we have money, we make progress in a matter of days."

Then, in early 1981, Prince Mohamed al Faisal came to the rescue again. The prince worked out a deal by which Maglich and United Sciences would construct a billion-dollar energy research center for Saudi Arabia. This center, at King Abdulaziz University, would thrust Saudi Arabia into the first rank of energy researchers. The consulting fees from its establishment would finance Maglich's migma research.

For a while, the scheme worked. Then oil prices began to fall. In 1983 the Saudis declared a halt to all programs that had not yet broken ground. They still owe United Sciences a million dollars. During this time, Maglich had been turned down for funding 14 separate times by the Department of Energy (DoE) and the Atomic Energy Commission. It was the hold the Toroid-controlled funding had over him, and it threatened to be a fatal obstacle.

Thermally induced deuterium–tritium (DT) fusion was the next step in nuclear research. Physicists referred to it regularly as "the mainline." By 1975, with the rejection of various rival systems (magnetic mirrors, for instance), the orthodoxy had narrowed further. They chose Tokamak.

As part of the agreements associated with détente, the United States and the USSR each pledged to pursue research into Tokamak-style fusion, which was originally an invention of the Soviets. (The name is an acronym of Russian words.) But Maglich claims, the Soviets soon abandoned the project because their scientists decided the cost was too high and the outcome too uncertain. The American Toroids, he says, conveniently ignore this fact and continue to garner huge budgets—more than 100 million federal dollars a year.

Maglich can rarely resist attacking the fusion fraternity. Talk to him today, even after a new measure of self-restraint taught him by the years of struggle, and he veers quickly from description of migma into an attack on the Toroids. "Tokamak," Maglich contends, "might not ignite. A purely thermal plasma reactor cannot ignite without violating the second law of thermodynamics (the continual increase of entropy). Cer-

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"I don't question the seeming realness of the experience I question the experience itself"

ANTI MATTER

UFO UPDATE

One is editor of a renowned magazine devoted to debunking UFOs psychics and astrology The other believes that a superior intelligence will transform the human race What s more, they're brothers

Kendrick Frazier forty-four, and James Frazier thirty-nine admit they have "lively disagreements whenever they get together for reunions at the family home in Greeley Colorado Ken edits *Skeptical Inquirer,* the quarterly magazine published by the Committee for the Scientific Investigation of Claims of the Paranormal (CSICOP) and the scourge of the ' new nonsense —including beliefs of brother James

But Jim who works as editor of the local *Greeley News,* insists that his beliefs are neither new nor nonsense Our benefactors have been here as long aa we have he declares, "Initiating the likes of Gilgamesh and Socretes into the mysteries of the cosmos '

To Ken this sort of statement represents a threat to the progress of science In the mid-Seventies as editor of the respected publication *Science News,* he grew alarmed when readers wrote in asking for stories on the parenormal Not long afterward he began to correspond with longtime debunker Martin Gardner Their idea the formation of a skeptical, scientific organization "to correct public misunderstanding " Two years later, CSICOP was born

Jim s odyssey began In the mid-Seventies as well On May 17, 1976 around 3 30 AM, he says he was awakened from sleep by the voice of Beelzebub booming from his clock radio Apperently, Beelzebub was speaking through radio-show host Brian Scott who said he'd been abducted by giant thick-skinned long-eared aliens back in 1971 Ever since, Scott claimed, disembodied E T s had been borrowing his vocal oords to express ideas of their own

Frazier a psychologist and would-be film producer, listened till dawn, utterly fascinated Six weeks later he introduced himself to Scott And several months after that, in December 1976, he accompanied his new friend on a visit to Inca ruins at Tiehuanaco Bolivia There Jim Frazier says, he saw Scott become possessed by a mysterious being "with the presence of a king " In fact, he was more than a king—he was Ticci Viracocha, the god who brought the Incas civilization from on high

According to Jim Brian Scott is just one of many humans who have been visited by alien forms But says Frazier 'Scott alone has survived the experience with all his faculties intact If we only listened to him, he would help us create a new world, a new philosophy, new forms of language a new relationship between man and the unknown '

One thing s for sure The relationship between Jim Frazier and Brian Scott continues to this day Jim now owns the rights to Scott's life story and has even written a television miniseries about his friend

Ken Frazier is reluctant to discuss his brother's unusual beliefs outside the immediate family But, he states "It s possible for people to have vivid personal experiences from which belief systems stem I don't question the seeming realness of these experiences "—*JEROME CLARK*

MALLORY'S CAMERA

On June 8, 1924, George Mallory and Andrew Irvine disappeared near the summit of Mount Everest. History books record their climb as "possibly successful."

Did they make it? No one knows. But both men carried Kodak Vest Pocket Cameras, and the undeveloped film might prove Mallory the first conqueror of the world's highest mountain.

This bit of information, mentioned in a *New Yorker* article, caught the eye of Massachusetts computer engineer Tom Holzel. Holzel went on to devour all the books in the Everest section of the New York Public Library. But, he says, it was as if somebody had taken scissors and cut out the last chapters.

In hopes of pasting those chapters back in place, Holzel recently led a search for the cameras. First he obtained a permit from the Chinese government. Then he asked White's Electronics of New England to build special, rugged-duty metal detectors tuned to the brass and steel construction of the cameras. To determine the correct electronic scent for the cameras, White's engineer Hugh Kizer used the only available identical model of the 62-year-old Vest Pocket Camera. It had to be shipped from the Kodak Patent Department Museum in Rochester, New York.

During their three-month trek in the fall of 1986, Holzel used metal detectors to find oxygen bottles at what seemed to be a 1924 camp-

site. But because the weather was fierce, they did not reach the sites where the bodies of Mallory and Irvine supposedly lie.

Holzel says he will send another group to continue the search this spring. Despite all the high-tech hinging, Mallory's camera will be tough. "It's like looking for a needle in a haystack," Kizer says. "It's a big mountain."

Sir Edmund Hillary, the first man to conquer Everest and return alive, has some doubts as well. Addressing the Explorers Club, he said, "I would have thought Mallory had the right to be left sleeping in peace."

But when people ask Holzel why he bothers, he echoes Sir Edmund Hillary's famous quote: "Because Mallory's there."

—Jeff Taylor

'Nothing is easier to arrange in our city than a death or a disappearance.'
—Lawrence Durrell

TOAD

It was nearly two decades ago that Bob Rickard discovered the collected writings of Charles Fort—the eccentric iconoclast who spent his life collecting reports of the seemingly irrational and bizarre. Today, as one of the world's premier experts on anomalies, Rickard is the indefatigable editor of London's *Fortean Times*. As such, he says, he has "accumulated tens of thousands of clippings and publications on such subjects as lake monsters, geophysical auras

and killer clowns."

To untangle this morass of information, Rickard has recently set out to computerize the Fortean field. Because his files contain varied accounts of, among other things, showers of frogs, he has named his new storage and retrieval system TOAD—also an acronym for Treasury of Anomalous Data.

Rickard's new database, developed with a 20-megabyte IBM PC and dBase III software, will allow users to browse through libraries of information. It will ultimately provide subscribers with custom-printed bibliographies and—the Fortean scholar's dream—the ability to make connections between seemingly unrelated events.

"The biggest hurdle for any general interest area on the way to becoming a science is proper organization of its data," Rickard says. "Only then can proper deductions and observations be made. It is my hope that TOAD will help Fortean scholars navigate the morass of information more easily."

Rickard is currently offering data-entry forms to serious researchers and welcomes contributions of unexplainable stories from anyone willing to submit them. He can be contacted at Archives for Fortean Research, 1 Shoebury Road, East Ham, London E6 2AQ, U.K.

Scott and Sam Parker

[illegible]

An image of Jesus recently appeared in Fostoria, Ohio—on the side of a soybean-oil storage tank. That is the scoop, at least, according to the steady stream of visitors to the site.

It all started one evening last summer, when a woman drove by the 40-foot tall tank and noticed what looked like the outline of a bearded, long-haired man. The good news spread, and according to Fostoria police detective Gary Mason, thousands of visitors soon flocked to Fostoria to see the silhouette.

At one point it took thirty-five minutes to an hour just to

drive a quarter mile past it, says Mason, who adds that he has seen the image personally. He also points out that some people claimed to see a second picture of Christ's face on the other side of the tank.

Officials of the firm that owns the soybean-oil storage container, Archer Daniels Midland Company, have a possible explanation for the images—rust and shadows that may have created an optical illusion on the

tank's sides. "But we really don't know for sure what caused it or what people are perceiving," notes company spokesman Dick Burket.

Some people see nothing. Some people *want* to see something. "You can't explain these things."

At present, the oil tank apparitions have been marred by splotches of paint. One local man got a little tired of being tied up in traffic, Mason explains, so he threw balloons filled with paint at the tank.

But the image may not be gone forever. "We are currently working to see if the paint can be removed," Burket declares. "We are trying not to damage whatever's underneath."

That's good news for Fostoria entrepreneur Rick Pfeiffer. Before the oil tank was vandalized, he was doing a brisk business in coffee mugs emblazoned with the likeness of Jesus and the legend I SAW THE IMAGE.

—Sherry Baker

ZIMBABWE UFO

Back in 1985 a round object topped with a cone was seen by dozens of people over the skies of Zimbabwe. With pilots, air traffic controllers and civilians among the witnesses, that country turned to aeronautical experts for an explanation. Now, a year and a half later, Zimbabwe's Air Commodore David Thorne sees no explanation in sight. "We have not been able to identify the object," he says. "We have had to classify it as a UFO."

Although he didn't personally witness the object, Thorne reports that "the craft was spotted as it streaked over southern Zimbabwe. Then air traffic controllers watched it hover and tracked it on radar. Two Air Force jets went after the object, and the pilots described it as incredibly shiny, reflecting the colors of the sunset. Our estimates indicate that the UFO was traveling at twice the speed of sound. And when it got dark outside, we realized the object was emitting its own light."

"Our pilots are completely reliable," Thorne contends. "This cannot be dismissed as a plane, weather balloon, or natural phenomenon."

But UFO skeptic James Oberg has his doubts. "The evidential value of unresearchable sightings in Zimbabwe is zero, however sincere the witnesses," he says. "Besides, pilots are not always calm, dispassionate observers. They tend to perceive any visual stimulus in its most dangerous possible configuration—as another craft. That's a good characteristic of a fighter pilot, but not a good characteristic of a UFO witness."

Oberg also points out that "Zimbabwe is sort of on the edge of the civilized world in terms of tracking things that might cause this kind of UFO report—like Russian and South African reconnaissance planes that, I'm sure, are flying over that airspace."

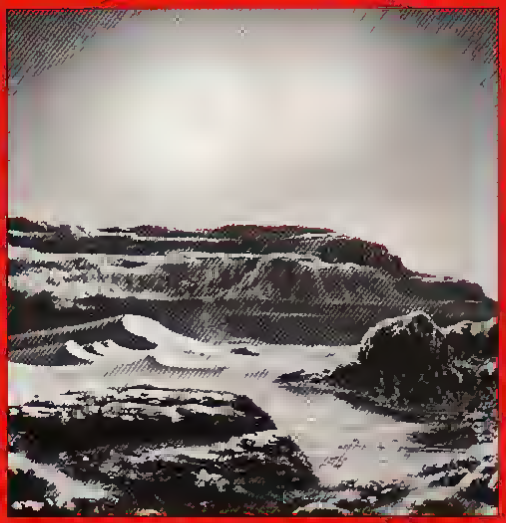
—Sherry Baker

"When the mind is in a state of uncertainty, the smallest impulse directs it to either side."

—Terence

"I was out jogging when this bright light hovered over me. It seemed to be watching me. It was like a huge electric light bulb in the sky."

—Muhammad Ali



NEAR DEATH IN INDIA

Near death experiences or NDEs most often follow serious injuries or illnesses in which imminent death is expected but does not occur. These bizarre, brief encounters with the "afterworld" are usually characterized by visions of long-dead relatives, swirling lights, and the sensation of utter peace.

But now, according to recent research, it seems that not all aspects of the NDE are universal. In a study by Dr. Ian Stevenson of the University of Virginia Medical School and Dr. Satwant Pasricha of the Institute of Mental Health and Neurosciences in Bangalore, India, NDE reports from East and West reflect variations in the cultures themselves.

Indians, the researchers found, tended to report that "messengers of the god of death took them to the otherworld, where a man with a book was waiting to check them in. They were generally sent back only after it was discovered that a mistake had been made—the *intended* victim had the same name but came from a different caste or lived in a village nearby. Once the mistake was detected, NDE-ers were generally escorted back by the same messengers that brought them in initially.

Americans, on the other hand, usually went unescorted to the otherworld and returned alone, not because of some untimely mistake, but because of love for family or a simple desire to live.

Do these findings prove NDEs are nothing more than mental projections of cultural beliefs? Maybe so.

But Stevenson and Pasricha contend that "if we do survive death and live in an after-death realm, we should expect to find variations in that world just as we do in this one. A traveler to Delhi encounters dark-skinned immigration officials, who in many respects behave differently from the lighter-skinned immigration officials another traveler may when arriving next in London or New York. In the same way," they declare, "there may be different receptionists and modes of reception in the world after death."

—Paul McCarthy

"It's all right letting yourself go, as long as you can get yourself back."

—Mick Jagger

CENSORING

CONTINUED FROM PAGE 49

tortions. He knows, says Godfrey, when he's making an outrageous statement, yet the next time he'll give exactly the same statement because it works in swaying the audience. An example of one of his tricks, she recounts, is the ploy of showing a cartoon drawing of a whale with a cow's hindquarters. Gish will point to this and say evolutionists want us to believe the whale is part cow. "Now isn't that *udderly* ridiculous?" he demands. And the audience roars. But how many people know that evidence from serology, the study of blood, shows that the chemical composition of whales' blood closely resembles that of the even-toed ungulates, cattle? Or that this affinity of the blood agrees precisely with evidence from comparative anatomy, embryology and paleontology showing that whales and cows descended from a common ancestor? The differences between the species today are due to adaptations evolved over millions of years by their living in vastly different environments.

Few scientists have the patience for going around mopping up after this sort of idiocy. Yet it's a job somebody has to do. Creation science "experts" and debaters take advantage of their audience's ignorance in a number of ways. They compare two scientific laws that superficially look contradictory as "proof" that one of them is wrong. Another rhetorical technique is to show one seemingly contradictory detail of a general theory to prove that the theory is wrong, or to show how the detail reveals the biblical "truth" hidden in the atheist theory. Yet another way creationists prey on ignorance is to say that such general theories as the origin of life on Earth, the Big Bang, and evolution rely on no measurable lab data. Of course in each case there are, even though demonstrating such data may be more complex than measuring the absorbencies of competing paper towels on television. One instance of hard empirical evidence for evolution is quite literally under our noses. As Nobel laureate Carleton Gajdusek, the famed discoverer of the slow viruses, indicates, one can see evolution at work through a microscope. "Microbes have a generation time of a different order of magnitude than larger living things," he says. "In the lab, during one human lifetime, the influenza virus can go through changes equivalent to a million years of human evolution."

Citing mathematical probabilities, too, is a technique creationists use to try to "demonstrate scientifically" some of their beliefs or to refute evidence for a theory they can't swallow. One major theory they are out to demolish is the idea, now highly verifiable with data, that life formed spontaneously from the primordial soup. No way, say the creationists. "Amino acids, like those that make up the enzyme ribonuclease—necessary for life processes—are as apt to form themselves into chains having the right sequences," says Gish, "as a tornado swirling through a junkyard can form spontaneously into a Boeing 747."

Mathematical odds, however, have nothing to do with the origins of life. In short, amino acids did not have to be organized into unique specific sequences in original molecules. There is an extremely large variety of sequences that probably could have worked in initiating life. Recent studies, furthermore, indicate that the basic chemicals of life are structurally attracted to one another.

To maintain the illusion of a 10,000-year-old universe, creationists stoutly deny the validity of radioactive and other dating methods. Bill Baumgartner is president and founder of the Christian Action Council of Middle Tennessee and an environmental engineer with an M.S. in civil engineering from Vanderbilt University. "I'm sorry," he says in his office in Nashville—the buckle of the Bible Belt. "There is no scientific way to determine how old a rock is." This is after he has delivered a rambling, pseudogeological, quasi-physics disputation about the half-life of uranium 238. "You can't look at a rock and decide how old it is. Old rocks don't look old, and new rocks don't look new. Rocks are rocks. They don't have nice little tags on them that say, I'M THREE AND A HALF BILLION YEARS OLD."

> *"Few scientists have the patience to mop up after this sort of idiocy. Yet it's a job somebody has to do. Creation science 'experts' take advantage of their audience's ignorance."*

Baumgartner is a handsome man, a second-degree black-belt karate expert who appears at least ten years younger than his forty-three years. Generous with his time, he energetically articulates his views. The fact that by denying radiometric dating he has to reject the two pillars of modern physics—relativity and quantum mechanics—doesn't make him less likable. It is just that his niceness collides badly against statements like "No Christians should ever turn their children over to the government school system unless they have decided to give them over to Molech. If you give your children to Molech, you will get Molech worshippers." (Molech, known also as Milcom, was a "king-god" of the Canaanites, identical with the god Baal.) Or "Secular humanists, pagans, unbelievers—what they have is a heart that hates God. Until that heart is changed by the power of the Holy Spirit, they're going to hate God. And educating one of them, you just end up with a well-educated pagan who hates God." Baumgartner home-teaches his three children.

Probably the most annoying technique the creationists use is to take scientists' statements out of context or twist their words to such an extent that the committed researcher ends up looking like a dyed-in-the-wool creationist.

When science teacher Donald Smith was on the stand in Mobile, the rather nervous witness recounted a moment in class when a student asked him whether he believed that monkeys were our ancestors. "I said, 'No, and I will tell you why scientifically.' I cited Richard Leakey," said Smith, "who made a statement in a conference in California that to his knowledge he did not know where man came from, but he was certain that we did not come from apes." Smith's bandying of the paleoanthropologist's name was astounding. Leakey is profoundly dedicated to unraveling the mystery of human–primate ancestry and told *Omni* not so long ago that "the only thing I would ask is whether, in fact, man and the apes ever really did diverge." Yet Smith's warped reference to the fossil hunter stands without rebuttal in the court record.

Fundamentalists foster a schizophrenic approach to the empirical world when they seem to endorse science but actually reject basic aspects of it, says Godfrey. The textbook trial in Mobile and the events that led up to it reveal tinges of that schizoid world view and the labyrinthine turns of mind necessary for creationists to avoid thinking the unthinkable. On the surface the case has nothing to do with science. The plaintiffs said that their main contention was that 39 social-studies textbooks excluded facts about such traditional religious faiths as Christianity and that seven home-economics textbooks promoted humanism.

Finally, they also admitted that they wanted to prove that secular humanism is a religion and, as such, should be expunged from the textbooks. When *Omni* called Thomas F. Parker, lawyer for the plaintiffs, he said that the case was "limited solely to the constitutional prohibition against advancing the beliefs of a religion and exclusion of facts about religion." And he warned that "if you try to draw any parallels between science and our case, you'll hear from me." Of course, evolution continued to rear its head throughout the trial.

The history of this case holds an absurd fascination. It began in 1981, when Shioke Jaffree, a Mobile County kindergartner, told his parents that his teacher was leading the class in various religious practices and that he didn't want to participate. In May 1982 his agnostic father, attorney Ishmael Jaffree, filed a lawsuit against teachers, principals, and the school board challenging not only prayer but also teachers who were bringing religious tracts into the

classroom. "I had the support of no one, really," Jaffree recalls. "The first case was very emotional. The born-again Christians came with their Bibles, smiles on their faces. They told me they were going to pray for me and that God loves me. Others were angry. I received threatening letters, phone calls, egg on the car, names on the street. But this secular humanism thing"—Jaffree refers to the present case—"nobody here's really interested but the judge, the attorneys, and some of the national groups. It's a legal quagmire."

McKown was Jattree's only expert witness in the earlier school-prayer case. "He's dynamic, he's vital, he's brave; he knows what he's doing," McKown says of Jaffree. "I was the only one to step forward to help who was allowed to testify."

The paint is peeling at Jattree's office at the Legal Services Corporation of Alabama, but his bank of windows offers a view of Mobile Bay that New York execs would kill for. His patrician African features show only a hint of the stress he has encountered in legal combat, but he is clearly obsessed with the ongoing ramifications of the 1982 case and obsessed with Judge Hand. At the time of his original 1982 ruling, Hand, a Nixon appointee, equated secular humanism with communism, atheism, agnosticism, and socialism, calling all of them religions. "Hand indicated his bias at that point," Jaffree explained, "and started making noises about secular humanism. It was discussed during the trial."

McKown remembers: "On the witness stand I adopted Durkheim's understanding of religion—that it is a body of beliefs and practices relative to sacred things, beliefs that unite people into a church, moral community, or temple. Secular humanism is not and cannot be a religion because it has nothing sacred. There's no object, no ritual, no action, no particular beliefs that are held sacred. Hand wants to maintain that irreligion is a religion. And I said, 'Well, then, I guess you must understand the inedible to be edible. If so, I suggest you try some azalea leaves in your salad tonight, and you'll discover there's a difference between *edible* and *inedible*.' It had no effect at all," McKown recalls. "That mind-set cannot tolerate anything incongruous with what has been decided."

In a footnote to the 1982 case, Hand said that if it got appealed and his decision reversed by the Supreme Court, he would reopen it and take another look at secular humanism. "And that's what he did," says Jaffree. "Out of the blue he reopened it, turned the six hundred defendants into plaintiffs, and let them sue the school board." Hand effectively removed Jaffree from the second round by refusing a request for attorney's fees, which would amount to at least $100,000. "Secular humanism is Hand's baby. This is his case," Jaffree says about the recent book trial, "and he's enjoying it. He doesn't even pretend to be impartial." Shrugging his shoulders ironically, he says, "This case has become a very personal vendetta, him against me, and he's got all the power. It was unfair the way he threw me off the case. But judges have so much power they can do almost anything."

In the Hand case, the Alabama State Board of Education and a dozen parents intervened to defend the textbooks. As in the Tennessee case, support given both sides came from outside "superpowers." The Alabama defendants were represented by Hogan and Hartson, a prestigious Washington, DC, law firm secured by PAW and the ACLU. The plaintiffs received considerable financial support and legal aid from Pat Robertson's National Legal Foundation.

If Hand finds for the plaintiffs—and he surely will—that secular humanism is an established religion, both sides will appeal. Should an appeals court and a Reagan-packed Supreme Court rule that secular humanism, the godless religion, is being foisted on Christian children in classrooms, the Mobile judge might indeed have his revenge. And he will have chaos in the classrooms.

> *"Old rocks don't look old; new rocks don't look new. Rocks are rocks. They don't have nice little tags on them that say, I'M THREE AND A HALF BILLION YEARS OLD."*

In the meantime, many plaintiffs say they're interested only in having religion-related events accurately represented in history textbooks. If that had been the only bone of contention in Mobile, there might not have been a trial. McKown, however, cannot resist a touch of mischief. "Tell the truth about religion? It's a delicious irony! I'd like to have the whole damn truth come out. That would have the people up in arms. If you think we've got turmoil now, wait until religion gets its due in the schoolbooks! In every religion there's a dark side—a very dark side."

In Mobile, one expert for the plaintiffs provided an example that would have evoked a gleeful laugh from McKown if he'd been there. "Kids are being bamboozled about religion," complained Timothy Smith, a professor of history at Johns Hopkins University, who deplored the lack of written information about Christianity in America's past. Yet on the stand he criticized a text that, in a section on the spread of Catholicism in South America, included a paragraph on the missionaries' cruelty to the native peoples. "Are only positive facts to be discussed?" queried a defense attorney during cross-examination.

The parade of witnesses brought forth to dissect secular humanism presented several levels of sophistry. "Where do they get these experts?" remarks Jaffree sardonically. "Have degree, will travel?" After one long-winded, jargon-ridden testimony, a courtroom observer remarked that the affair reminded him of the scene in the movie *The Name of the Rose* in which top monks gather in a monastery summit meeting to debate whether Christ's clothes on the cross were borrowed or new. In his testimony University of Virginia sociologist James Hunter said secular humanism was the "functional equivalent of a religion," since groups like the Ethical Culture Society were listed in the Los Angeles phone book under CHURCHES.

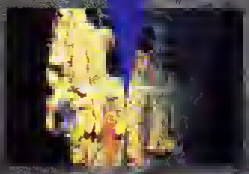
At another point Judge Hand leaned over and asked Hunter what *phenomenology* was—the word, in Hand's rich Southern accent, taking on a life of its own. Hunter picked up his pace and for hours lectured on the definition of a religion. In secular humanism, he said, people believe in progress, change, scientific rationality—anything achieved by man alone. There is an elite group in this country, he continued. These people have access to college, they are professors, lawyers, journalists—people with advanced degrees. Elitists, particularly prominent in the highly educated class, tend toward [illegible], he leaned forward in the witness box, making a steeple of his hands. "*narcissism*."

In bringing up intellectual elitism, however, Hunter touched a chord that rings deep in the United States. Americans are victims of a profoundly anti-intellectual culture. "We're the biggest class of know-nothings in the civilized world," says McKown. "How we could have so many people going to school for so many years and coming away with so little beggars the imagination." The religious needs of the people, he points out, are much more powerful than any scientific objectivity or dispassionate approach to things—something that education is supposed to provide but has not. "We've spent billions of dollars, and nothing resembling critical thinking takes place in the public schools. We have the brains to organize a curriculum of logic, language, mathematics, and computer literacy. It's got to be the foundation of any sensible future curriculum."

"But Americans fear logic," McKown continues. "It's part of our fallen nature—ever since Eve sank her teeth into the fruit and disobeyed the dominant male Yahweh. Stultification, it would seem, must be added to grace and faith. In a crunch, elevate faith, debase reason. Only when Americans lose their religious fear of logic and cease to repudiate it will intelligent educational reforms become possible."

Is a "fundagelical" theocracy a real possibility? Christianity is a millennial religion,

TITANIC



PREMIERES
SUNDAY, MARCH 22
9PM EASTERN

EXPLORER

SuperStation WTBS
GREAT AMERICAN TELEVISION

ALSO: 3/23 at 9pm (Pacific) & 3/28 at 9pm (Eastern)

and we are fast coming up on 2000. Overpopulation, the breakdown of the traditional family, and drugs are being blamed on humanism, not on the social disruptions that accompany the urbanization of large aggregations of people. The late twentieth century is living under the nuclear sword of Damocles—with the threat of annihilation. things seem out of control. There are all kinds of chickens coming home to roost, and the fundamentalists are saying, 'See, this is what God does to a nation that turns away from him.'

Supposing Jesus doesn't come by 2000," says McKown. "I've said of Jesus that he's always coming, he never leaves and never arrives. It's his nature to come. Suppose he doesn't come, and conditions continue to get worse. Then this stuff will be around for a while." McKown sees little indication that scientists and "reasonable people" will quell it. "The scientists just want it to go away; they don't want anything to do with it. They are so blind."

What, then, if there were a coalition of Bible believers ranging from Hasidic Jews to Mormons to Pentecostals to Baptists? You mean a Khomeinization of America? McKown asks. Well, that's the worst scenario, and it's not expected. But if the gulf between the educated intellectuals and the ordinary folks widens considerably, we'll be in trouble. That is what happened in the Moslem countries—the leadership got a bit educated and secular and began moving away from the great body of fundamentalists. You can't govern a country if there's too much separation between the governing classes and the folks. And the level of understanding of the average American is appalling. They come into my classes every fall semester—a sea of ignorance.

It's obvious that if the level of teaching of logic, of science, of how to think, doesn't improve, McKown insists, Europe and Japan will knock the stuffing out of the United States economically and technologically. Meanwhile, he says, the schools cannot teach modern science without adopting the rational empiricism that underlies it, nor can they teach the scientific method without aiding and abetting the secularism that follows in its wake.

West of the Mississippi and speeding along Interstate 10, a motorist must cross the massive Atchafalaya swamp system on a bridge many miles long to get to Lafayette, Louisiana. It is in that region, suffering grievously in the wake of the oil glut, that Don Aguillard is assistant principal at Acadiana High School. One wonders what this man, whose solitary name appears at the top of the Supreme Court brief in defense of science education in Louisiana, will be like. Acadiana, a one-story brick establishment in a field on the edge of town, looks like a normal, well-run postsegregation Southern school. There are students, both black and white, actually reading books in the afternoon sun in front.

Inside the administrative office a poster of the *Challenger* crew hangs on the wall

Aguillard's appearance—olive skin, dark hair and limpid eyes—reflects his Cajun ancestry. 'This is the only interview I've given,' he says, referring to requests from religious groups for debates.

"When this thing started five years ago, did you feel as if you were being categorized among the godless?" I asked.

"Yes," he says, "but that's because of the lack of understanding." Aguillard, who clearly has loved his years of biology teaching, never thought when he wrote a letter of protest about the state creationist legislation that the matter would drag on so long or end up before the Supreme Court. He maintains that most science teachers are against the equal-time law—although he was surprised that there weren't more who would get involved in the lawsuit. To Aguillard, the legislation passed by a fluke pulled off mainly by politicians.

"I'd like to see this thing laid to rest," he says quietly. "We would be in jeopardy of confusion if we said 'Now that we've told you the earth is four billion years old, we're going to tell you it's six thousand years old.' It would be difficult for a tenth-grader to comprehend why we're going through these two extremely different concepts. That's not science."

Aguillard downplays the creationist phenomenon in his community. 'Our concern here is that the oil business is just about bankrupt. This town is on the verge of closing down, and it's an oil town. Now that's another story.' Nonetheless, when the subject of textbook adoption comes up, his voice grows tense. In 1988, he says, science textbooks will come up for review 'and it's essential that we have a number of people concerned with the quality of science education at that meeting. It's possible that if we're not concerned, we might have a state with creationist textbooks. A small number of vocal, articulate people may get into the process through the back door.' Aguillard versus the creationists may not end as soon as he hopes.

What will happen to textbook quality if the absurd happens, say, and the highest courts rule for the fundamentalists? 'As an educator," says Gerald Skoog, who is also the retiring president of the National Science Teachers Association, "I'm very concerned that as controversial topics are swept out of the textbooks, they are in danger of becoming so bland the students will consider them irrelevant to the real world."

Stripped textbooks may not survive the insidious banality—not to mention lack of information—brought on by attacks from the religious right, attacks that scare the bejesus out of the publishers, with their corporate concern for bottom line accountability. "Sometimes I wonder if textbooks as we know them—expensive four-color production—aren't becoming passé," muses Wayne Moyer. "Instead, why couldn't a teacher use paperbacks with black-and-white pictures, published locally for a couple of years and then throw them away? It's possible to produce a book with decent-quality typesetting and print faces on a PC. A school district could take an existing basic text, modify it for its own use, and publish it themselves with a license from the original publisher.

Customized texts would certainly tempt the creationists to use their desk-top computers to do massive rewrites. "Now that's a worry," says Moyer. Alternative books open the door to fragmentation of the school system along sectarian lines. If the religious right is successful, says PAW president Podesta, "it might mean the end of public education as we know it. Maybe the system itself is too vulnerable and today's censorship phenomenon is just a symptom of terminal disease.

'So the born-agains want equal time," says Ishmael Jaffree. "Then we'll have to give all religions equal time according to the numbers the percentages. But realistically, you can't give equal time to some way-out faith here in Mobile that only a few people believe in. The Buddhists, perhaps—they get two minutes every other week. Look, we're fair! If you've got a community that's mostly Buddhists, then it's the Christians who get two minutes every other week. It's only right. I mean, this is pluralism. This is American democracy."

Omni is your map, and these 13 clues are your guide, their solutions hidden in this issue

THE GREAT OMNI TREASURE HUNT

Words are powerful tools. They can kindle a romance or kill a deal, soothe a baby; incite a riot. Rudyard Kipling said, "Words are the most powerful drug used by mankind." And this month the words in *Omni* have even more power. In the second Great *Omni* Treasure Hunt, our clues will lead you through the magazine looking for specific pages. Each clue consists of two parts. The first refers to a particular advertisement or article, and the second contains actual words appearing on that page. Take, for example, this clue: "Fundamentally, a verbal command *attempts to impose* one person's will on another, but we hope that in *schools* throughout the United States students are taught to think for themselves." The words *fundamentally* and *verbal* in the first part of the clue refer to First (fundamentally) Word (verbal), on page 8; the italicized words are found in the quote below the title and confirm that you found the *correct* page. Use the same method to decipher each of the 13 clues. Find the page by interpreting the clue, confirm it by finding the clue's italicized words on that page. The actual words in the ads will not necessarily be italicized. On editorial pages, however, they *will* be italicized or in boldface type, as well as being in a larger type size—and can be found on *only* one page. For an example, see "Kingdom Come" on page 60. The title is in boldface type; the lines below it are italicized, as is the quote on page 62. After you find the correct page, make a note of its number. If no number appears, check adjacent pages to determine what the number should be. Add all 13 page numbers; the total is your answer. Read and follow the rules below before submitting your answer, and you may win one of the prizes (on pages 102 and 103).

OFFICIAL RULES

1. No purchase necessary. To enter, print your name, address, zip code, and your solution on a three-by-five sheet of paper. Mail your entry to *Omni* Treasure Hunt, Box 812, Boston, MA 02117. Enter as often as you wish, but mail each entry separately. We are not responsible for lost, illegible, or late mail. Entries must be received by April 30, 1987. Drawings are immediately thereafter.

2. Winners will be selected from all eligible entries in random drawings conducted by Proaction Marketing, Inc., an independent judging organization whose decisions are final. Odds of winning are determined by the number of entries received. Winners will be notified by mail and may be required to sign and return an affidavit of eligibility and release within 15 days of date of notification, or an alternate winner may be selected. Limit of one winner per household. Winners agree to the use of their names and likenesses for publicity purposes without additional compensation.

3. Open to residents of the contiguous United States, twenty-one or older, except employees, and their families, of *Omni* Publications International, Ltd., its subsidiaries or affiliates, its advertising and promotion agencies, and Proaction Marketing, Inc. All federal, state, and local laws and regulations apply. Void where prohibited.

4. Prizes are not transferable, assignable, or redeemable for cash. No substitution other than as necessary due to availability. All taxes are the responsibility of the winner. The Rome vacation for two consists of round-trip airfare from John F. Kennedy International Airport in New York City, plus hotel accommodations in Rome for seven days, six nights, meals and other expenses are not included; winners will be responsible for transportation to and from Kennedy Airport, travel subject to space and departure availability and must take place between September 1, 1987, and April 30, 1988. Prizes with alcoholic content will not be awarded in states where prohibited or restricted.

5. For a copy of the official rules and the solution, send a self-addressed, stamped envelope to *Omni* Rules, Box 815, Boston, MA 02117, no later than June 30, 1987. Washington and Vermont—no return postage required, Vermont postage will be refunded.

6. For a list of winners, send a self-addressed, stamped envelope to *Omni* Winners, Box 818, Boston, MA 02117, no later than June 30, 1987.

TREASURE HUNT CLUES

1. If you focus on what creates a *catalyst for the creative mind* you'll find that challenge produces *new vision*.

2. A sound piece of technical equipment should be *made to last in the first place*, with no *breakdowns* to give us the *shakes*.

3. Around the Neolithic era, prehistoric man studied *each pebble, every rock*, and when he created the first stone tools, he *left untold* legacies for generations to come.

4. A gem of an *idea* seems to *capture and release light* in our brain as *brilliant* flashes of enlightenment engulf us.

5. Scientific experimentation provides data on which we base *business needs;* with this knowledge we always *have a solution*.

6. Learning to copy personal speech patterns, computers will sound businesslike *at work, at home*; the talk will be *lighter and uniquely brighter*.

7. A spirited and "positiv" point of view is a *treasure* in space exploration; and *in accordance with* that credo, one *superb* astronaut after another *has been produced*.

8. In general, foods cooked in microwave evens take longer to eat than to cook, whether in *combinations of succulent* tidbits or in a single baked potato that *tastes so good you forget* to add sour cream.

9. All kinds of energy went into advertising a watch, instilling *public confidence* with such claims as *it keeps running* even when someone *shoots a bazooka through it*.

10. We know the earth rotates, but fortunately we don't *experience* it or we would be *all over* the place, unable to walk *with the confidence* of higher primates.

11. Speeding along in his career, a molecular astronomer may be *light years ahead* of others in the field of interstellar space because of his *superior detection ability*.

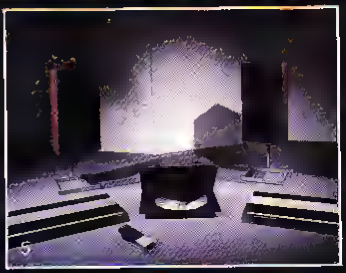
12. A collection of stones told by fit astronauts confirms that *your body knows the difference* whether you're *on the slopes*, or *on the town*.

13. A distillation of facts is always essential, and if you *blend 1¼ oz.* common sense *and 2 oz.* spunk with a *special kind of spirit*, you'll *serve* yourself well.

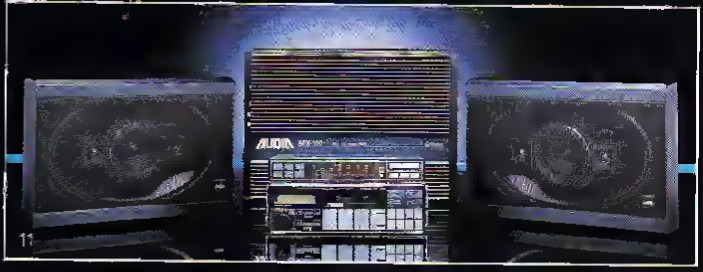
—Clues created by Gloria Rosenthal

Any of these prizes, from a hovercraft to a videophone, could be yours if you're both perceptive and lucky

THE OMNI CACHE MACHINE



The following descriptions correspond to the numbered photos above. 1. Grand prize: AMC Jeep Wrangler ($16,000). 2. First prize: the Hoverstar Sports Hovercraft, which skims over land, water, snow, and ice ($7,500). 3. Second prize: Mitsubishi Electric VS-581R 50-inch rear-projection television and HQ VCR HS-421UR ($4,150). 4. Third prize: Lazare Kaplan half-carat flawless diamond on a 24-inch 14k gold chain ($3,500). 5. Fourth prize: Bang & Olufsen Beosystem 3000 stereo equipment—cassette deck, receiver, turntable, and speakers with stands ($2,593). 6. Fifth prize: from Fantasy Holidays, a one-week vacation for two in Rome ($2,500). 7. STS Home TV LSR Satellite Earth Station by STS, Inc. ($1,995). 8. 10 MHZ Turbo XT computer with 20 MEG hard drive and printer by ACS Importers ($1,600). Not shown: Interstate Voice Products' VocaLink SRB-LC, a 400-word speech-recognition board for IBM PC/XT/AT and compatibles ($400). 9.



A set of Luma Telecom picture-transmitting telephones ($1,579 each). 10. From Canon camera, a Canon T90 Professional SLR outfit with T90 body and normal, wide-angle, and zoom lenses, plus Speedlite ($1,574). 11. Clarion car stereo Audia Collection, including a 200E tuner, AFX 150 amplifier, CSX 695 speakers, and EQX 700 equalizer ($1,555). 12. Three lucky winners will each receive $500 worth of liquor from Carillon Importers, Ltd. 13. From Casio, the CZ-1 full-size 61-key synthesizer with programmable touch sensitivity. It has 64-RAM memory and is MIDI compatible ($1,400). 14. Two lucky winners will each receive Canon's PC-3 Portable Personal Copier, with PC MINI-Cartridge from Canon USA ($770). 15. Seven winners will each receive a Micro Eye Vector Radar Detector, model 870, from B E L-Tronics, Ltd. ($230). 16. Not shown: the Halleyscope land and sky telescope, which doubles as a telephoto camera lens ($200).

CONTINUED ON PAGE 116

KINGDOM

CONTINUED FROM PAGE 62

flickered, turned grainy, and for a moment was blacker than any night.

He thought of it simply as The Shadow.

When it came, the building rocked. It reached through the glass, it grabbed them both by their very souls, and they trembled, knew fear, and forgot the old script.

The window was their agreement. It had worked for weeks.

They waited. They jerked. A single cry from the baby's room reached them; they held their breaths, and the cry did not come again. Sometimes the baby could sleep through the rocking of the building, the flickering of the universes. Sometimes the slightest sound would wake it.

Joanna was the baby's name. When he thought about her, it was as if she were someone else's. As if the woman beside him were someone else's wife. Had they ever laughed? He could not remember.

They waited. He felt her stiffen and thought it was coming at last. But then he heard what she was hearing. The scratching at the door. They held their breaths again, together. There was a cry—not from the baby's room this time—and then it was gone. Silence came back.

Once, a little later, he thought he could feel the building tremble. But it was only the woman beside him, shitting on the couch. It wasn't going to come.

Even if it did, it wouldn't work this time.

He couldn't remember the last time it had worked—for him.

He felt her against him, her shoulder warm. It made no difference.

A tear in space. An Einstein intersection. Black hole, wormhole, parallel universes colliding, or literal gate into literal hell. He could not have said what it was—this Door. He was a high-school psych teacher who sometimes taught English, sometimes coached basketball, and he could not have said. He had simply gotten two cycle-fitted generators, built a storeroom in the back bedroom, stocked it well because the world had turned ugly, and was lying in bed with his wife when the universe seemed to end, when The Door appeared, and the three of them were suddenly alone.

It was the same night, according to Channel Eleven, that the Aryan Knights were going to try for Harlem again, using the same pit mortars and antipersonnel weapons The Takers had used against *them* weeks before. Two nights before that, three buildings on One hundred tenth had blazed with the pretty white phosphorus all the gangs liked, and the city's SWAT fire units never quite got the fires out, "Willy Peter" being the tenacious thing it was. They'd watched the stubborn glow from their window, but the strike on Harlem never came off. There were reports of new black market Israeli Tamirins—the new generation of laser-aimed, infrared assault rifles—being used in the subways by the bankrolled mercs, and a story about a viral epidemic in Newark too perfect not to be a gene splice, but nothing in Harlem. They'd watched from their window, holding their breaths, and then finally had gone to bed.

They'd have left the city, but it was no better anywhere else. Boston, Chicago, and Atlanta were as bad. DC was a fortress where you couldn't move without paper, and the curfew started at six. The West Coast was being hit by imports as well as its own native sons, and L.A.'s streets, people said, belonged to high-tech urban warriors. Rural New England was swamped with refugees, the Midwest was blockaded, and you didn't leave the U.S. if you didn't want worse. No one knew why. It had started somewhere, of course—farm demonstrations in '86, the San Onofre meltdown, the Cabinet Hoax, a revolution in Mexico, all of these things—but how it had come this far no one seemed able to say.

Sarah's brother had taken a hollow-point bullet on Fifth Avenue, tearing the back of his skull off, and the next day Jerry had bought the generators and a manual on their use, had tripled their supplies, and had started on the storeroom with what lumber he could get from Max Cheney in the school's woodshop.

> *"The baby screamed, and they rushed in to find a ball of ragged yellow light hovering over the crib, moving slowly away, finally disappearing through the bedroom wall."*

Was it only two months? Six? He could have kept track by their fights in the kitchen, dining room, and bedroom. At the beginning, when The Door first appeared, he'd suggested they try to leave. He could remember her crying, arguing, and before long he had stopped. Her fears had become his. They were safe in their rooms. Sounds came to the hallways outside their door. There were poundings on the walls, on the door, each day, and voices, but nothing seemed able to get in. And when the canned goods, Eversafe water bottles, and first-aid supplies began to replenish themselves—like miraculous fish, miraculous bread—without anyone's help, without the storeroom door even being opened, their decision was made for them. Something—someone—wanted them to stay. *It is not your business, what is happening outside,* it was saying. *Stay and you will be fed, you will be safe.* It was saying.

One day the television came on by itself. A picture appeared for a few seconds—a still frame, image grainy and unclear—and then was gone. He began to watch TV after that, the set hooked up to the generators, his eyes on the screen's blank static, pedaling until his legs ached. While he did this she stood behind him with one of her looks, feeling afraid and alone, saying instead that it was a waste of time and energy—only that. He remembered it clearly.

Twice, more pictures appeared—of the city as it had once been, of the park as it was now, of things that looked real but could not have been, a coiling black shape boiling from a strange sea, a sky with too many stars, a winged man glowing with a light that was more like a voice. They came quickly, these pictures—like accidents, like random thoughts. The phone did not ring. Human voices did not reach them from other parts of the building, and they never saw people walking on the land bridge below them. But he kept pedaling, hoping, while she stood behind him, judging.

One day the baby screamed, and they rushed in to find a ball of ragged yellow light hovering over the crib, moving slowly away, disappearing finally through the bedroom wall. The baby's eyes had rolled back to the whites. Her arm was twitching, two fingers burned, but she made no sound. And then, just as suddenly, the brown irises were back, the baby was breathing again, and so were they.

The next day in the storeroom—which smelled oddly like ozone—he found a tube of salve that had not been there before, and he put it on the baby's fingers, and the fingers quickly healed.

A few days later he found three cans of vegetables on a storeroom shelf that had been empty the day before.

He grew aware that she was leaning against him. He started to say, "I've still got two hours left," knowing how she would answer, but she was asleep.

He thought of what he'd found in the old encyclopedia set and the embarrassingly few books they had in the apartment, and wondered again what a public library would tell him. Even in the books in these rooms, he had found the story everywhere.

Cherubim and seraphim.

The seven archangels.

Nabu, Karubu, Azazel, and Satan.

The Angel Rulers of the Seven Heavens.

The angels of Babylon and the *Zend Avesta*. Theophanic messengers, fallen sons. The Armenian *hreshtak*—angels at the beginning of the world. The Japanese winged "Bloom Lady," fairies, and *tennin*—Japanese host of angels. The Persian *firishtah*, Hebrew *mal'ak*, Slavic "angel of death," and the guardian angel of Njals saga. Dwarts—fallen angels of the Danes. Allah's angels sent to worship man. Africa's child of the angels who brought rain. And the dark Paris Hindu demons of the night.

And the second angel poured out his vial upon the sea and it became as the blood of a dead man And the third angel poured out his vial upon the rivers and fountains of waters, and they became blood And the fourth angel poured out his vial upon the sun

But best of all the poem he had taught only once in fifteen years Castor and Pollux winged children of Leda and her godlike swan

He thought of the creatures outside of The Shadow that shook the universes in its passage and wondered how many times this had happened—this Door—and what it must have been like for other men and women—on the sands of Judaea on African velds in Asian jungles and European fjords long ago Abraham and Daniel Guadalupe Joan of Arc Coming out of nowhere the white wings spread a ragged ball of light that could move anywhere and the darker things that would always follow

He thought of the darker things He wondered which world they had come from and was afraid he knew

Ten days ago one of the things had appeared only a few feet from their window as they sat looking out Its form wasn't clear It wasn't real and so they didn't move from the couch It was the size of a man dark wingless and perfectly still floating there before them changing before their eyes—jaws giving way to other jaws eyes to other eyes legs to other legs

When the jaws struck—the glass bending with the blow the teeth slipping along it with a dark smear that bubbled away into the twilight—he ran for the gun

The thing was gone when he returned and he stood looking at the cracked window at the place where its saliva had etched deeply into the glass

They waited afraid for it to return For three days they did not fight

He stared at the woman in the darkness and got up He spoke gently to her helped her to her feet and guided her to the bedroom There he undressed her and finally pulled the soiled covers up over her shoulders She was tired The baby the worries their fights—all of it tired her She deserved her sleep

He stepped quietly to the corner of the room plugged the fan into the extension cord and placed it on her bed stand He turned it on aiming it away from her head and stood listening The fan was old and loud and he could not believe they had never laughed at its sound

He waited When she did not stir he went to the kitchen He removed the screwdriver and the loaded Walther 38 from the Tupperware bucket under the sink and went to the front door

It took him ten minutes to remove the screws from the three bolt sheaths It was slow work but quieter than the bolts would have been

When the last sheath was free hanging against the doorframe he laid the screwdriver and the screws on the floor where she would be sure to see them picked up the Walther and reached for the doorknob

He would he told himself pound loudly on the door when he was on the other side She would rush over she would be able to get the screws back in easily She would cry and plead with him but she would get the screws back in

His hand was shaking He knew it wasn't fear Anything was better than this—the fighting a woman he didn't know anymore the waiting the not understanding If he touched the doorknob, he knew his hand would stop shaking

The storeroom would take care of the two of them, he told himself again He was the one with first-aid training the one who knew CPR but whatever was making things appear on the storeroom shelves would take care of them The woman and the child would be okay He would come back as soon as he found other human beings as soon as he understood the world outside better or as soon as he could stand the thought of being in these rooms again

When he turned certain that she would be standing behind him at the bedroom door, contemptuous silent—just as she'd been the other times—she wasn't there

He stared at the empty doorway remembering another woman and began to replace the screws

When he returned to the bedroom she was asleep in the bed the soiled covers over her shoulders where he had laid them

In the morning he could not look at her They said little but she seemed rested less afraid Even when the scratching began at their door in the afternoon they said nothing to each other and he was grateful The scratching stopped

That evening he cranked on the generators as long as his legs could bear it The pedaling made him want to scream He could feel the walls the slow suffocation the looks of the woman As his calves cramped he saw himself reaching for the doorknob saw himself walking in the perpetual twilight outside across the land bridge toward dark cliffs The pale wings were high above him, playing and teasing then suddenly plummeting bleeding He looked up The great Shadow was passing overhead and he could see

They awoke that night to the sound of scratching—louder now

What is it? she asked stupid with sleep

Nothing' he said What would his old textbooks say? How do feelings die? How does a man lose what defines his life—memories affection his very being?

Blunted affect, pathological bonding system, retrograde amnesia But wasn't it more than this?

He barely remembered last summer It was as hazy as someone else's memory or like a television set coming on by itself the image grainy and random Westport The great long lake with its history islands and shore They had made love just once

The Artist

hating it, on a narrow, musty bed that could have been anywhere—Manhattan, Brooklyn, or Albany. She had cried; he remembered. They had tried one scenic drive to Middlebury—through the roadblocks, refugees, and National Guard—and had left two days later. It was not the soldiers that made them leave. They simply did not want to be together.

The baby had been a mistake. A slip of spermicidal foam. You don't bring a kid into a world like this if you can help it, do you?

An older memory washed over him then, dimmer and wrong. In it a boy met a girl. She, the nursing student. He, the wise psych major. They went to a party; he made silly jokes about "playing doctor" and was afraid to kiss her. Even after beers, he was afraid to kiss her.

In that dream or in another she laughed at his shyness, put her arms around his neck, and made love to him in the dark while the party went on forever below them.

She had never been a nursing student. She had never been so full of laughter. He had always led. Wondering even as he did it, he touched her cheek, pushed hair away from her forehead, and—when the noise stopped—watched her face soften once again into sleep.

When it came again, it was a pounding on walls and doors that entered their bodies like adrenaline, snapping them upright like dolls. The walls shook.

Sounds that throats might make ululated with the pounding, which was louder than any he could remember.

"My God," she said, struggling up, heading toward the baby's room.

He was running to the kitchen on the balls of his feet. He grabbed the Walther from the bucket, ran back down the hallway and crouched—naked—ten feet from the front door, hands shaking violently.

The pounding stopped.

A voice spoke. The words—if they were words—were not human.

A weight moved against the door. The scratching began again.

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"Go away!" he found himself shouting. He made it louder. "*Go away!*"

Please. It seemed to say. A hoarse whisper. A word impossibly human.

He held the gun with both hands and listened. The baby made a sound. He heard her try to quiet it. On the other side of the door something moved again, whimpered once, and did not move again.

"Is it gone?" she asked. She was at the end of the hallway, afraid to come any closer to him or the door.

"I don't know," he said. The gun was heavy. His arms hurt. He continued to wait.

When, after an hour, nothing happened, he got up, walked past her without a word, and got dressed.

As he sat at the generators, he laid the gun on the rug by his feet.

They had forgotten about it and were about to eat dinner. She had gone to their bedroom for something, the baby in her arms, and was passing the front door when it began again and she screamed and the baby began crying and he could barely hear them over the thunder of the pounding. When he reached her, she was two or three feet from the door. She had stumbled and was trying to get up with the baby. He grabbed her, yanked her back and away, and behind him, so that nothing stood between him and the door.

The whimpering was there again, barely audible under the pounding, and he opened his mouth to shout. And then, as always, he heard the other voices.

And as he heard them, he felt them in the marrow of his bones.

In the bowels of the building, high and nightmarish and so far from being human that at first he had imagined something else—straining wood, screaming hinges, blood thundering through his own skull—the other voices were moving up the stairwell, like the wind, coming fast.

The thing on the other side of the door heard them and grew frenzied. Through its frantic scrabbling, its frantic rubbing against the door, he could hear it whisper. *Please.* He opened his mouth to shout, and stopped. There was something about it.

The voices were almost there.

It was, he realized then, like a child's whimpering. Like a child's fear.

Please.

He should have shouted, should have pounded back on the door, made it go away, but he did not. He looked back at her. Her eyes were wide. One of her hands was over the baby's face, as if to hide its eyes. He could hear the thing's frantic scratching everywhere now. The voices were nearly there. He knew what they were. He had always known, he realized then, the black, leathery skin that burned to the touch, saliva that was like no other saliva, jaws colder than the vacuum between stars—all of it familiar now, the ancient enemy, its faces rising from the eons in his bones, from the sheaths of his nerves and the membranes in his skull, the waves of nausea washing over him now as dark-

ness. He fought it, managed to keep from falling, to hold onto the gun.

Outside, the thing whimpered, gibbered. He took a step toward the door.

"*No!*" his wife shouted.

The voices were there now. The thing outside slid to the floor and began to scream. The door buckled, struck. Then it was hit again, the body tossed like a rag against it, the scream cut short.

And then the terrible grunting began, obscene and rhythmic, as something worked at flesh and its screams became rhythmic, too.

He was at the door, fumbling at the bolts with his free hand, before he heard her shout again. As he pulled it open, wanting to close his eyes but knowing he could not, he fired the Walther into the darkness, only inches from his face, fired again and again, until the clip was empty, and as the oily darkness spun away from him, twisting and writhing, his skull filled with unimaginable pain—with a scream of rage so old it knew no words—and he reached down, grabbed at the body that lay at his feet, pulled hard, and somehow closed the door. Nothing pushed against the door. Nothing fought him now. But the howling in his skull would not stop. It wanted him. It had wanted him for eternity. Without looking down, he slid the bolts in, refitted the chain, and closed his eyes against the sound.

"He was running to the kitchen on the balls of his feet. He grabbed the Walther from the bucket, ran back down the hallway, and crouched, naked, ten feet from the front door."

When he turned, he saw that the thing had curled on the floor, making no sound. His wife was staring at it, afraid, and his daughter was crying.

Even where there wasn't blood, the body was dirty. The hair was twisted and snarled. Its arms and thighs were streaked with dirt, and there were scabs on the feet and knees. The shoulders were covered with deep wounds. The blood had pooled in the torn flesh; the white tendons of one arm showing where the meat had been ripped away. Where the long, graceful, articulated wings should have been, just behind the shoulder blades—anchored on the thick, broad spine—two bloody stumps glistened instead.

The thing smelled. It was the salt smell of blood, but also the smell of a wet animal so familiar from childhood, and he could only wonder at it. He crouched down. The thing saw him, eyes clearing suddenly in its pain, and jerked away from him.

He wanted to touch it. Never had he wanted to touch something so much.

The eyes were yellow, like those of certain dogs, and the chin was smooth, hairless. The skin was olive, darker than he had imagined. And the lips were full and cracked with sores.

Between its legs, where the thighs—astonishingly thin from the atrophy of flight—were streaked with dirt and shivering, lay the shadow of its organ, hairless and pale.

He wondered what it felt like to make love in the sky. To walk with legs not meant for walking. To die under such jaws.

He looked up at her, and as he did, he felt a dizziness, and something like ragged light filled the room. She looked back at him. The look on her face was not pure terror, no, not any more than his was. He had been wrong, somehow. Had she always held the baby that way? Had she always stood so straight? And how, how could he have forgotten, for all these months, that *she* was the one, not he, who'd had CPR training—that she had been a nursing student, not a preschool teacher—that she was the one who would be able to help keep this creature, and the others that would certainly follow it, alive and safe. Shadow willing.

"I'll get pressure bandages," she said. There were some in the storeroom yesterday. The baby had stopped crying. She would grow up knowing angels, he thought to himself.

He could remember last summer at last, so clearly now that it took his breath away. Westport, yes. The great long lake with its history, islands, and shore—beautiful even with the guardsmen everywhere. The two of them had swum to Picket Island more than once, naked in the night, and on the same warm ledge of limestone had made love again and again until their bodies hurt, their laughter skimming out across the lake like moonlight. They had stayed until the swamp maples turned flame-red and the ranks of soldiers began to thin. They had stayed until the air grew cold.

Joanna had not been an accident, he recalled. *I know it's an ugly world, Jerry. But we can do it. We can make something different for a child. I know we can.*

She had never been the woman he had thought she was. He understood that now. She had only been the woman he had been *tempted* to see. It wasn't over, but it would be different. They would be able to make the building—perhaps eventually the city—theirs, and it would be different. They had let the creature in.

He got up, and as he did, he saw what looked like teeth marks on the hands and feet of the creature beside him.

The marks were bleeding slowly. He remembered a painting from long ago.

And then the creature crossed its arms in pain.

STAR TECH

ACCESSING THE FUTURE

ELECTRONIC DEGREES

Tele-learning—taking courses and earning educational degrees via personal computer—is becoming more of a practical reality for Americans thanks to the development of the Electronic University Network (EUN).

EUN allows you to complete degree programs or short-term certificate programs on your own computer. Launched three years ago by Ronald Gordon, former chief executive of Atari, EUN now boasts some 17,000 students and network access to more than 140 different courses, ranging from 'Entrepreneurship and New Business Formation' and 'The Foundations of Political Science' to 'Right Brain Drawing" and 'The California Wine Connoisseur.'

In each case, universities adapt their programs to the new technology and instructors—via telephone modem—work with each student at his own speed. An enrollment fee of $150 (with an annual $50 renewal fee) includes registration and access to such services as counseling and an electronic library containing more than 60 databases. Course fees—which include the cost of course disks, instruction, and telecommunication—typically range from $95 to $625. Employee tuition refunds are available from many large corporations, including Honeywell, Frito-Lay, Bank of America, and Pacific Bell.

—Connie Zweig

Access: For detailed course and fee description call 1-800-22LEARN. In California call 1-800-44LEARN. EUN operates on Commodore, Apple, IBM, and IBM-compatible computers.

FRUIT ROBOT

Citrus growers may soon have a cost-cutting tool in the groves: a multiarmed robotic orange picker.

The experimental robot, which is being developed by engineering professors David Shoup and Roy Harrell at the University of Florida in Gainesville, could have as many as ten arms before the two scientists are finished. Says Shoup, "We've got a citrus harvester that can definitely spot ripe oranges and pick them regardless of the wind or whether the oranges are moving."

Harrell adds, "A computer controls the [picking arms] and analyzes the images we get from the camera by their color, not by their shape."

The system admittedly has some bugs in it. "If you asked me whether the robot makes mistakes," says Harrell, "I'd have to say 'Every day.' For instance, right now if those yellow tennis balls grew on trees, the robot would be likely to pick the balls every time." On the other hand, a prototype of the orange-picking robot has been used on a trial basis by several large growers with no serious complaints so far.—George Nobbe

Access: The robot is not yet ready for the groves, and a projected price tag of $25,000 to $30,000—*per arm*—will most likely make it practical for giant commercial harvesters only.

MALAYSIAN FUTURE PARK

From the bizarre if innovative, people at a company called Sequoia Creative in Sun Valley, California—the same ones who furnished us with animatronic spiders for the Jacksons tour, and a fire-breathing laser-shooting serpent out of *Conan*, not to mention a $7 million version of King Kong, with most of the foregoing intended for the Universal Studios tour—now comes a 300-acre theme park outside of Kuala Lumpur in Malaysia, 5,500 feet above the heat and humidity of the Southeast Asian coastline.

The park—the first of its kind in that part of the world—was contracted for by Prince Tunku Salimon Shah Soligar who hopes it will reflect the customs, cultures, and religions of the racially mixed area. That won't be easy, admits David Schweninger, Sequoia's president, because Malaysia consists predominantly of people of Chinese and Indian descent with multitudinous ethnic/cultural backgrounds.

Schweninger hopes the park will attract wealthy businessmen from Djakarta, among other places, luring them with a spa, time-sharing units, a casino, and a five-star hotel. Other features include a 'future world' complete with space station and animatronically delivered food.—George Nobbe

Access: Late 1988. Contact Sequoia Creative Inc., 9265 Borden Avenue, Sun Valley, CA 91352.

VCR'S THAT CAN READ . . . FROM JAPAN

In last October's Star Tech we told you about German videocassette recorders (VCRs) that could read TV-show information contained in bar codes, thus simplifying recording off the air.

Now Japan has gotten into the act. Matsushita, the world's largest manufacturer of VCRs, has introduced several machines in Japan (one shown above), each featuring a digital scanner. The scanner is a hand-held remote-control device that reads date, time, and channel information from a bar code (like those printed on supermarket products) and transmits the data via infrared to the VCR. To gear up for this new feature, several Japanese TV-program guides are including bar codes along with conventional text in their listings.

Although the initial scanner-equipped VCRs are higher-priced machines, Matsushita reportedly plans to make the feature standard on all its domestic models in the future. As for U.S.-bound machines, Matsushita—which manufactures VCRs sold here under the brand names Panasonic, General Electric, and Magnavox, among others—has not yet decided if and when they will include bar-code-scanning technology.—Marjorie Costello

Access: Available in Japan.

FREUDIAN PIPE

While floating down a French canal on a barge several years ago, social worker Marti Loring cast an envious eye at the crew members. "They were smoking pipes, and it seemed like such a relaxing, sensual thing to do," she recalls.

A nonsmoker, Loring set out to invent a tobacco-less pipe. The result: a clear plastic, smokeless pipe that looks like something a high-tech elf would smoke. Dubbed a Kup-Pipe, it holds liquid (Loring suggests fruit juice or wine), which is released into the mouth in a trickle as you suck on the mouthpiece. A few ounces of liquid last for hours.

"It's normal for an infant to go through the oral stage. Freud talked about and to enjoy sucking," says Loring. "The Kup-Pipe is one way grown-ups can still enjoy oral activities. And for some people who maybe didn't get enough nurturing as infants, sucking on one of these pipes can help them feel calm and fulfilled."—Sherry Baker

Access: Kup-Pipes, expected to retail for around ten dollars, should be on the market early this year.

COUNTERFEIT MACHINE

Ever since paper money was first issued—about 300 years ago—counterfeiting has been a problem that has preoccupied such companies as Brandt, Inc., a Bensalem, Pennsylvania, company that has been making bogus-bill detectors for the past 15 years.

Brandt's most recent device includes a magnetic sensor they believe will help all manner of businesses to control the problem.

Potential clients include the Federal Reserve, a chain of banks, retail stores, vending companies, department stores, and boutiques.

According to Brandt's David Bryce, American currency has a magnetic property derived from the particles of ink used to print it. "Most counterfeiters simply don't have access to that ink," he says. So when they try to duplicate the ink and pass bad bills in volume, the sensor equipment will spot the fraud right away and trigger a light.—George Nobbe

Access: Contact Brandt, Inc., 1750 Woodhaven Drive, Bensalem, PA 19020.

HAND-HELD COPIERS

Despite the smaller size and lighter weight of today's copying machines, they have remained for the most part desk-bound devices All that is changing, however with the arrival of the first generation of hand-held copiers which are now taking their place next to calculators in executives' briefcases These compact copiers provide an electronic way to 'clip' articles and other pieces of printed information, replacing the more traditional fold-and-tear method

Two products are leading the way in the hand-held copier arena Plus U S A 's Copy-Jack and Silver Reed's Porta Copy (shown above) Both devices are made in Japan and use thermal technology to "read" everything from magazines and newspapers to documents and diagrams The black-and-white copy is printed on a strip of thermal paper dispensed from a replaceable roll inside the copier The portable units draw their power from built-in, rechargeable batteries

Weighing in at about a pound Copy-Jack can copy a 1 6-inch wide strip Porta Copy, on the other hand, can produce 3 25-inch-wide copies and weighs slightly more than three pounds

—Marjorie Costello

Access Both copiers are available now and carry the same suggested list price $349 95 You can also buy a five-pack of 33-foot rolls of thermal paper for each product for about $11 or $12

CUSTOM HOLOGRAMS

Looking for a catchy high-tech gift for a loved one who has everything the Eighties can offer? How about a custom hologram?

The bright, three-dimensional image of your choice floats eerily in space suspended within a clear plastic cylinder The image could be you throwing a kiss or it could be a model of your favorite molecule

Reach inside the cylinder and try to pin it down and there's nothing there The image is nothing but light

In years past holograms of living or moving subjects could be made only through a costly time-consuming process With new advances in multiplex production technology however, any subject that can be filmed with conventional 35mm equipment can be transformed into a hologram—and displayed without laser illumination All you need is a standard light bulb

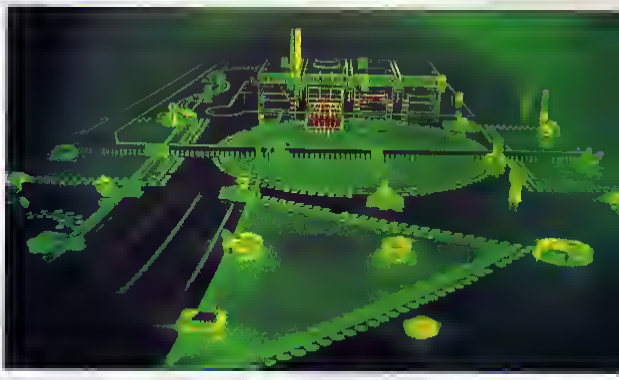
How is it done? Peter Claudius of Multiplex Holograms in San Francisco explains First he films the subject on a slowly rotating platform, using ordinary 35mm equipment and lighting Each frame records one third of a degree of motion So a 360° hologram is made up of 1,080 frames, and a 120° hologram is made up of 360 frames

Then he puts the developed and edited film through a special printer in which each frame is illuminated by a laser beam and projected through a cylindrical lens, which focuses the image into a vertical line This narrow vertical image is then recorded holographically on high-resolution film twice per 35mm frame

Next this product is mounted on a curved display—and voila! The observer sees a composite image of the original subject The many individual frames—each representing a different perspective of the subject—form in effect, a single hologram Claudius believes this development has almost unlimited applications It could for instance, animate advertising displays or clarify visual concepts in the classroom

—Connie Zweig

Access A 360° custom hologram equipped with rotating display costs $2 000 a 120° hologram with metal wall display costs $1 500 From Multiplex Holograms, 746 Treat Avenue San Francisco CA 94110



CONTINUED FROM PAGE 72

complex to the point that it begins to control its own future. Then a self-replicating molecule comes into the picture. It is virtually unimaginable that all those stars resembling the sun could form and leave an environment around them so clean there's nothing left to coalesce into smaller "coaly" bodies. So there must be planets around. Many stars will have planets too close, too small, or too far away from them. But those with planets at the right distance will have liquid water on them, and once you have liquid water and all the other stuff, life is going to happen.

Omni: How do you process your images?

Smith: The image is created by focusing light onto the front end of what is called the Viticon tube. A little beam inside the tube goes back and forth on a raster [a displaying technique], basically measuring the electron-charge distribution that's on that window. But the surface of the tube is more sensitive to some wavelengths of light than to others. Other factors of the tube cause it to distort the image. So first you try to get your images into a form whereby all these instrumental effects are removed. Each image is a mosaic of individual pixels. There are eight hundred by eight hundred of them. Because every pixel has its own way of responding to light of different intensities and wavelengths, we treat them one at a time. It's a fairly large job to take this six-hundred-forty-thousand point array and try to remove the effects of the instrument. What you have left over is an image that comes as close as possible to the one seen by a perfect instrument.

Omni: How about color images?

Smith: Since planetary spacecraft don't have color cameras, we shoot the same image with blue, green, and red filters and then integrate the pictures by computer. But between the time you took the blue, green, and red images, the planet—say Jupiter—rotated a bit. Blindly putting them all together gives you something that looks like the comics when the color registration isn't perfect. The computer has to figure the match. Then you can change the intensity. Image processing is still pretty much of an art. It is an eye–hand interaction. If you sit in front of the screen and type in commands with a good, fast, modern system, you get the picture instantly. Then you can clearly see the changes you've made.

Enhanced false color, if used properly, can help you to see subtle details in images. The problem comes when you give copies of these images to the media to describe these subtle features. We do say, "This is exaggerated or false color," but by the time the picture has been reproduced, nobody remembers our caveats any longer. In the encounters with Halley's Comet, almost everything that was shown to the media was in false color. On the evening of the *Vega 1* encounter, Radio Moscow's broadcast referring to the first pictures of Halley's Comet described it as a very colorful object—red near the center, green beyond that, and blue farther out. I'm not picking on the Soviets, but enhanced color is not always understood as it should be by the lay public.

Omni: How did you get involved with the Hungarians and Soviets?

Smith: In 1982 I heard that the Soviets were modifying one of their Venus probes so that they could go past Venus and on to Halley's Comet. Later, when I was told they planned to use CCDs, my interest went up enormously. These would be the first CCDs to study an object in the solar system, and CCDs can get very good data. Through mutual friends I indicated my interest in seeing the data after it became available. I had worked hard to image a cometary nucleus in this country—and couldn't.

Later in the year the Soviets suggested I join the Hungarian imaging team. There followed a rather painful process of trying to get this all approved because Washington was very worried about technology transfer. Image processing is used to guide smart bombs, so as soon as you mention it, flags start popping up everywhere. Actually, the way we process images is not all that sophisticated. Many of our programs could be quickly worked out by graduate students. This wasn't high tech. This was a step toward cooperation between the Soviets and NASA. Seeing the chance to have the data later become available in the United States, I was solidly behind joining the Hungarians. Still, it took almost three years to get it through.

I spent about ten days in Moscow for the two *Vega* encounters. As at JPL, scientists in Russia try to do astronomy in real time. Thinking on your feet often proves embarrassing, but the public wants to know what you've found right away.

Omni: What were the most significant findings to emerge from *Vega*?

Smith: The cometary nucleus turned out to be very much darker than most of our estimates. Its being so dark means it is much larger than it appears in the sky. There is an inverse relationship between the albedo [reflected light] and the comet's size. It is roughly a peanut shaped object, with the long dimension about sixteen kilometers and the shorter dimension more like eight. That makes it a good ten times more massive than we thought before.

Also, the material driven off the comet to create the coma [head] and the tail shoots out from very discrete points on its surface. So most of the surface is not involved in this activity. As an active region swirls around into the sunlight, the comet starts putting out a jet. Rather than the whole sunward-facing hemisphere blowing off gas and dust into space, these jets come from very discrete locations on the surface. And the jet continues until the comet moves into darkness, whereupon it shuts off. So now it's necessary to explain how the internal structure of the comet allows

for this jet type of activity rather than for a general boiling off of the surface.

Omni: How could newly discovered worlds aid understanding of our own system?

Smith: We're trying to piece together the early history of our solar system from what we see right now. Some of its chemistry is still with us in the form of comets and asteroids. So that early composition is conveniently tied up for us as soon as we get the technology to examine it. But the early dynamics and distribution of that material are much more difficult to assess. The memory of that very early stage carried by particles surviving today is weak. But suppose we could find one thousand Beta Pics within a thousand light years—they'd be at various stages in their evolution. If we looked at a large number of them, we could trace out the evolution of our own system.

Omni: Have you been involved in global-habitability concepts?

Smith: Not directly. But planetary exploration is shedding light on the delicacy of the earth's climate. Nobody understands what one additional tenth or five hundred hundredths of a percent of carbon dioxide will do to our atmosphere. The atmospheric machine may be so delicately balanced that any increase in fossil-fuel burning could tip the thing over so that areas now providing most of the world's food turn into deserts. You could have worldwide starvation on an unimaginable level, where wars are fought for food or other basic things, wars that would kill more people than even the worst nuclear disaster.

Omni: Some scientists have difficulty applying their work to their everyday lives or to philosophical perspectives. Do you?

Smith: I have some difficulty in separating science from nonscience. I view science as our perception of the truth, so I can't separate it from my day-to-day experience. As I'm walking down the street, I look up and see the sun as a source of illumination and a good tan, and I also see it as a sphere of hydrogen and helium with a core temperature of fifteen million degrees Kelvin. I guess I don't make a big distinction between the two. I never really drop one for the other.

Omni: Why are you a planetary scientist?

Smith: Because I want to know more about what was happening during the very earliest moments of the universe's formation. What sequence of events led to the formation of our solar system, and how, on this particular planet, the right mixtures of chemistry and energy came together to develop a process that ultimately led to my sitting here contemplating the whole question. You can seek answers to those questions through philosophy or religion—which is really through philosophy—or through science. I believe there is a scientific explanation to how everything, including life, came into existence, how we as an intelligent species came into being. I believe metaphysical concepts are not required to explain it. My goal in life is to try and seek out those answers.

TREASURE HUNT

CONTINUED FROM PAGE 103

Here are the names and addresses of the products and services featured in the Great *Omni* Treasure Hunt.

ACS Imports, 5311 Derry Avenue, Suite A, Agaura Hills, CA 91301, (818) 889-1092.

American Motors Corporation, 27777 Franklin Road, Southfield, MI 48034. Contact: Tom Draur.

Bang & Olufsen, 1150 Feehanzille Drive, Mt. Prospect, IL 60056, (312) 299-9380.

B. E. L-Tronics Ltd., 20 Centre Drive, Orchard Park, NY 14127, (716) 662-0522.

Canon U.S.A., Inc. (Camera Division), One Canon Plaza, Lake Success, NY 11042-9979, (516) 488-6700.

Canon U.S.A., Inc. (Copier Division), One Canon Plaza, Lake Success, NY 11042-9979, (516) 488-6700.

Carillon Importers, Ltd., Glenpointe Centre West, Teaneck, NJ 07666-6397, (201) 836-7799.

Casio, Inc., 15 Gardner Road, Fairfield, NJ 07006, (201) 575-7400, ext. 383; in California, 1-800-433-3416.

Clarion Corporation of America, 4400 Rosecrans Avenue, Lawndale, CA 90260, (213) 973-1100. Contact: Tom Mitchell.

Fantasy Holidays, 366 North Broadway, Suite 130, Jericho, NY 11753; in New York, (516) 935-2970, nationwide, 1-800-645-2555.

Hailey Optical Corporation, 15 West 39 Street, New York, NY 10018, (212) 764-0900.

Hovertechnics, Inc., Box 257, St. Joseph, MI 49085-0257, (616) 925-0025.

Interstate Voice Products, 1849 West Sequoia Avenue, Orange, CA 92668, (714) 937-9010. Contact: Peter Van der Most.

Lazare Kaplan, 529 Fifth Avenue, New York, NY 10017, (212) 972-9700. Contact: Marcy Feinberg.

Luma Telecom, Inc., 3350 Scott Boulevard, Building 49, Santa Clara, CA 95054, (408) 970-9555. Contact: Jeff Richey.

Mitsubishi, 5757 Plaza Drive, Cypress, CA 90630. In California, 1-800-843-1252; nationwide, 1-800-654-8056. Contact: Evette Caceres.

STS Satellite, 2310/12 Millpark Drive, St. Louis, MO 63043, 1-800-231-5322; in Missouri, 1-800-392-5021.

NUKED

CONTINUED FROM PAGE 86

tainly it is not commercially viable. The utilities don't want it. The heat pollution alone from one plant will be equal to the heat from all the industrial facilities in the whole state of New Jersey.

The idea that because fusion works well in the hydrogen bomb it will make a good source of power also strikes Maglich as absurd. "It's as fallacious as saying that because TNT makes good bombs it would be appropriate to power our automobiles," he says. Then he catches himself. "But I shouldn't attack them. We almost get a good hearing now—almost."

Indeed. Tokamak's break-even point—when it produces more energy than it takes to start the process—once scheduled to be achieved in 1981, now seems more elusive than ever. A growing number of physicists have become disenchanted with the approach and are looking instead at the possibility of achieving DT fusion by heating the atoms with high-powered lasers or particle beams. In recent years Tokamak's budget has been cut back, but it refuses to wither away. Too much has already been committed.

"Fusion research," Maglich charges, "is the only socialized sector of the American economy. If you apply for federal money you are asking to compete with labs owned by the federal government. It is like asking General Motors to lend you money to build a new type of automobile."

This policy not only constricts research, Maglich further charges; it smothers free scientific inquiry. Edward Teller at Lawrence Livermore Laboratory, for instance, could not lend support even if he agreed with us, because he is obtaining his funding from the same people who oppose us.

A 1978 report to the Secretary of Energy by the General Accounting Office, the congressional watchdog agency, pointed out the fallacies Maglich complains about. First, unsolicited proposals compete for the same dollars as do the DoE-supported laboratories and contractors. Second, when panels are chosen to evaluate these proposals, panel members are drawn largely from the laboratories and contractors that stand to lose funding for their own programs. It is a review process whose bureaucratic geometry is as circular as that of the Tokamak's torus itself.

Ironically, however, the various committees DoE appointed to review Maglich's funding requests have, in some cases, helped to spread Maglich's gospel. MIT physicist Lawrence Lidsky was a member of one of the committees. Maglich's ideas intrigued him and helped crystallize his growing realization, after a dozen years in fusion research and teaching, that the DT fusion process had fundamental problems—that, in his words, "it is a big, complicated, ugly, expensive thing." Now Lidsky is on the steering committee of United Sciences, as are a number of former stars of various plasma labs.

As Lidsky puts it, nuclear power of any sort is in such bad repute that the only way a reactor can win public confidence "is if Mike Wallace shoots a bazooka through it on *Sixty Minutes* and it keeps running." Lidsky himself is currently working on smaller, fail-safe fission reactors at MIT.

The roots of the church of nuclear orthodoxy reach much further back than Tokamak. They lie in the military-dominated history of nuclear research, which took its shape in the forge of war.

The splitting, or fission, of uranium and plutonium atoms was the process chosen for the first nuclear chain reaction and the atomic bomb because it seemed the most practical. It was the quick-and-dirty approach needed in the race with Nazi Germany to build a nuclear bomb. After the war the military dominance continued. Civilian power reactors were modeled on those that Hyman Rickover put in his submarines and, as a result, used more expensive fuel and were larger than if they had been designed directly for civilian purposes. And it was from the government that the funding for research came.

Maglich himself began with this bias. One of the most exciting periods of his life, for instance, came while he was working under Luis Alvarez, a key figure in the development of the A-bomb and a promoter of the H-bomb. It was with Alvarez at Berkeley that Maglich helped discover the omega meson.

In setting a dominant mainline for nuclear research, the military also created an environment in which much promising research languished. The reactions Maglich studied for aneutronic energy, for instance, had been discovered in the Thirties by the British scientists John D. Cockroft and Ernest T. S. Walton, both of whom won the 1951 Nobel prize for physics. They bombarded lithium with protons, splitting them and releasing energy—twice as much energy for the fuel weight, in fact, as in the fission of uranium. But the process produced no chain reaction and therefore had no weapon potential. So as World War II loomed, it was dropped.

Maglich knew of this research, of course. When he first began his work on migma, he had assistants survey the physics literature for related research and discovered, in the abstracts, that scientists had come across the properties of self-colliding beams as far back as 1964—at Oak Ridge, one of the high holies of the mainline. But nothing had been done to follow up on that discovery. It fit none of the theories. It was off the mainline.

There are plenty of off-the-mainline theories—from gas fission reactors to Dr. Robert Bussard's fusion-based rigatron, a smaller, disposable reactor—that have struggled in vain for a share of funding. Had nuclear energy been developed out-

side the military Maglich argues we might now have an entirely different nuclear technology It would be as revolutionary as if we had developed electric motors instead of gas engines for our cars And that issue, not just a personal quarrel with the Toroids is the important one for Maglich

In this light Maglich's most recent funding scheme takes on a particular irony It came about like much in the migma story in a roundabout way

In June 1982 Maglich attending a conference in Paris, spoke to physicist Carlo Rubbia the Harvard professor and Nobel prize-winner he knew from CERN Maglich complained of his difficulties in obtaining federal funding

Hm Rubbia said in effect No neutrons—no shielding Have you considered going to the Air Force with this?

The Air Force! Of course!

In the Fifties nothing had been dearer to the heart of General Curtis LeMay apostle of strategic bombing, than the idea of the nuclear airplane In the era before ICBMs he saw the nuclear airplane as the perfect way to deliver nuclear weapons anywhere in the world anytime

The nuclear-bomber project—named NEPA Nuclear Energy for Propulsion of Aircraft—was to be the Strategic Air Command's equivalent of the Polaris submarine The lead-shielded cockpit was to have weighed 20 tons and even then the radiation level would have been so high that some plans envisioned using only older crews—those who had already had children Maintenance was to be carried out by robots And of course the problem of radioactive contamination from a crash seemed impossible to solve

Migma offered the Air Force new hope The applications for air and spacecraft for either civilian or military purposes were obvious Aneutronics could safely power a space station an instrument package or probe and of course any one of a number of SDI—star wars—projects

Maglich found a shepherd for the necessary appropriation in Congressman Bill Chappell of Florida who heads the House Defense Appropriations Subcommittee

"We had this [aneutronic energy] looked into very carefully" Chappell says "There is no physical reason why it can't work—and in the long run it has the potential to make the deserts bloom"

Maglich happened to mention to Chappell that he needed a new lab and he listed the qualities desirable in a lab location—quality of life proximity of universities—fairly vague criteria And in the end Maglich agreed to shift his lab to Daytona Beach in Chappell's district

Meanwhile, Chappell whose committee position generally ensures that his phone calls to the Pentagon are returned contacted then Secretary of the Air Force Vernon Orr Orr in turn talked to General James Abramson the chief star warrior who said that a power source like that would certainly be of interest to SDI

Despite reservations about SDI—"It's a political hot potato"—Maglich will take his funding where he finds it So what if Chappell promoted migma primarily as an SDI power source? The same 30-kilowatt reactor that would power avionics or electronic-surveillance equipment could also power an East African village It was an irony Maglich could live with

Using the Air Force funding United Sciences was able to hire two subcontractors to conduct "test runs" of his as-yet-unbuilt Migma V on Cray supercomputers (The computers follow the repeating course of the reactions—tracing products of the reactions that become fuel for the reaction and so on) The results were encouraging Exceeding break-even was possible

But computers are one thing and a real migma chamber is another Plasmas—even directed ones like migma—are notorious for developing unpredicted instabilities Migma V, in the words of Professor Peter Auer of Cornell a member of the United Sciences steering committee "will operate in an unexplored regime of density" Critics of the process charge that at higher energies migma's flower shapes will disintegrate into a sort of "atomic slush" There are questions as well How much of the power will have to go back into the system to drive the particle beams? "I'm not sure" says Auer "that this area has been given enough attention"

And as always the problem of money remains Maglich estimates that he needs $22 million more to build Migma V the stage that will produce more energy than it uses He has already spent some $20 million on Migmas I through IV which

paved the experimental road to Migma V Others put the money required at double or triple that figure Even with the Air Force funding and more private investment, either amount is formidable

But Maglich has never had any doubts that migma will be proved viable within his lifetime It given the money today he believes he could have Migma V producing energy within three years "It might take longer—admittedly something may go wrong but I'm convinced we could fix it ' he says 'Our system allows for external corrective actions "

From there on Maglich's timetable for aneutronic development is specific Three years after Migma V is completed a prototype of a commercial reactor will be available "for the sophisticated user" Three years later assembly-line production of reactors could be under way By the turn of the century Maglich plans to be scattering Migmas around the globe

In the fall of 1986 the Air Force appropriations were renewed, with another million and a half—chicken feed by Pentagon standards—for continued research Back in his office Maglich clutches the Xeroxed page from the appropriation legislation happily Bechtel National Inc the major construction firm has been made a subcontractor Its top reactor designers are being assigned to create a "point design ' or basic test model for a migma reactor

But Maglich is exultant for other reasons The National Academy of Sciences is conducting a complete evaluation of the feasibility of aneutronic energy at the request of the Air Force And he is just back from Baltimore where he presented papers to the American Physical Society s plasma physics division The society has at last formally accepted the category of migma "But more important all the seats were taken at the presentation Maglich had standing room only

"Senior plasma people people who used to be our biggest detractors, ' Maglich says 'came up and told me they were doing their own experiments in aneutronic energy It s unbelievable—people who wouldn't even talk to us before" And—a sure sign of being taken seriously by the physics community— 'they were asking *technical questions—all technical questions*"

Marshall Rosenbluth was there Along with many of Maglich's critics he had believed that something called flute instability" would show up at the densities reached in Migma IV, smearing the delicate floral pattern of the particle orbits It did not Now Rosenbluth has told Maglich he is working on a paper that asserts flute instability will in fact show up in migma but at higher densities This tough criticism makes Maglich happy "To have a man of Rosenbluth s stature even deigning to criticize you is a victory he says

Maglich stops himself "I've learned to take ups and downs in these years, I try not to get overly excited

"But you know we deserve a break ∞

Here is the answer key to last month's qwertycrypt.

We have assumed that the typist starts with fingers on WERT and IOPL. That means each symbol is above and to the right of the intended key We have let the letter *m* stand for a space between words which assumes that the right thumb hits this letter instead of the space bar Certain odd things happen when you try to capitalize letters If the letter is on the right side of the keyboard a touch-typist would press the "Shift" button on the left and vice-versa An attempt to push the Left Shift button would result in an *a* A push of the Right Shift button results in hitting the "Enter" key at the far right, which starts a new line The Left Shift button is pressed for the quotation marks, the *M* in *Mark* and the *H* in *Here's* This results in pairs of symbols *aJ*, *ak* and *au* The Right Shift button is pressed for *Always This, Twain, Rare* and *Character* In each case this results in a Return and a new line.

Here is the solution to last month's qwertycrypt.

"Always do right.
This will gratify some people, and
astonish the rest."
—Mark Twain

Here's to Rare Character.

Competition #40 winners
New uses for nitinol, the miracle metal

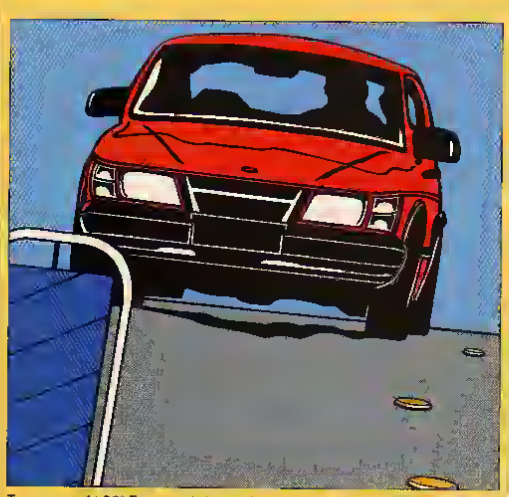
GAMES

By Scot Morris

In the May 1986 Games column we asked the question, "Whatever happened to nitinol?" (Nitinol—pronounced *ny*-tin-all—is an alloy of nickel and titanium. When it's heated it springs back to the shape in which it was forged.) Because we don't like rhetorical questions we demonstrated a few known uses for the so-called miracle metal—from kids' toys to complex motors that use differences in water temperature to keep running. And then we announced Competition #40, a call for readers to contribute some novel nitinol applications of their own.

A few items already in production might have offered our contestants some inspiration. For example, there are wire-rim glasses that repair themselves when dunked in a cup of hot water. New nitinol filters placed in a vein through a catheter in a supercool state expand to form a wire-mesh screen across the vein, filtering out blood clots. There are springs that automatically open and close the vents in greenhouses and livestock buildings, and a Japanese company produces a brassiere with nitinol underwire. Run the bra through the clothes dryer and it will promptly be restored to its original shape.

Even given these efforts, nitinol seems to have untapped potential. It's 25 years old this year and is still a solution looking for problems. Fortunately, *Omni*'s readers supplied those problems. We were especially impressed by our contestants' creativity and timeliness. We saw



Top prize. At 32° F sign rotates to blue side; reflectors flatten.

eight designs for space shuttle O-ring seals that could have safeguarded against the sort of temperature-related accident that doomed the *Challenger* and two nuclear-reactor shutdown devices designed to prevent another Chernobyl.

The idea most frequently submitted was that bumpers, fenders, and other auto body parts be made of nitinol. Then, after an accident, you could use a blowtorch or put the car in a paint drying oven, and the dents would pop out just like in Stephen King's *Christine*. The problem here is that nitinol can be permanently deformed if it is bent too sharply—as would likely happen in a fender bender. A more promising application might be on the smaller scale of a self-repairing car antenna.

Another common theme involved fashioning artificial muscles and joints out of nitinol to operate prosthetic arms and hands. One reader even wondered whether the shape-memory effect could be used to advantage in the male sex organ.

Other repeated ideas: fuses, sprinkler systems, collapsible camping cookware, and nitinol-belted radial tires. We even saw two "better mousetraps" activated by the mouse's own body heat.

In judging the entries, we enlisted the aid of David Johnson, president of TiNi Alloy Company. He is the Berkeley physicist who invented the first nitinol turbine engine ten years ago. Our judging criteria were originality, practicality, feasibility, and a demonstrated understanding of the capabilities and limitations of nitinol.

Our grand prize-winner gets an Apple IIc personal computer, the first runner-up receives a $200 sampling of nitinol products, and three more winners get $100 each. The top five also get the usual one-year subscription to *Omni* or a one-year extension to an existing subscription.

GRAND PRIZE WINNER

Icy-road warning sign. When the temperature drops below 32°F a two-sided reflector rotates from a white side to a blue side. Also, highways in northern states can't use "cat's-eye" reflectors because snowplows snap them off. Reflectors mounted on a nitinol hinge would become flush with the road when the temperature fell below freezing point.

—A. Ruttimann
Holbrook, NY

RUNNERS-UP

Aircraft-tire pressure relief. Aircraft tires could be provided with nitinol plugs. In an emergency braking procedure the plugs would blow out, allowing a controlled release of air pressure. This would let the tire deflate instead of burst, providing greater safety and control.

—L. E. Doerr, Pinetown
South Africa

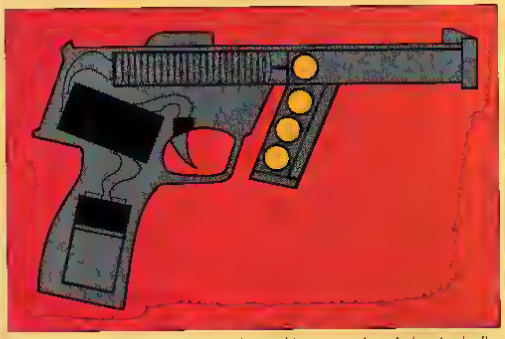
Surgical staples. Doctors now use staples to close large incisions. Staples made of nitinol might be easier to remove. Just pop the patient in a warm bath and the staples will loosen.

—Paula Greene
Hyannis, MA

Toys and tricks. A nitinol coil could propel a ball or other projectile from a toy gun.

GAMES

"Use a blowtorch and car dents would pop out like in Stephen King's Christine*."*



Toy gun. Battery pulse causes the coil to expand and shoot a ball.

when a battery pulse caused the coil to expand suddenly. Another application would allow a magic egg to turn into a dove when warmed by the magician's hand.

—Corey Cole, Auburn, WA

Cornucopia. The most enthusiastic response—37 ideas in one letter—came from readers identified only as the Omnipotent Immortals. A few of their suggestions: Since the higher surface temperatures of ocean waters are suspected of causing droughts, the heat "extraction" of nitinol generators, which would run on the temperature difference between surface water and deep water, might result in the double benefit of electricity and drought reduction. To reduce heat loss from homes, a chimney damper could remain closed until warmed by a fire underneath. An automatic choke could be designed to open when an engine heats up enough. A lampshade could expand like a flower when the bulb is turned on.

—The Omnipotent Immortals, McLean, VA

SPECIAL MENTION

For exceptional ideas too complicated to describe without elaborate drawings or complex equations, additional *Omni* subscriptions are awarded to J. C. McComb of Portland, Oregon; Silas S. Warner of Owings Mills, Maryland; Tom Mroz of Derby, New York; and Suzanne Boucharel of Neufchâtel, Quebec.

HONORABLE MENTION

An automobile air conditioner would run on the temperature difference between the engine and the passenger compartment. The efficiency of the cooling unit would increase as the engine got hotter *and* as the passenger compartment got cooler.

—Larry Kuss, Albuquerque, NM

Crash-resistant model planes, helicopters, and other toys. Brand name: Electrofix.

—Edward E. Kerbs, Victoria, TX

A bottle cap that requires no opener. The heat of your hand expands the cap and opens it. To reseal, replace the cap and put the bottle in your refrigerator.

—Bryan Lethcoe, Springfield, OH

Electronically tunable guitar strings.

—Jim Ross, Port Moody, B.C.

Boats that transport icebergs from Antarctica to drought-stricken areas could be powered by the temperature difference between the iceberg and the surface water (or water warmed by a solar collector).

—Joe Stevenson, Baker, LA

A childproof coil toy, like a Slinky. You could straighten any kink or fold in the spring in the dishwasher or dryer.

—S. Trever, Chatsworth, CA

Forest-fire detector/preventive. Drop nitinol-activated radio transmitters from a plane over dry forest areas. The units could be triggered by the intense heat of a fire to send out their location to a central computer or even to release fire-retardant chemicals.

—Randy Altmann, Londonderry, NH

The "ship in a bottle" industry has fallen on hard times lately because the old masted sailing vessels have been replaced by modern metal ships. What is needed is a nitinol hull that could be inserted through a bottle neck and then expanded with heat. This could save S.I.A.B. craftsmen from sharing the fate of buggy-whip and slide-rule manufacturers.

Also, you might be able to power a ski lift by exploiting the temperature difference between the chilly top of a mountain and its sheltered warmer bottom.

—David S. Shiller, Atlanta

Novelty gift wrap. Packages wrapped in nitinol foil would open themselves when set in a warm place.

—David R. Moffatt, Pine City, MN

Fuses on power poles that trip during an electrical storm must now be reset manually by a bucket truck crew. If the fuses had a nitinol element they could be reset by microwave transmission or a laser.

—Mitten R. Schwartzwelder, Plantation, FL

Weave tiny strands of nitinol into carpet fibers in high-traffic areas. Steam-cleaning the rug would restore the original pile.

—Clinton E. Major, Eureka, MT

A nitinol security lock for a policeman's holster could prevent anyone but him from drawing the weapon. The officer would wear a special ring or glove that would activate the release of a nitinol clamp on the gun.

—Robert Schreib, Fords, NJ

Chain-smoker's ashtray. It clamps down on a smoker's wrist when he tries to extinguish a cigarette. The "Jaws" model, providing added incentive for those trying to break the habit, would be available by request.

—L. E. Doerr, Pinetown, South Africa

LAST WORD

By Terry Runte

"Join forces with Meeseman, Lord of Good, as he wages battle with the Sinister Forces of Evil to gain dominion over an interstellar chain of convenience stores."

He's cooler than Sting and twice as arrogant. He's hotter than Prince and twice as male. Let's face it, folks, law is the hot ticket in America right now, and the big box-office name in law is Attorney General Edwin Meese. Whether he's screening porn videos as part of vital research or delving into secret Iranian dealings, Ed has won a big following.

But that's only going to last two more years. What will happen to Ed Meese after the Reagan years? He could go on to a career in politics, but we all know that he just doesn't have what it takes. The smart money says Ed will return to the private sector and use the skills he's developed as Secretary of Censorship to launch some new, socially redeeming projects and make some big bucks as well. In fact, his reps at William Morris have already lined up dozens of gigs for our future erstwhile Attorney General. Here are just a few:

MEESELAND "The trouble with Disneyland," Ed Meese once said, "is that it encourages youngsters to worship false idols. Think about Mickey Mouse. He's like Dorian Gray. He never ages. He lives a life of shameless hedonism, with no visible means of support. (And I think we all know what he does with Minnie.) Yet Disney sells over 2 million products a day with Mickey's image on them, drastically cutting into the Jesus paperweight and watch business. Mickey, we must conclude, is the Devil incarnate."

Well, let's hear it for Meeseland, which Meese claims will be the first truly "family" amusement park. The multibillion-dollar theme park, to be built in Skeeter Hole, Alabama, would include:

- *Kid-O-Rama*, the first musical extravaganza to feature "Up with People," "The Osmonds," and "The Lawrence Welk Singers" together at one time.
- *The Tunnel of Like*, a brightly lit, chaperoned ride restricted to married adults.
- *The Edcot Center*. Travel through the brave new world of the future as foreseen by Reagan's right-hand man. The terrifying experience will stay with you forever.
- *The Meeseketeers*. This TV show to be produced and broadcast from Meeseland, will be almost exactly like the old Mouseketeers show, except the female Meeseketeers' bodies will *never, ever* develop, no matter how long the show airs.

ED MEESE BOOKMOBILE. This books-for-rent business will employ some radical new concepts in educating the public. Instead of a fuel-guzzling bus, for example, the Meesemobile service will employ a 50cc Honda scooter, an economy made possible because only three books will be offered: the Bible, *Power for Living*, and, in the adult section, *Mein Kampf*.

ED MEESE'S *101 THINGS THAT ARE BETTER THAN SEX*. A bold experiment in alternative sexology, this has become a bookmobile best seller at $19.95. This Meese volume plunges beyond the steamy world of erotica with a highly compelling personal collection of alternatives to the joys of sex. In breathtaking detail, Meese explores the excruciating anticipation of "waiting for the microwave meal," the frenzy of group indulgence of "Bible charades," and such old-fashioned pleasures as "cleaning out the shed."

MEESE LITE. At last, a light beer that gives you nothing you wanted in a beer . . . and even less. Meese Lite is a unique beverage, brewed from only the finest ingredients (all of which are classified), to make it more acceptable to the general public. Sample jingle: Who says you can't have it all? Ed does.

MEESEMAN, ATTORNEY GENERAL OF THE UNIVERSE (from Hasbro, $94.95). Hey, kids—it's the ultimate power trip! Join forces with Meeseman, Lord of Good, as he wages battle with the Sinister Forces of Evil for dominion over an interstellar chain of convenience stores. Buy his anatomically correct figurine and watch his Saturday cartoon show as he and his friends try to stop the spread of smut throughout the galaxies.

THE ED MEESE GENERAL HOSPITAL. EMGH will be a daring experiment in medical care. It will be the first hospital to specialize in punitive medicine. "Maybe people will think twice about getting sick if they know they'll be prosecuted to the full extent of the law," says Meese.

Those suspected of being ill will be examined by a panel of nonprofessionals (Meese hopes to keep overhead down by not using actual doctors, whom he refers to as "so-called experts") to determine whether there has been any violation of U.S. health codes.

The panel will review a person's medical records and life-style and make a diagnosis. If the person is not sick but has an unhealthy attitude, the panel will send a warning letter to the patient. A version for someone with questionable dietary habits might read, "It has come to our attention that you've been eating a lot of cholesterol. It would be a shame if we had to put your name on the list of high-risk heart-attack victims we are preparing for your insurance company."

If the accused is found to be sick, he could be fined or even sentenced to a minimum-security hospital. Penalty for a ruptured appendix: six months. Heart disease—in advanced stages—will get you life. "It may seem cruel," Ed admits, "but it will be in keeping with my hospital's motto: 'Stay healthy. It's more than just a good idea. It's the law.'" ∞

The Meese Commission says freelance writer Terry Runte should be censored.