BRAINBUSTER: OMNI'S ALL NEW I.Q. TEST

THE FICTIONS AND FANTASIES OF MODERN SCIENCE

INTERVIEW: THE SWISS CHEMIST WHO INVENTED PSYCHEDELIC DRUGS
Suppose that the DC motor with its commutator and brushes had not been invented in 1832 and that the induction motor, devised in 1880, therefore came into general use. Now suppose that some bright person were to come up with the idea of a commutator in 1981 and take his idea to British industry, to the National Research Development Corporation, and to the Science Research Council. All would escape the inventor to the door as soon as they had heard him out. The development of such an idea: they would insist, would require too much money. It could never be cost-effective and if it had any merit at all the Germans or the Japanese would have done it anyway.

Still, the commutator motor thrives in industry throughout the world. This fact highlights two profound problems that hamper invention in Great Britain. First, invention takes an absurd second place to science. Second, there is no direct connection between anyone’s scientific education and his or her knack for invention. The history of technology proves this.

Technology began some 10,000 years ago. Science is a relatively new luxury born out of technology. No other nation has surpassed the United Kingdom in terms of sheer ingenuity. The fruits of our country’s inventiveness have appeared, more often than not, as technology.

We have, of course, an excellent record in science too. Sir Isaac Newton, Joseph Priestley, Sir Humphry Davy, Michael Faraday, James Clerk Maxwell, and more recently Ernest Rutherford, Oliver Heaviside, Henry G.J. Moseley and Sir William Bragg and his son, Sir Lawrence constitute a most impressive assembly of scientists. However, since the 1920s, a decline has set in.

Science depends on wealth. Wealth, in turn, depends on much more than technology. It is interwoven with commerce, industry, and politics. Since the beginning of this century, we British have been losing ground in world trade and world politics.

The climate that existed when Sir Marc Isambard Brunel and his son, Isambard Kingdom Brunel, were digging tunnels under the Thames and holding banquets underground to celebrate their success has long passed. If the railway network in Great Britain had not been laid when it was, no accountant today would have authorized its construction. This brings us to the very heart of the present-day inventor’s problem. We live in the Age of the Accountants.

When it comes to real exploration and pioneering—activities that continue unabated whatever the financial state of the world—the first question always is, Can the venture be done at all? Don’t ask what it costs to put a man on the moon. Ask only what the chances are of bringing him back. But as soon as success is in sight, the man with the cash-flow concept moves in and asks, “Now how can I perform the undertaking?”

The climate for innovation in Britain has never been chillier. Established failures, from the groundnut scheme of the late 1940s to the tracked hovercraft of the 1970s, are held up as classic examples to those who would brave the unknown. No one wants to learn real lessons, other than those favored by accountants.

Whether we like it or not, we British individually and collectively are answerable to the accountant. This is not to be attributed to our political system. Nor is it the result of our having become civilized earlier than those who now possess more wealth than we. We have allowed the accountants to get into the driver’s seat, and they know it. Like other dictators, accountants will succeed for a while until human nature moves to overthrow them. But it will take time.

Meanwhile, there are some things that can be done to improve the climate for adventurers. There are good and bad accountants, just as there are good and bad engineers. Let those who are employed by firms that do not do well take note of what happens in large organizations that are successful and try to follow the same pattern. For example, a large firm mass-produces a product, die-cast metal toys that has constituted 90 percent of its sales for years past. In 1961, that industry will have a loss for the first time in 50 years. What policy does that company now pursue?

The obvious remedies, such as cutting down waste, reducing the number of employees, and raising the price of the product, are all rejected. The company prunes its production program drastically and diverts the money it has earmarked for a new plant into the research department. Does this sound crazy? Not at all. To make twice as much of the standard merchandise is to make twice the loss the next year that you made this year. Change the product instead. Make expensive executive toys in much smaller quantities. You will lead in a new fashion. To do it, however, you need research lots of it. More than that, you need men of courage, men who can ride a failure or emerge like a phoenix from their own first near-disaster.

One thing should be made crystal-clear to us all: Raising the price is an almost certain loser. And what shall it profit a man if his increased prices promise him a fortune, but he loses his company?°°

Eric Lathwaite, professor of heavy electrical engineering at the Imperial College, London, is a pioneer of magnetic levitation.
Contributors

There's a myth about Nobel Prize winners. Some people think the Nobel is the kiss of death. Samuel C. C. Ting has exploded that myth, says writer Bruce Schechter.

When Ting received the Nobel Prize, he was only forty years old. Schechter, an MIT graduate student when Ting's discovery of the J particle was announced, wanted to find out how a person who made a major discovery and won the coveted Nobel at so young an age can continue to do first-rate work. Read "The Once and Future Ting" on page 48, to learn how Schechter believes Ting achieved success.

Going up? Paranoid Omni contributor Robert L. Forward and Hans P. Moravec, who studied at Stanford University's Artificial Intelligence Laboratory, speculate on the possibilities of stretching cables from orbiting satellites to Earth, creating a theoretically simple skyhook. 'In High Wire Act' (page 44) we see why elevators to space might easily supplant rocketry by the middle of the twenty-first century.

Forward, a physicist whose specialty is gravitation, works full-time for the Hughes Research Laboratory in Malibu, California. Bellantine/Dell Rey Books released the paperback edition of Forward's first novel, 'Dragon's Egg,' this past February. Moravec is a research scientist at the Robotics Institute, Carnegie-Mellon University. His consuming interest in robotics began when, at age ten, he put together tin cans, batteries, lights and a motor to construct his first 'serious' robot.

I kept pleading harder and harder and thought I was locked into one spot. Finally I got home. Everything had changed, become terrifying. My neighbor came in and looked like a horrible witch. This is what Albert Hofmann, the chemist who discovered LSD, recalls of his first experience with the hallucinogen, in 1943, the earliest recorded in science. Hofmann tells David Monagan in this month's Omni Interview (page 68) that he happened upon the potent drug quite by accident while studying fungus applications.

Formerly an editor of Archaeology magazine, Monagan is a freelance writer whose articles have appeared in Science Digest, the New York Times, and the Medical Tribune, a weekly newspaper 200,000 physicians subscribe to. Science-fiction award-winner Robert Silverberg returns with 'The Palace at Midnight' (page 52). In June Bantam published the paperback edition of his book 'Lord Valentine's Castle,' which was nominated this year for a Hugo Award. Jayge Carr, whose story 'Mathus's Day' appeared in our November 1979 issue contributes another story, 'Blind Spot' (page 62). Two new Carr novels are soon to be published, 'The Space Reversers' (Playboy Press) and 'The Treasure in the Heart of the Maze' (Douglas and Doughty).

Robert Kail's Mind column, 'Resurrection,' on page 20 raises some disturbing questions about how we cope—psychologically and emotionally—with our loved ones who, diagnosed as terminally ill, survive because of a new technique. Kail, an inventor and a consulting editor of Behavioral Medicine, is director of the pain and stress management program at the Growth Opportunity Center in Huntingdon Valley, Pennsylvania. The U.S. Olympic ski team has asked Kail to advise team members on how to use biofeedback methods to improve their Olympic performances.

The year is 3000. A couple has just won the prize to end all prizes: a voyage through the universe. What might they see? Robert Sheckley, our fiction editor, tells us in "Tour of the Universe" (page 82). The illustrations are from the Mayflower book of the same title, by Robert Holdstock and Malcolm Edwards.

Three months ago Columbia landed at Edwards Air Force Base, in southern California. Ben Bova was present for that historic event. In this month's Science column he reminisces about what it was like to see America's latest accomplishment—one that all of us can celebrate during Space Week: July 13 through 20.

What number logically follows in this sequence? 2, 3, 5, 9, 17, ? This question and 38 others like it are part of the Omni-Mensa I.Q. test, created by Games editor Scott Morris with the help of Alice Fux, public relations director for Mensa, the worldwide high I.Q. society. Turn to page 96 to test yourself against Mensans who completed the examination in little more than half an hour. Next month Omni will provide the answers and will help you make sense of your score.
The Mummy Makes It

Three cheers for Ray Bradbury! His story "Colonel Stonesteel's Genuine Home-Made Truly Egyptian Mummy" [May 1981] is a splendid example of tall-tale telling in the spirit of Mark Twain. Please give us more.

William P. Roeder
State College Pa.

The Space of Life

Reading the Donald Symons Interview in the March 1981 Omni was exasperating. How can one person hope to extrapolate the true nature of modern man from a study of primitive and homosexual social behavior? From the populaion patterns of caged bulls and monkeys? Human beings have long since risen above the level of baboons.

Symons drones in his own arrogance when he assumes that human females have little need for variety. It is human nature to be curious and to crave diversity. Cultural brainwashing and societal intimidation are inconsiderate of women's sexual preferences, including variety.

Vai'a Clifton
San Francisco Calif.

if we pursue Donald Symons's line of biological fatalism to its logical end, we must conclude that there is no future for art, music, or higher mathematics because such initiatives break the natural law and confer no apparent selective advantages.

Yet our society has prazed and has legitimized these inventions, just as the tolerant rejection of sexual determinism should be prazed. Darwin's is a brilliant model for explaining the morphological and behavioral differences between Homo sapiens and other mammalian species. Applied incansiously within our species, however, it leads to a downgraded view of the human potential.

James Morrow
Westford, Mass.

For the Good of the Group

I enjoyed the balanced review of Robert Heinlein's Expanded Universe in the April

Omni, but I disagree with Alexo. Panish's comments about Heinlein's "misplaced morality."

Panish finds Heinlein's definition of morality--behavior that tends toward survival--false, because it is based on examples of individual behavior.

But Heinlein's work treats survival as a group concept, not solely an individual one. Where the clam or shark will succumb to the gene pool of its species through heredity, Heinlein understands that man will direct his actions toward survival of the human race.

Racford C. West
New York, N.Y.

Zep Appeal

I would like to clarify a few points raised in "Rape Zapper" featured in Continuum [May 1981].

Several design improvements have been made, including a snap-on protective cover and Personal Security Devices, Inc., Suite 79637, One World Trade Center, New York, N.Y. 10048 now manufactures and sells the Zapper worldwide.

Edward R. Koengieelef
New York, N.Y.

Attention Science-Fantasy Artists

In October 1981 the World Fantasy Art Exhibition will be held in Berkeley, California. In conjunction with the seventh World Fantasy Convention, the exhibition will feature paintings, drawings, and sculpture, with a bizarre chromatic twist! Send twenty thirty-five color slides of your work, a resume or cover letter and a postpaid return envelope to: Will Stone, 580 Sutter Street, Suite 201, San Francisco, CA 94102. The deadline is August 1, 1981.

Jack Rees
Chairman, WFC
Berkeley, Calif.

In Defense of Privilege

I wish to reply to a letter written by Robert Bailey [Communications, February 1981]. We live on a planet with differing ideological factions. Although the idea of working together for the common good is a
SOLARES will not. They are mistaken. SOLARES mirrors can illuminate moon minning operations, concentrate solar energy in space furnaces to process ore and concentrate heat to run turbines to produce electricity.

It is time for a strong dose of economic realism and political savvy in the space-interest community. It is time to support SOLARES.

Max Gordon Phillips
Sunnyvale, Calif

Correction

In Omni's May 1981 issue I noted a reproduction of a painting by René Magritte, one half on page 85 and the other half on page 87 ["Rent-a-Conscience"]. This painting is none other than "Decalomania". I deplore the reproduction of this work of art in pieces and without proper credit or copyright.

Also the 1966 oil-on-canvas, 31½ X 39½ painting was stolen from the Brussels home of its owners, Professor and Mrs. C. Perelman, in August of 1979. I would appreciate it if persons having information concerning this painting would contact this office.

Harry Torczyner
Attorney for the Estate of Rene Magritte
521 Fifth Avenue
New York, NY 10017

We would like to apologize for reproducing the painting "Decalomania" in two parts. It is a single work and should be viewed as such. The correct credit for the painting is "Decalomania" by Rene Magritte, copyrighted by A D A G P Paris, 1981. Also, the credit for the painting on page 26 [May 1981] should read "Le Mois des Vendanges" by Rene Magritte, copyright by A D A G P Paris, 1981 - Ed

Perpetual Search for Perpetual Motion

James Randi's Last Word [May 1981] mentions the refusal of the Stanford Research Institute to investigate a perpetual motion machine that was endorsed by Science and Mechanics magazine and has even been patented (U.S. patent 4,151,431).

I believe that the source of energy for the machine is something worth consideration by even the most hardened skeptic. Think about it. Two doughnut-shaped permanent magnets with a metal rod through the middle, with poles facing and thereby repelling each other. The rod will be held up straight and one magnet will be held suspended in air by magnetic repulsion alone.

Dave Martell
Bay City, Mich

Dr. Paul Nahin, an associate professor of electrical engineering, replies: I have read the material on the "perpetual motion motor" as carefully as I can read any patent, and I have several reactions: (1) The conservation of energy is such a basic cornerstone of physics that is going to take more than a few claims to shake my faith in it. (2) The inventor is careful not to claim perpetual motion in his patent disclosure (the Patent Office has a policy of requesting a working model to accompany any claims of perpetual motion). (3) Physicists long ago gave up looking for magnetic particles (the "magnet monopole") - Maxwell's equations for the electromagnetic field conspicuously lack such a particle. If they had one, we would have to explain why the equations work so well (they're even relativistically correct) without the monopole particle.

As far as the conversion of Science and Mechanics goes, a good fraud can easily mislead the susceptible. Look at how Uri Geller made utter fools out of supposedly intelligent scientists, and all he had to do was cheat at bending spoons.

We Stand Corrected?

I just received my copy of Omni. To my surprise, I found this very nice article that Allan Maurer wrote about Uri Geller and Robert Ellis [Communications, May 1981]. Unfortunately, the article contained some mistakes. The greatest of these was the statement that Uri was founder of Intergalactic Robot Eggs, Inc. I am the founder, not Jake. In the Robot Egg
Ecologist Orie L. Loucks is proud of the self-sufficiency he's achieved with his little urban garden, but lately the garden isn't healthy. Corn yield is way down. The cucumber patch is dried up, yellow dying too soon. There is a greatly reduced yield of raspberries, beans, and asparagus. Insect-eating birds, such as wrens and nuthatches, have left the area and aren't around to help with pest control.

At the root of the trouble are the ozone and sulfur compounds now widespread over the Northeast and the Midwest. The garden is slowly being killed by low-level pollution. Loucks, science director of the Institute of Ecology (TIE), considers this the major environmental challenge of the 1980s. Environmentalists of the 1960s and 1970s wrestled over toxic and radioactive hot spots. But today low level pollutants are "warming" vast geographical regions.

In his garden, Loucks laments the subtlety of the environmental effects. "What makes me saddest of all is that people get to think this is how cucumbers grow in the cities we've come to accept evergreens that are yellow and brittle and plants that are dying."

The garden is merely one link in a chain reaction that begins with emissions thrown into the air by the tall smokestacks of coal-fired power plants. Slowly drifting eastward, a cloud picks up pollutants from urban areas along the way in Illinois, Indiana, Ohio, and Kentucky. The cloud's ozone destroys up to 15 percent of the corn, wheat, and soybean crops. In the Northeast, sulfur and nitrogen compounds drop out of the cloud as acid dust or acid rain, damaging wallpaper, paintings, and clothes, and converting lakes and streams into vinegar fish graveyards.

"These subtle stresseses have become almost a way of life now," Loucks says. "It is different from the environmental problems of the 1970s. Then solutions could be identified and people could commit themselves to persuading society to embrace proposed solutions. Much of the population seems willing to live with the warming trend and let their kids solve the problem."

The Canadian-born Loucks is a scientific pioneer—one of the first to apply systems methods—a holistic approach to environmental science. In the 1960s he was the first "environmental systems scientist" to testify against DDT.

Loucks thinks that the way to combat low level pollution is through what he calls "the new Renaissance science," that is, research that unifies the isolated scientific disciplines. Since the 1950s Loucks has specialized in forestry, soils, atmospheric sciences, and botany—all the tools needed to trace toxic substances through the air and soil to their harmful effects on living organisms.

Collaborating with experts in universities, government, and industry, TIE coordinates interdisciplinary sciences in the study of stressed ecosystems. "With this holistic approach and by working within an invisible college that spans the large area," Loucks explains, "we can work with modern science in the same way Renaissance thinkers dealt with the whole body of science in their time."

So far, Loucks says, society pays scant rewards to those who cut across disciplines and dedicate themselves to understanding large bodies of relationships. "Scientists are rewarded for isolated breakthroughs," he says, "not for integrated findings. But as people begin to understand the implications of environmental disruption, the long-term view will become increasingly important. Once more integrated findings are known, our environmental choices may change."

The danger of conventional problem solving is illustrated by the 1960s solution to urban traffic problems: building freeways. With freeways in place, more cars traveled to downtown areas. Now parking garages had to be built, leaving less space for stores and reducing the number of downtown shoppers. Loucks fears that such problem solving, without regard for consequences, is pushing us to use coal for its cheap energy.

A recent TIE study of the Ohio River valley demonstrates the danger of our shortsighted rush to coal. The total crop loss caused by coal-fired power plant emissions is expected to exceed $3 billion.
For no apparent reason there has been a nearly 70 percent rise in cancer of the testicles in the United States since 1972.

Compared to lung or breast cancer, testicular cancer is still quite rare. Of the 403,000 estimated new cases of cancer among American men this year, only about 5,200 will involve the testes. But it is now the most common tumor in men from the ages of twenty to thirty-four, causing 13 percent of all cancer deaths in this group. Even more disturbing, the incidence of the disease seems to be growing. The American Cancer Society expects 200 more cases this year than last.

The same trend can be seen in Great Britain. There were 762 cases of testicular cancer there in 1975—the last year for which figures are available. Ten years earlier only 193 cases were detected. The increase appears to be continuing, especially among males from fifteen to thirty-four years old.

Testicular cancer is most common among white middle- and upper-class men. One recent study found that young, college-educated professionals have four times as much a chance of developing it as laborers do. "Tell thin, Caucasian men seem especially susceptible, nonwhite men almost never develop it whatever their class or occupation.

No one has been able to explain the increases in testicular cancer. Why it occurs in some men but not others, or for that matter why or how the cancer develops. American scientists have learned that men born with an undescended testicle suffer up to 40 times greater risk than the general male population. But while this group has become more numerous in recent years, the cause of their high vulnerability remains a mystery.

Doctors say testicular cancer is not caused by venereal disease, sports injuries, or even vigorous sexual activity. Some Danish researchers suspect that the increase is caused by jockey shorts or bikini briefs, which press the scrotal sac too close to the body's heat. They're trying to determine whether men who wear loose-fitting boxer shorts, or none at all have a lower incidence of cancer than man who wear tighter-fitting underwear.

Ten years ago testicular cancer was one of the rarest cancers and one of the most fatal kinds. Surgery and drugs have made it one of the most curable. Once the cancer is confirmed, the cancerous testicle is removed and is closely examined by a pathologist. A plan of radiation and/or drug therapy is then devised for the patient.

Most who have undergone the surgery can even maintain an active sex life. Fertility may be reduced by the loss of a testicle, but those who want to have children later can often bank their sperm before the operation.

As in breast cancer, early detection and treatment are crucial. "Unfortunately, public ignorance of the disease is overwhelming," says Dr. Marc B. Garnick of the Sidney Farber Cancer Institute of Harvard Medical School. "There's a startling lack of awareness even among physicians. No one seems to give a damn about male sexual health.

"By comparison, this society is perfectly at ease talking about breast cancer in women. We put up billboards on it, train girls in piggytails in how to check their breasts, and find the topic sooner or later in every newspaper and magazine and on every TV show in the country. I hardly mean to criticize this growing public awareness of breast cancer—it is an essential tool in fighting the disease—but I mean to criticize this growing public ignorance of testicular cancer.

Because there is no early pain or discomfort, self-examination is the key to detecting testicular cancer early. At first the cancer manifests itself as a pea-sized or larger bump on one of the testicles. Though it rarely affects both glands, the tumor can spread into the body, notably the abdomen or the lungs, and eventually cause death.

The best time to make the examination is after a warm shower or bath, when the scrotum is relaxed. The normal testicle is smooth, egg-shaped, and somewhat firm. Underneath the testes is a tube that carries...
**SPACE**

By Ben Bova

In the early morning sunlight thousands of us searched the empty sky waiting in the desert like religious pilgrims, waiting for a sign from above.

America's space shuttle Columbia had reentered the atmosphere, halfway across the world, and was going through radio blackout—bathed in a sheath of air so hot that radio waves could not penetrate it. No one spoke much about there on the desert at Edwards Air Force Base next to the seven-mile-long dry lake bed. We all knew that this was the critical time: the real test of Columbia, her reentry heat-shield tiles, and her two-man crew.

She had been launched two days earlier, after years of delays and frustrations. Launched by happenstance, exactly on the twentieth anniversary of Yuri Gagarin's pioneering one-orbit spaceflight. The spaceship and the two astronauts piloting her John Young and Robert Crippen, had performed magnificently so far. But those reentry heat-shield tiles were a questionable item. Had they really stayed put on Columbia's underside, or had significant numbers of them peeled off during the thundering launch from the Kennedy Space Center?

The loudspeakers that NASA had set up for the visitors awaiting Columbia's return were silent for long, agonizing moments. Then, abruptly, the morning air was shattered by the voice of the mission controller in Houston.

"We have radar fix on you, Columbia. You're looking good."

Young's reply was drowned out by the cheers of thousands:

"Columbia mission control reported, we show you at 151K [151,000 feet altitude] now 8.4 Mach, looking good."

"What a way to come to California!"

Crippen exulted.

- The pigeons on the desert expanse surged expectantly now by the tens of thousands they had come, in campers, in buses, in limousines, in dust-covered family cars. Children, grandparents, businessmen, pensioners, college kids—most of them had come out to the desert the night before and camped out while waiting for the return of the first space shuttle. Across the dry lake from where we stood, we could see a long, dark line against the base of the distant mountains: thousands of visitors, glittering in the sunlight with cameras and binoculars around their necks.

Columbia announced her arrival over Edwards Air Force Base by a double clap of thunder like a goddess coming out of the sky to visit her worshipers. The sonic boom rang across the Mojave and pulled another cheer from the vast crowd.

Mission control: "Columbia, you're coming right down the track. The tracking data, map data, and preplan trajectory are all one line on our plot boards here."

We knew Columbia was overladen, but we could not see her. At an altitude of more than 40,000 feet, she was an invisible speck in the bright blue California sky. But, we strained our eyes anyway searching, glancing at the maps NASA had provided to show the long, sweeping course the spaceship was taking out over the dry lake, peaking every few seconds at the television sets that had been positioned around the visitors' area. High up in that crystalline cloudless sky we could see the thin white scallops of vapor trails from the T-38 chase planes that were ushering Columbia earthward.

And then we saw her! A speck of white coming in low over the distant bluish blur of mountains; the word made flesh—and metal. She grew before our widening eyes into a stately machine with wings, seemingly suspended above the shimmering floor of the ancient lake.

She was coming in nose-high regally, and her wheels down, her white flanks gleaming in the sunlight. A puff of dust as the wheel touched the landing strip.

"Welcome home, Columbia!" mission control said for all of us. "Beautiful!"

And she was. We screamed. We laughed. We shouted and hugged one another in our joy. People wept. Some danced. Some made a brief silent prayer of thanksgiving.

At the controls of the world's first true spaceship Young quipped coolly, "Do you want us to take it up to the hangar?"

Mission control: "You got a lot of people smiling back here. Good to have you back."

Astronaut Crippen: "This is really the..."
RESURRECTION

By Robert Kall

Everyone thought Lisa would die. Her illness was supposed to be fatal, the chances of recovering from last-ditch brain surgery were slim. And yet, through the application of new medical techniques, Lisa survived unimpaired and went home.

"Damn you!" cursed her husband, Steve. "Why don't you drop dead? You're a walking zombie." After two weeks Lisa took his advice and gobbled a handful of pain pills.

The story of Steve and Lisa is a composite drawn from cases studied by Dr. Charles David, associate professor of psychiatry at Dalhousie University Medical School in Halifax, Nova Scotia. It is an example of a new social syndrome caused by rapid advancements in clinical science that have outstripped our ability to cope with them.

"Modern medicine," Dr. David states, "has brought us miraculous cures, but it also has brought us resurrection of the dead syndrome. Resurrection means the coming back to life after death. "Resurrection of the dead" is used in this situation to refer to the patient's reentering the world of the living after the relatives or family have written him off for dead."

Patients with terminal diseases are now routinely snatched from death's grasp by wonder drugs or advanced surgical techniques. When they return home often following extended periods of hospitalization, the families of these fortunate patients treat them as if they should have died. During the illness, family members go through the preparatory stages of coping with death. The syndrome arises when they experience anticipatory grief too early. They accept their loved one's death as a fact and suffer the tumultuous emotions this resignation comes with it.

Then, when a new or experimental procedure is trotted out at the last minute to save the patient, family members go into a complex form of shock. They resent the suffering they have endured needlessly, and they feel guilty about the resentment. The result is anger and denial of their resurrected dear one, who by cheating death has, in a sense, also cheated them of their grief. At this point, David says, after the turnaround in prognosis, the patient's relatives reject him and treat him as if he's dead. They may even sabotage medical treatments or drive the patient to suicidal attempts, as in Lisa's case. Parents reject or ignore their children. Children abandon their parents. Spouses leave each other.

"This syndrome is far more common than one might think," David declares. "Millions of people every year suffer from life-threatening illness. And they are all potential victims of the resurrection syndrome. It could even explain why so many elderly are put away in old folks' homes and why some people, including children, are put away in mental institutions or sate homes for their whole lives. It's a way for the family to bury them while they're still living."

David suggests that some denial is normal and healthy during the dying process—a gentle refusal to believe that the patient will actually die. This denial provides a measure of hope that sustains patients and families through the painful anticipation of loss. But the people most susceptible to the resurrection syndrome, David believes, don't have as much capacity for denial. They bury themselves in passivism.

It's important that the families understand the implications of the illness. And it's very important that the doctor convey a sense of hope.

For physicians, encouraging hope in what may be a hopeless case is controversial. Do they ease the family's pain and prepare them for impending death, or do they raise false hopes for a barely possible breakthrough cure? There's no simple black-and-white answer. It demands the highest interpersonal communications skills. More important, the situation emphasizes the powerful affect that hope can have on people. The resurrection syndrome is an extreme example of why believing in a positive future can be good for you. Problems tend to develop when people put either too much or too little faith in the future.

The answer appears to be a balance of hope and a healthy understanding of future expectations.8
**THE ARTS**

By Jeff Rovin

I playing General Zod taught me anything,” says actor Terence Stamp of his role in *Superman II*. It's that when you're creating special effects that involve people flying, there's no possible way to avoid pain. This means either you have to be very masochistic or you must love a project whose shooting schedule offers forty weeks of sheer physical agony. In my case, it was the latter. The two *Superman* films were personally very gratifying.

One would hardly expect such ungrudging words from the Kryptonian supervillain who comes to within a hairbreadth of conquering Earth in this sequel to 1978's box-office powerhouse *Superman*. Aided by those grueling but impressive special effects, Zod and fellow aliens Ursa (Sarah Douglas) and Non (Jack O'Halloran) murder astronauts on a lunar mission, use their heat-vision to torch an Earth community, devastate the army, bring a president to his knees, kidnap Lois Lane, and in a climatic battle with *Superman* all but razed Metropolis in some of the most spectacular footage ever filmed.

Off-camera, however, the almighty Zod is quite a different fellow. There is no bombast or sizzling autocracy, only the quiet intensity of his alter ego. The British-born Stamp is one of the acting profession's most serious and selective artists. His screen credits include *Billy Budd*, *The Collector*, and *Far from the Madding Crowd*. Onstage he has performed in plays as diverse as *Dracula* and *The Lady from the Sea*. Yet nothing in the actor's eclectic twenty-year career prepared him for the difficulty of making *Superman* films.

Stamp had only a few scenes in the first movie—being banished at the outset to the Phantom Zone as punishment for crimes of sedition against Krypton. He returns for the sequel in grand fashion when *Superman* averts the atomic destruction of Paris by deflecting a terrorist bomb into space. The blast opens the Phantom Zone and liberates the criminals simultaneously burdening the performers with the very real honor of having to fly.

Long before *Superman II* commenced shooting, Stamp spent weeks getting his body accustomed to the unique sensations of flight. “I was on a trampoline for hours every day so that after I was rigged on the set, I didn’t just hang there, which was the temptation. On a trampoline you can simulate the fact that the air is your new surrounding and get into a frame of mind to fly.”

This preparation was vital. Stamp contends, since he is airborne during much of *Superman II* either suspended from wires or locked in a body mold—a solid cast in which the performer is swooped and turned against prelimined aerial footage. What he could not drill for was the torment these methods caused.

“When you’re flying,” Stamp explains, “every rigging that can possibly be used involves the whole body weight resting on something, somewhere. No matter how you pad yourself, your weight is always hitting something. It’s just a question of where you take the pain. If you’re strapped into a flying harness and dangling from wires, it hurts between your legs and on the front of your pelvis. If you’re in the body mold, you take the pain in your chest. Not that you mind the pain during a take because you’re being afflicted for something worthwhile. But you are dressed over the harness or body mold and so it doesn’t show and then they take away your ladder, leaving you literally, to hang around for hours while the crew sets up the shot. It’s an ordeal that saps your energy and makes you irascible.”

This regimen was especially taxing for Stamp and for Christopher Reeve, once as Zod and Superman, their every flying position had to be dramatic and self-assured. “It’s an even greater strain to keep yourself in that sort of commanding posture, with your body straight and your legs rigid. Most of the weight falls upon the stomach muscles. The only comparable exercise I can think of is holding a yoga pose, interminably.”

And then there were accidents. Stamp admits. A number of people were injured by mishaps with the flight equipment. The only way to prevent them is to keep extraordinarily alert when you’re flying. If a wire breaks and you’re totally there, you’ve got a chance. You can roll on your back.
when you fall or try to tumble toward your mattress. But if your mind is wandering, as happened with a couple of people you haven't a chance.

Despite the aches and chills it took to defy gravity, Stamp maintains that the anguish offered practical dividends. In my case it helped the performance by putting me in an absolutely vile mood making the want to spread some of that suffering around. Also if you're playing a villain, you have to bring an incredible degree of consciousness to the part. If you watch films of Hitler for example, he clearly has a greater sense of presence than you find in an ordinary soldier. Zod needed that kind of wicked charisma, and the concentration it took to dangle safely in the air helped that. There was never a stray thought in my mind; as a result you know just watching Zod, that this is a man to whom accidents do not happen.

One of the pleasures of observing Stamp's performance is his ability to make the power mad Zod more than just a posturing icon; which was no mean accomplishment. Zod is Superman is unplayable really, the actor confesses. He was a destructive force on Krypton where he had the same power as everyone else. On Earth, with his expanded abilities, he really becomes the personification of evil. But there is still a man at the center of him, and I tried to divine and relate to that. Zod was reachable to me when I thought of him as just a fire element as all things that burn. So when you'm in a man that serious, fury greed and envy. He was always being consumed, and there's a very little actual demonstration from him-only this incessant furnace. He seems always to be thinking of a way that he can tear off someone's head and crap it on particularly in the scenes with Gene Hackman [repeating his role as Lex Luthor].

Zod is also very vain Stamp confers. Though he doesn't knowingly show it, there are moments when it sneaks out like when he is confronted with a television camera for the first time and realizes that there's a world audience. The staggering power of the character is layered upon these very apparent areas of instability which give him a handle for me. I think some dimension in the film.

Aside from the challenge of interpreting so arch a figure Stamp was anxious to play Zod for another reason: to increase his slim body of work in the science-fiction genre. Except for The Mind of Mr. Soames [made in 1970], I have acted largely outside the realm of science fiction although reading it is something of a hobby with me. I totally identify with these characters who are trying to gain a greater more profound cognition of the universe in which they move. Stamp cites as his favorite works of science fiction More Than Human by Theodore Sturgeon, Frank Herbert's Dune, and Walter M. Miller's A Canticle for Leibowitz. As a rule, the science-fiction novels I like best are those with an allegory one that I stumble upon maybe months afterward. I don't really like it when the message is so apparent as in Stranger in a Strange Land, which is nevertheless an interesting novel. I'm also fascinated by the different creative worlds that seem to blow over science-fiction writers from time to time more than with mainstream writers. The Frank Herbert who wrote Dune is thematically very different from the man who wrote The Dragon in the Sea some years earlier and to some extent the latter Dune novels. I think science-fiction authors are keenly aware of change and their writing reflects this.

"Philosophy too is something I enjoy for much the same reason. In fact it is the subject that has helped me to recognize an amusing but compelling parallel between movies and life. If you watch a film you realize that it's a transient thing that only the light of the projector is constant. A person's life is also over-changing, a shadow play of flesh in transit made perceptible by the light inside us. I won't label it the soul or the consciousness because of the way those terms have been made superficial by overuse but that light is present when we're young and is with us as we grow. Whether the images before us are romantic or terrifying or illuminating it reveals them impartially for us to interpret just like a movie. I think it would be quite interesting and fitting for our media-oriented society to evolve a philosophy or religion inspired by the cinema. We already have our idols the Brandoes and the Hepburnes, symbolism of this sort may be the philosophy of the future.

Fascinated though he is by abstractions Stamp describes himself as no less affected by what goes on in the real world, and he points to one event that almost made him feel as if he were living out a science-fiction novel while filming the Superman movies.

"There was an extraordinary harbinger associated with the project that I think affected me deeply. Stamp recalls. The minor planet Chiron was discovered in October of 1977 by astronomer Charles T. Kowal. This coincided with the commencement of shooting the first film, and in terms of credibility it made that remote world of Krypton seem more plausible to me. Even more significant is the fact that the planetoid was named after a centaur, a great teacher in Greek mythology. As knowledge and hope are the legacy of Chiron, so they are also the legacy of Krypton. The pole surviving artifact of that planet is the green crystal through which Superman speaks with his long-dead parents. It is a self-perpetuating source of energy and immortality an example of the ultimate power of science wisdom, biology and technology functioning as one as the neighbors they were always intended to be.

I also wondered whether in a larger sense the discovery of Chiron might signify a new surge in human knowledge, the same way that Pluto heralded a seismic era of learning atomic power the growth of Freidianism, the astonishing strides taken by the communications media, and so forth. It was a timely moment in which to be shooting a science-fiction film, and I hoped these abstractions would infuse the two movies and affect audiences on that same personal, philosophical level.

Whether audiences have recognized these subtle subtexts in Superman II or are merely responding to the film as the marvelous entertainment it is, they're heading to the box office in record numbers. One result of this is that Stamp's following has swelled beyond its previous cult appeal. The actor is of two opposite minds regarding his newfound popularity.

What pleases me is that people are reacting to the character of Zod. Chris and I agreed at the very beginning that it was up to us to take this movie seriously and we'd like to put a fun scare into it. But we'd like the audience to be a bit more, to have done our job and that is always a rewarding feeling.

As for the negative aspects of his success Stamp sighs: well I'm prepared to be offered a lot more villains, I'll tell you that. But what concerns me even more is Superman III. It won't trouble me to play Zod again if the public is interested enough for the producers to resurrect him with a good script there are still a lot of people who want to see us. The one thing I would absolutely insert upon.

Top billing? A love interest for Zod? The downfall of Superman?

"No" says Stamp, utterly serious. Only that I remain on the ground a lot more."

Stamp, "Zod like Superman is unplayable"
It's merely coincidental that his name is Muscio and he's chairman of the board at Muzak Corporation. Before coming to Muzak as president in 1966, Bing Muscio, whose total musical background consists of the operas on which he was brought up, was the chief operating officer at Fedders Corporation, an air-conditioner manufacturer. "I went from cool air to cool music" is how he puts it.

Muzak is cool, nonentertainment. Functional music. Entertainment music is meant to be listened to; functional music is not. It's music you notice when it's not on and don't notice when it is. Muzak's got a scientific beat that stimulates work interest while increasing muscular activity; it is a music to work to.

More than 80 million people in 125 countries around the world hear Muzak. It also is heard in the White House: where it was installed by President Eisenhower, in the Pentagon, in the headquarters of General Motors, Texaco, and the Bank of America, and in the Houston Astrodome, in Lloyds of London, Japanese police stations, and a 39-story high-rise cemetery in Rio de Janeiro, and even in the reptile house at the Bronx Zoo. Neil Armstrong heard Muzak before stepping onto the moon.

Muzak heard Muzak for the first time the way most people of his generation did. We went to a restaurant, and music was being played, but there weren't any commercials. He recalls: "At the tables were cards—we called them table tents—that showed the selection being played that night. At 8:02 it was 'Goodnight, Irene.' At 8:02:45 it was something else. I was wondering how they could tell exactly what was going to be played on the radio, and then someone said that it wasn't radio, it was Muzak. Most of us thought of it as radio without commercials coming over the telephone, which is how it began."

Muzak got its name by contracting the words music and Kodak. Muzak was invented by Major General George Square who pumped recorded music into better restaurants and the homes of wealthy people by playing it piggyback on utility lines. But since Muzak did this without wires, General Square's method was obsolete before he started.

All that changed when the fledgling company was acquired in 1941 by William Benton of Benton and Bowles fame, for about $100,000. It was Benton who experimented by playing Sousa marches in factories during World War II to see whether it increased workers' productivity. It did. Using more sophisticated programming, he discovered certain music increased productivity in the postwar years as well. Benton turned Muzak to a nifty profit when he sold it to the Weather Organization in 1957. Now Muzak is owned by TelePrompter which in turn is owned by ITT.

When Muscio came to Muzak in 1966, his job was to make Muzak scientifically attuned to the Now Age. Muscio is a now kind of guy. Together with some industrial psychologists, M.D.'s, and Muzakologists, he created the New Muzak.

"What we attempt to do is mirror your productivity curve, so that at that point where your spirits are down we try to bring them up. You have your most stimulating music around ten or eleven in the morning and at three in the afternoon. You take your upper lunches when you're down. We give you the upper lunches without worrying about the prescriptions."

According to Muzak engineers, when the average worker arrives on the job, he's in far better spirits than he is at around 10:30 A.M. when his energies are at the lowest. It picks up again around lunchtime and dissipates until 3:30 P.M. when it's at the day's lowest. Muzak is programmed to counter these depressions by becoming increasingly stimulating inversely to the "worker's efficiency curve" moving from moderate to bright in the morning, restful around lunch, and brighter as the day goes on. By midnight the tunes are almost bouncy.

"Muzak arranges, records, and produces all of its own music," says Muscio, who is pretty bright and bouncy himself, like the brass section around 11 P.M. "We claim to be specialists in the nonentertainment uses of music-specialists in the psychological/physi—
On a clear day you can see tomorrow. Maybe even the year 2000. The New Worlds of Robert A. Heinlein: Expanded Universe (Grosset and Dunlap $12.95, Ace $8.95) clears the day. It’s a long view from a very special mountaintop.

"The Manana Literary Society" was Heinlein’s name for the little group of writing friends who used to gather on Saturday evenings in his Hollywood home to sip dry sherry and discuss fiction, the future, sex, or whatever. Heinlein was an inspiration to us then, and this big book is better than those evenings were. It’s a whole weekend.

He’s a quiet man, neat, reserved, very sharp. Scrappy, too, though polite about it. He likes to challenge false assumption and stupid error. But his military code includes a very formal sort of courtesy. He was the most civilized person I had met.

Never try to write for easy money. Yet his plain style conceals an extraordinary skill. Look at his opening for "Dillahun and the Space Figger". Sure, we had trouble building Space Station One—but the trouble was people.

His future world is there, factual and felt. This easy seeming art of making some far tomorrow as familiar as today was new to the genre, and it made him an instant model for serious science fiction.

Through the early 1940s—with time out for research with the Navy during World War II—he was Campbell’s top writer at Astounding/Analog. After the war he earned science fiction out of the pulps and into the popular magazines and the visual media. He began his long series of juveniles for Scribner’s.

They are my own favorites. Never condescending, these books ring true. Generally optimistic, they dramatize the human expansion to the stars. The protagonists are young people, growing up, finding their roles in human society. This is the pattern of the "juvenile," as well as of James Joyce’s Portrait of the Artist as a Young Man.

Through most of the 1960s Heinlein led the pack. Stranger in a Strange Land (1961) made him the top seller he still is.

The paperback advance on his new novel, The Number of the Beast was $500,000. But Starship Troopers, though it earned him another Hugo, miffed his editor at Scribner’s and touched off criticism that has never subsided.

The real target I suspect is his Darwinian philosophy. He sees evolution still at work selecting the fittest for survival. His fiction is about survival types. In the nonfiction he warns us of hazards and urges us to become survivors.

Most people don’t listen. They prefer something warmer: TV, the largess of the welfare state, the comforting notion of special creation. Bishop Wilberforce tried, but failed, to demolish Darwinism in 1860. William Jennings Bryan lost again in 1925 at the Scopes monkey trial.

Now the California creationists are back in court. The new academic critics generally neglect or attack Heinlein. As liberals or Marxists, they want softer answers than Darwinism gives.

Another attack on Heinlein may be more valid. His novels often appear undisciplined, sometimes willful. He seems to neglect the basics of good fiction and to let his ideas run wild. As Wells did, he ignores art for the sake of his message in ways a professional editor would never permit.

Scores of able new writers have diversified science fiction enormously since 1940, but Heinlein did much to make it what it is. Any writer might still find useful models in Heinlein’s early work: his vigor and his clarity, his strong imagination and his respect for fact, his quiet literary competence, his fighting courage.

This new book is a mix of fiction and prediction, some of it unforgettable, some of it unbelievable when he wrote it. All of it is more or less unified by new comment and one strong theme: survival. Heinlein is disturbed by the kind of future he sees. For him, as it was for Wells, tomorrow is something real. Darwin had revealed life as an evolutionary process. Wells, extrapolating the process into the future, invented futurology. Heinlein knows the art.

This book is filled with some of his most frightening forecasts. Five years before Hiroshima and Nagasaki he foresaw the horrors of nuclear war and the appalling problem of nuclear disarmament. Forty years later a sane solution still eludes us.

The critics call Heinlein an elitist and a militarist. Perhaps a Darwinian has to be these things. If evolution operates through selection and survival, the elite are those who select themselves and sometimes they must do battle. That is Heinlein’s message. It is a humane message, more bracing than gloomy Starship Troopers, which set off the storm, does not praise violence. It is a blueprint for survival. It pictures a state ruled by those who serve it, in peace as well as in war, not by those who hope to live off it.

This new book makes the message urgent. It’s Heinlein himself, as close to an autobiography as he’s likely to come. In spite of the critics, it will be—and indeed deserves to be—another best seller. The pity is that those who need it most will remain blind to it.
Kaluga is three hours from Moscow by train, a rambling ride through birch forests and storybook villages. The city appears to be much like many other stops: a blend of wood and concrete and decidedly Russian. But on a hill overlooking Kaluga rests a Vostok rocket. Behind that towers a silvery dome. This is one of the Soviet Union's proudest monuments, the Tsukolvsky Museum of the History of the Cosmos.

For someone from the West, a visit to the Tsukolvsky Museum or to any of the space science memorials that dot the USSR offers a revealing look at the Soviet Union's space program. Since the first Sputnik, we've dissected the reports of each new Soviet launch, anxiously compared it with our own, and wondered what it might mean to us. There's no new information to be gleaned here; perhaps, but if you look closely at (or beyond) the displays of hardware and eulogies of unfamiliar heroes, you can begin to sense what the Russians' accomplishments in outer space mean to them. The events remembered by monuments, the dreams enshrined in museums, are candid clues to the direction of a culture.

For Soviet citizens, Kaluga is where the Space Age began. One house in the rocket's shadow gray with white trim, plainer than most, was the home of Konstantin Tsukolvsky: the Father of Russian space science. As a resident of Kaluga, Tsukolvsky taught geometry and physics and read Jules Verne in his leisure time. Verne's ideas so captivated him that he began to work out the mathematics of spaceflight. He calculated orbits and escape velocities and proposed ways to attain them. Tsiolkovsky's manuscripts are on display amid the rustic furnishings of his home. Though he wrote many of his works before the dawn of the century he describes with uncanny accuracy the future of space technology: multistage rockets, spacecraft operating on solar power, and the artificial Sputnik.

Czarist Russia ignored Tsiolkovsky. His visions might have withered in Kaluga, but in the 1920s Lenin's new Bolshevik government, anxious to adopt progressive attitudes, took an interest in Tsiolkovsky's theories. The aging schoolteacher was granted a pension and was encouraged to continue work in "cosmonautics." Before Tsiolkovsky's death in 1935, the Soviet Union had an active rocketry program.

A few weeks after the celebration of his hundredth birthday in 1957, the first Sputnik was launched. The engineer who presided over this launch was Sergei Korolev known in the West as the USSR's Chief Designer and a prominent figure in the cold war. Korolev's home in Moscow is in a row. Inside, Tsukolvsky's in Kaluga is preserved as a dom-muzey: it's filled with Korolev's lifework of manned and unmanned spacecraft, remembrances from cosmonauts (whom he called his "little eagles") and a library of books about aeronautics and cosmonautics.

The experimental results of Tsiolkovsky's theories and Korolev's engineering are on display in many places throughout the USSR. Not far from the Korolew Home-Museum, at the end of the tree-lined Avenue of the Cosmos, is the towering Monument to Space Conquerors. A bas-relief set in its base shows Lenin and the Russian people looking forward to a future filled with the benefits of space technology. Inside are examples of that technology.

But the largest and most extensive collection of Soviet aerospace hardware is housed under the silvery dome in Kaluga. The Tsukolvsky Museum of the History of the Cosmos consists of two large halls. The first presents a history of rocketry and cosmonautics. Such familiar names as the Wright brothers, shown in their first airplane, appear alongside names like Nikolai Kibalchich, who in 1881 built a flying platform lifted by rockets. Unfortunately he also exploded a bomb under the czar's carriage which shortened Kibalchich's aeronautical career and partly explains his obscurity in the West.

The second hall shows the end result of this history. Yuri Gagarin's Vostok 1 and Soyuz space capsules; the Mars Venera and Luna landers; high overhead hang satellites and artificial Sputniks. If you think of the Vostok's launch, you think of the Soyuz/Apollo test project (though here quite understandably it's billed as Soyuz/Apollo), along with several gifts from NASA and the Smithsonian Institution. Taking up one vast wall is a representation of the cosmos, Earth and the planets, showing the paths and orbits.
The question of hoaxes presents an interesting aspect of the UFO phenomenon. It can test the adequacy of UFO investigations and measure the powerful "will to believe" of many UFO investigators and authors. Only when, and if these lessons are fully appreciated will serious UFO investigators be able to escape the suspicion that they are often victimized willingly or unwillingly by hoaxes.

English physicist David I. Simpson enshrined some very revealing "UFO controlled experiment" hoaxes several years ago. According to his report published in the Spring 1986 issue of the Skeptical Inquirer, the tests "compared known details of fabricated UFO stimuli with the issued statements of investigators." In addition, Simpson wanted to test the abilities of UFO researchers by leaving clues that could suggest a practical solution. The hoaxes were designed to present substantial inconsistencies that would allow any moderately critical investigator to cast strong suspicion on their authenticity.

One particular experiment was performed on the evening of March 28, 1970, while a group of British UFO enthusiasts near Warminster, in Wiltshire, were watching for UFOs that reportedly frequent the region. Simpson installed a purple spotlight on a neighboring hill. As it suddenly flashed on and off, a phony "magnetic detector" sounded an alarm at the observation site. An accomplice with a camera containing preexposed film (which already showed UFO images) made several exposures of the horizon and then handled the camera—the film still inside—to a prominent UFO researcher. Simpson prepared the hoax film so that the photographed direction and appearance of the UFO were grossly at odds with what observers actually beheld. He also saw to it that the first two preexposed frames (taken almost a year earlier) showed background scenes significantly different from the two subsequent real exposures (which of course did not show any UFO). This should have been evident even to the least experienced investigator.

But no one seemed to notice (and no one even interviewed the photographer). After two months of study by top UFO experts in Europe, the photographs were declared by Flying Saucer Review editor Charles Bowen to be "genuine beyond all reasonable doubt."

One consultant reported that "there is nothing about these photographs that suggests to me they've been faked in any way whatsoever."

Ufologist Dr. Pierre Guerin, Director of research at the Astrophysical Institute of the French National Center for Scientific Research, reported that "there is no question that the object photographed was the result of faking."

An artist's impression of the UFO appeared on the cover of the July-August 1970 issue of Flying Saucer Review. It showed the object with an angular diameter ten times too large; the experts had computed that the flying saucer was 60 feet long and 30 feet in diameter.

Eyewitness accounts described how the UFO—purple fringed with white, having a crimson light in the middle—hovered for a moment and then moved toward Warminster before stopping again. All estimates of direction and duration were significantly erroneous, and the errors accumulated as time passed. (Later the object was described as giving off ultraviolet light and being surrounded by a ruby-red halo.)

Simpson's critique of the "investigation" which he allowed to continue for two and a half years before revealing the hoax was devastating. My experiences in the UFO field have shown that the investigative incompetence demonstrated by this particular experiment for being exceptional is typical. Occasionally individuals with relevant technical backgrounds become involved, it is disturbing to witness the abandonment of their mental disciplines and common sense. It over there is subtle evidence suggesting extraterrestrial visitation. It is unlikely that it will be discovered by a typical ufologist.

Some UFO hoaxes start out as impulsive pranks rather than as carefully

Continued on page 114
FEMINISM AND THE BRAIN

Not so long ago a prestigious psychology journal immortalized this strange theory: Sex hormones exert mysterious effects on the balance between our sympathetic (active) and parasympathetic (inhibitory) nervous systems. Womanly estrogen, the article claimed, favors the sympathetic nerves, and that explains why females are so good at "simple, overlearned perceptual-motor skills," like typing. Testosterone, the macho hormone, boosts parasympathetic activity, so men are at their best with "perceptual-restructuring tasks." Read all higher intellectual functions.

That was in 1968, more than two millennia after Aristotle pondered whether women had souls and concluded they did not. Since females consistently outshine males at verbal ability, the authors of the sympathetic/parasympathetic manifesto were forced to dump reading and writing into the simple-motor-skills basket (planning Pride and Prejudice must have required exquisite manual dexterity we assume). In that same year a male writer wondered in print whether woman might be the missing link in evolution—midway, presumably, between Java Man and a Green Bay Packers fullback.

This is an old and sorry tale. In the days when women were believed to possess diminutive frontal lobes, articles surfaced extolling these parts of the brain as the headquarters of human reason. Later, females turned out to be in no way unendowed in the frontal-lobe department and scientists shifted to the parietal lobes as the locus of all smarts. Today the notion that sex differences lurk in our brains makes a feminist cringe. And why not? No matter what data are unearthed, brain research has had a long, inglorious history of coming up with the same conclusion: Men are superior, and women are inferior.

Yet this is not a rallying call for an end to sex-linked brain research. There are differences between the male and the female brain. But because of brain research's male-chauvinist past, some conscientious scientists are feeling a subtle but unmistakable pressure. Their work runs the risk of being judged sexist, even though they themselves may be feminists.

For instance, Sandra Witelson, a psychologist at McMaster University, in Hamilton, Ontario, has observed that the sexes seem to make unequal use of the two halves of the brain. Females tend to shine at verbal, analytical left-hemisphere skills, males at the visual, spatial right-brain side of life. But Witelson is clear about raising feminist hackles: "The people who are upset by this are those who think males and females are the same. It would be very surprising if they were the same."

University of California, Santa Barbara, anthropologist Donald Symons wonders further into choppy waters: "I'd expect parts of the brain—like those concerned with sex and nurturing—to be as different in men and women as their genitals."

Anticipating feminist grills, he points out that his theory of male-female mating strategies (see the March 1981 Omni interview) is less flattering to the female sensation-seeking male.

Why should gender creep into our brains? Well, we've learned that the developing human fetus responds to its own sex hormones early in utero life, and that it is these hormones not an XX or XY chromosome that turn us into girls or boys by the time we're born. And the prenatal chemicals don't just sculpt our genitals. They also shape the brain. We know this because female monkeys exposed to male hormones in utero are born with masculinized genitals, and—here's where the brain comes in—they also act like males with their unladylike rough-and-tumble play. This sex-changing behavior also happens with hormone-treated rodents. And yes, even with Homo sapiens.

Girls born with a condition called adrenogenital syndrome are flesh-and-blood examples of the handshake of sex hormones. Masculinized before birth by a hereditary chemical defect, these girls are given a completely feminine appearance nowadays with surgery and hormone injections. But their behavior betrays the prenatal male-hormone influence on the brain, says medical psychologist John Money of Johns Hopkins University. Though raised with the same sugar-and-spice expectations as other American girls, adrenogenital girls nearly always turn out to be hard-core tomboys, preferring rowdy sports to dolls, and dreaming of careers rather than of Tupperware.

So how do we handle all these new data? We shouldn't use them to shore up ancient male-supremacist doctrines. Neither should scientists be inhibited in their research by feminists fearful of the results, for it will serve neither sex to deny the growing evidence of masculinity and femininity within the brain. After all, as UCLA neuroscientist Roger Gorsky put it, "I've always said the brain is a sex organ anyway."—JUDITH B. HOOPER
REAGAN'S JELLY BELIES

Now another chapter in the fracas caused by President Ronald Reagan's jelly bean habit. The American Medical Association has endorsed the Chief Executive's candy saying it poses "no harm" in moderation.

Philip L. White, the AMA's nutrition expert, said the candies contain sugar, corn syrup, dextrose, and corn starch—all carbohydrates, a basic dietary component. While admitted that many people already eat too many carbohydrates, he noted that the President eats jelly beans, which are about half the size of jelly beans. Each has only five to ten calories. Thus, eight or ten candies daily will add little to one's calorie intake.

The AMA endorsement pleases the candy industry—jelly bean sales are booming—but it displeases some dental and nutrition experts. "It's self-indicating that the nation's largest medical association makes a special effort to endorse candy," Michael Jacobson, head of the Center for Science in the Public Interest, a nutrition group, charges. "When was the last time they endorsed a nutritious food like collard greens or chicken?"

The AMA counters that any sugar laden food, including raisins, can cause cavities and urges candy eaters to brush thoroughly after consuming. "White calls Reagan's habit 'innately human,'" Jacobson retorts. "How can you tell kids not to eat candy when the President flaunts it?" And the American Society of Dentistry for Children asked Reagan to go easy.

For the savants: jelly beans, the bases, have hardly changed in 50 years. Things may not remain so much (longer). A Japanese sporting-goods firm, the Mizuno Corporation, has taken a new look at old products and come up with some new designs.

Prototype have been developed for all these products, they were dispensed to major league players during spring training this year.

On the drawing board are some even more futuristic designs: a strike-zone sensor to distinguish automatically between a strike and a ball, and an electronic foul line to tell a fair ball from a foul. Working in tandem with the Japanese electronics industry, Mizuno expects to produce workable models during the coming year.

Mizuno has been demonstrating its standard products at spring training camps for the last five years. Some 400 pro ballplayers have already switched to its long-lasting soft-leather glove, which needs no breaking-in. This year's look at the future of baseball equipment was unveiled as part of the Japanese company's $3 million R&D program. —Dan Ross

Reagan and jelly beans: Flavoring in the center as well as the shell—and an endorsement from the American Medical Association.

FUTURE BASEBALL

If Ty Cobb were to come back to life and step onto a baseball diamond, he'd still feel right at home. Baseball gloves and shoes, and even the bases, have hardly changed in 50 years. Things may not remain so much longer.

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ANIMAL REVENGE

For centuries Homo sapiens has been ravaging his habitat. Now the world's animals are striking back.

In Cambridge, Maryland last year sea gulls dented cars by bombing a new parking lot with oyster shells. The lot had replaced their nests. Near the Japanese island of Iki dolphins forced fishing boats back to port after the crews had killed 200 of the sea mammals. In Bangladesh 1,000 poisonous vipers invaded a village, sending people rushing for safety. A road crew had disturbed the snakes' nests.

Each spring half a billion blackbirds cause damage amounting to millions of dollars by eating corn, grapes and other crops, as well as suburban and urban plants. In Pennsylvania the sortie caused $15 million in crop damage in 1978 alone. The National Wildlife Federation says drainage of wetlands and clearing of forests are forcing the birds to feed in the habitat that people have created for themselves.

Perhaps taking a cue from Alfred Hitchcock, some of the most common spring birds— including robins, larks, grackles, and crows—are on the attack. Individual insults also bring retribution. In Virginia, a prankster put an opossum in a public mailbox, and the animal reacted by chewing up 40 letters. In Tokyo a crow became tangled in power cables, electrocuting itself, but also causing a short circuit that halted 20 trains for an hour.

But some people are trying to make amends. Last winter for example, a woman from Kennebunk, Maine persuaded Delta Airlines to fly according to a report by two top English policemen who claim that rapid advances in technology will end crime as we know it.

Chief Superintendents Keith Hollawell and Alan Charlesworth claim that people will do all their work at home, using computers and closed-circuit television so that they'll hardly ever need to go outdoors and subject themselves to the criminal element. And when they do leave their homes, they'll be surveyed by scanning devices and orbiting satellites that will spot any criminal activities.

Those enterprising criminals who do manage to break the law despite such handicaps can expect severe penalties. The report forecasts that, with no personal at home. The ultimate punishment would be a withdrawal of life-support systems.

Hollawell and Charlesworth also predict that inflation and devaluation will ruin most people's commodities thereby precluding theft. Personal wealth will be measured by the amount of leisure time someone possesses.

At the end of the report Hollawell states, "Perhaps historians will see our present stage of existence as a very early development stage of technological man." — John Giatt

CRIME'S TIMELY DEMISE

One hundred years from now the world's police forces might well be superfluous.

Security guard monitors consoles of closed-circuit TV screens. An explosion of this technology may help eliminate crime in 100 years.

"A Potpourri of Bollow Fruptions" — Title of paper delivered at a dermatologists convention
FERTILITRON

A watch-sized device that will tell a woman when she can become pregnant is being developed by a New York firm.

Richard Lester, president of Intertronics, Inc., said the still-to-be-tested device called the Fertiltron would monitor minute changes that occur in a woman's body when she ovulates. By pressing the back of the insulated watch against her wrist, a woman would obtain a reading from a microcircuit sensor. The Fertiltron would flash a red or green light informing her she is either fertile or infertile.

"Apparently no one knows why, but a woman's body voltage changes slightly, as does the polarity of the charge," Lester said. "Accurate sensors can detect this almost infinitesimal change. It's an automatic way of telling her when she can become pregnant, and it would still give her time."

While the Fertiltron is still being developed, Lester said another device invented by his company may be ready this year. Called SafeTime, it is a tampon with a microprocessor sensor that reads a woman's body-temperature change when she ovulates. "It will let a woman know when she cannot become pregnant," Lester said.

The idea for both devices, he noted, came from a conversation he had with a gynecologist. "He said it would be nice if women had a quick, automatic way to monitor the changes that occur during ovulation. Right now they have to take their temperature regularly during the period in question, read it, and so on."

Either instrument will sell for about $100 apiece.

On one level, Dr. Rozin says the hot chili is part of Mexican food's identity, what he calls traditional flavoring. Beyond this, chili peppers are rich in vitamins A and C otherwise not present in the Mexican diet. At any significant degree they aid digestion by stimulating gastric secretion and salivation and in the torrid Mexican climate, even help cut in cooling off the body by causing the face to sweat.

Also, Rozin suspects, the luck of the hot pepper may trigger the release of endorphins—natural opiates in the brain—into the system of the chili eater.

Finally, Rozin points out that Mexican cuisine has one thing in common with others that use hot spices. It uses chili peppers to give some zing to otherwise bland staples.

KITE FREEDOM

Many kites went up into the air instead of into the sky after the publication of several stories about the trouble some kite flyers got into for allegedly flouting Federal Aviation Administration (FAA) regulations.

Despite these stories it's all right to fly a kite almost anywhere "All of those stories are in error," said an FAA spokesman. "A sheriff in California arrested some kids for flying kites near an airport, saying it's against FAA regulations. It's not."

"FAA regulations don't prohibit a kid from flying a normal kite for recreational purposes anywhere. Section 101 of the Federal Aviation Regulations applies to manned balloons and kites weighing more than five pounds. Those can't be flown in restricted areas without permission, higher than five hundred feet, or less than five hundred feet from the base of a cloud."

Large kites of this type also require bright lights if they are flown at sunset or sunrise.
ENERGY-INTENSIVE LAWNS

An intensive study of lawns in Maryland has come up with a surprising result. It takes twice as much energy and resources to keep a typical lawn green as it does to grow farm crops, such as corn and tobacco.

John Falk, a scientist at the Smithsonian's Chesapeake Bay Center for Environmental Studies, found that a well-kept lawn 11 meters square requires 173,000 calories of food equivalent in labor water fertilizer and other resources each year. With half as much energy in the same space, a house could grow 150 pounds of tomatoes, 87 pounds of cucumbers, and 208 pounds of potatoes, according to government figures.

A lawn produces more new plant material each year than a tall grass prairie or coniferous forest. Falk said he added that the 30 million acres of U.S. lawns total an area the size of Indiana—a tenth as large as all farmland under cultivation.

Falk, who has studied lawns for a decade, traces their proliferation to "affluence, technology and conspicuous consumption" in the last 100 years. Advances in farm technology liberated soil for other uses. And scientists spurred by the golf industry developed grass strains that satisfied the aesthetic desires of the burgeoning middle class.

But he also found that, though lawns for the masses are new, the desire for lawns is ancient and has a place in evolution. He said there is evidence the hanging gardens of Babylon were actually a lawn. The village green was the traditional site of tournaments and many cultural events. The lawn's smoothly rolling contour surrounded by trees and bushes resembles the African savannah where some anthropologists place the origin of the human race.

"The effort to understand the universe is one of the very few things that lift human life above the level of farce and give it some of the grace of tragedy."

—Stuart Diamond

PET NEUROSES

Dr. Victoria Voith has had a 90 percent success rate in treating her neurotic patients yet not one has said so much as thanks—mostly because they're all animals.

Dr. Voith is director of the Animal Behavior Clinic, part of the University of Pennsylvania's Center for Interaction of Animals and Society and for the past two years has been working with people (the clients) and their pets (the patients) to solve the animals' behavior problems.

The two most common neuroses are biting and eliminating when they are not supposed to. And there are other more peculiar problems, like the Old English sheepdog that was terrified of thunderstorms and would crash through closed windows and glass doors at the first thunderclap.

Therapy usually consists of three one-hour sessions with as many of the family members participating as possible. One solution, in the case of a Doberman pinscher that kept snarling at its owner involved teaching the person how to reestablish dominance over the animal by training it to assume submissive positions stay sit lie down, etc. To solve other problems, Voith may work with the animal itself. For the nervous sheepdog she used the classic desensitizing methods developed to treat human phobias. She played progressively louder recordings rewarding the dog for tolerating the noise each time, until she built up to the real thing.

Since roughly one fourth of animals brought to local pounds to be destroyed each year are turned in because of behavioral problems, Dr. Alan Beck, the center's director, points out that the clinic is a humane idea.

"Science clears the field on which technology can build."

—Werner Heisenberg
LAUGHING GAS HAZARDS

Dentists who are too liberal with laughing gas may be endangering their own health. A Stanford University study of 42,000 dentists and dental assistants has found that heavy dispensers of nitrous oxide are four times more likely than their nonusers to feel neurological aftereffects numbness muscle weakness or tingling itters.

Some earlier medical detective work by San Francisco's Dr. Robert Leyer on "laughing gas junkies," dentists who end each day with long chuckles instead of dry martinis, prompted the mass investigation. Stanford's Dr. Jay Brodsky began his recent huge study not as a direct for laughing gas abuse but as an attempt to assess the anesthetic's more general occupational hazards. The anesthesiologist's results indicate that up to 12 out of every 1,000 dentists and dental assistants who have administered more than 3,000 hours of laughing gas may suffer neurological impairment.

Sustained exposure to a few parts per million of laughing gas in the office air, however, is far less damaging. Dr. Brodsky cautions, than the massive doses that nightly abusers absorb.

And the Stanford physician also emphasizes that there's no cause for patients to worry unless they've been in the chair for more than 3,000 hours. In that case, they've got other problems.

But Brodsky does feel that some dentists might stop unwarranted use of nitrous oxide in cleaning teeth, for example, and make sure that their air scavengers are working.

— David Monagan

GRASSOHOL

A Florida utility company now burns oil worth $37 a barrel and marijuana worth $220,000 a barrel.

Florida Power and Light Company has agreed to take 600 tons of marijuana confiscated in that state each year by the U. S. Customs Service, shred it and mix it with oil at the utility's Port Everglades generating station. The drug produces power that is then fed into the southern Florida electrical grid.

"It started out as a big joke" said utility spokes-woman Mary Ann Linden. People referred to it as glasshole. But we look at it as a service to the taxpayer. We're happy to help as much as we can.

And in fact the dope helps. At the first burn, past January five tons of marijuana, with a $3 million street value, produced as much energy as 13.66 barrels of oil. The utility's engineers calculated that 732 pounds of pot yields the energy in one barrel of oil. Thus, the January burn packed enough energy to power all of southern Florida for 4.4 seconds. On a yearly basis the 600 tons of the stuff confiscated will replace enough oil to power southern Florida for 8.8 minutes.

Of course, for equivalent energy the marijuana costs $218,519.33 per barrel, but no one pays it except the smugglers who had brought it in. The Customs Service, which for years struggled to find a suitable disposal method now saves $25,000 each year in incineration costs, because the utility does it free.

Florida Power and Light and its customers have saved $60,000 in imported oil. And a lot of people don't get stoned.

Ms. Linden said the utility has received inquiries from power officials and legal authorities throughout the world who want to duplicate the procedure. She said there is no pot smell, because the power plant's 400-foot stacks propel the smoke ten miles out over the ocean. But U.S. Customs official Mark McCormack had a warning for marijuana growers who claim they were just growing their own power. We would consider that an illegal use. Marijuana is not a legal product at this point...— Stuart Diamond

"I hold that man is right who is most closely in league with the future" — Henrik Ibsen
KITE SAILS

Flying a kite may become a routine duty for crews of large, oceangoing tankers. Professor Glen Schaefer and Keith Allsopp of Cranfield Institute of Technology, in England, calculate that big ships could increase speed and save fuel if they were towed by vast kites giving auxiliary power to their main engines.

Ship owners bedeviled by rising energy costs are warming to the idea of rigging ships with masts and sails to save fuel. A Japanese tanker rigged in this way is already undergoing her trials.

Schaefer and Allsopp argue that masts and sails clutter useful deck space and make shape roll, sometimes dangerously. One solution is to do away with masts and transfer the sails up into the sky as diamond-shaped kites — as large as 3,000 square meters — made of tough new materials at the end of strong towing lines.

The kites should be more effective the higher you fly it, because wind speed increases with altitude. Winds also veer with height. At some altitudes the trade winds blow in exactly the opposite direction from which they blow at sea level. So increased energy better stability, and greater flexibility await the kite flyers, who can probe the heights with plot kites to find a favorable wind just as sailors once plumbed the depths of the sea with a lead.

Schaefer and Allsopp believe that sophisticated kite sails, using modern aerodynamic principles and remote control, could add as much as 40 percent to a ship's speed.

The two scientists have used a 50-square-meter kite to tow a 10-meter cabin cruiser in the English Channel — 77 years after the Texas-born aviation pioneer Samuel Cody used a box kite (FWS) and the U.S. Department of Agriculture (USDA) have been looking for more selective weapons. Now they think they've found two of them: a rubber collar containing 1080 and a shaggy 100-pound dog from Hungary, the Komondor (plural, Komondorok).

The collars are not put on the Komondorok but on a small number of sheep or goats in a herd. When a coyote bites any of these livestock on the neck which is its usual target, it attacks the rubber pouch containing 1080 is pierced and the predator receives a lethal dose. The FWS has tested the collar on Western ranches with results that range from fair to spectacular.

"The collar is a sort of tool of last resort," says Guy E. Connolly of the FWS. "You use it when you've already tried everything else." Since 1080 is still banned except for research, the collar can't be used by livestock owners.

There are no restrictions on the Komondor, and there are about 1,000 of them in this country, most doing guard duty against coyotes in Hungary. they're used to guard sheep from wolves. A survey of Komondor owners by the USDA's sheep experiment station in Dubois, Idaho, shows that most give their dogs high marks.

"There are dogs that are literally keeping people in the livestock business," says Jeffrey S. Green of the station. Research at the Dubois installation indicates that for the best results Komondorok should be raised with their charges. — Barbara Ford

"In the final analysis, randomness, like beauty, is in the eye of the beholder."

— R. W. Hamming

COYOTE DETERRENTS

Can collars and Komondorok keep coyotes away? Coyotes usually dine on rodents, but occasionally a coyote takes a liking to lambs or other livestock.

Western farmers and ranchers fought the coyote with baits laced with a poison called 1080 until 1972 when the use of the substance was banned on federal lands. Ever since then the U.S. Fish and Wildlife Ser-

Sheep models the latest poisonous rubber collar Coyotes are in for a rude surprise when they go for the necks of these animals.
**AIR FORCE SHUTTLE**

The Air Force is already planning a second space shuttle, a smaller version that could take off like a orbit-manned spaceship. Working independently, both aerospace companies came up with a small delta-winged vehicle with a projected lifetime of 500 to 1,000 missions, versus the 100 mission life of NASA's space shuttle. The Rockwell minishuttle would take off from an ordinary runway using air turborockets while still in the atmosphere. Boeing would launch its spacecraft from a rocket sled. After the initial stages, both craft would rely on advanced versions of the space shuttle's main engines to reach orbital velocity and altitude.

When can we look for this newest addition to our space fleet? Probably not much before the year 2000. If then, The Air Force wants to examine other alternatives and study the possible uses for such a vehicle. — Nick Engler

**SATELLITE TAX AUDIT**

The Chilean government has found a new use for Landsat satellite images—tax collection. According to recent disclosures by the director of Chile's National Revenue Service, the satellite's remote sensing is being used to maintain surveillance on an area of some 650 square miles in one of Chile's richest agricultural regions.

The authorities believe that farmers are evading some $300 million in taxes each year. Agriculture represents nearly 10 percent of the Chilean economy, yet it accounts for only an estimated 4 percent of total tax revenues.

The sensors of Landsat 3 cover the same spot every 18 days, photographing various crops, fields, and forests. The color-coded images identify such crops as wine grapes, fruits, and grains. These images are later transmitted to a receiving station in Brazil. The magnetic tapes are forwarded to Canada for interpretation and then are returned to Chile.

The Chilean taxmen expect to recover at least $200 million from undeclared taxes in the agricultural sector and this will more than cover the $200,000 annual fee that a foreign country must pay the United States for using the satellite. Director Felipe Lameara also disclosed that the use of Landsat was part of a pilot project currently being tested. If the data supplied by the satellite don't quite match the amount of taxes declared by the farmers, special teams of investigators will be sent to the area and severe sanctions will be imposed on those caught cheating.

— Antonio Huneues

*Photograph of Chile's National Revenue Service is buying U.S. satellite imagery to tax-audit that country's farmers*
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BECAUSE FACT IS A PLACE FICTION HAS ALREADY BEEN.

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BECAUSE THERE'S NO COMPETITION FOR THE RIGHT IDEA.

It isn’t going into space that has you reaching for the Drama-more. Before NASA retired the shuttle, it had gotten to be almost routine. There’s just something about being dropped by the cargo plane in midair. Those moments of free fall before the cable catches you for the real trip to space are nerve-tingling, not like being in orbit at all.

The loud metallic clankings don’t help. The passenger capsule is being locked securely to the flatbed SST that will carry it to the edge of space, the streamlined fairings are being latched into place. It still sounds as if the capsule is being battered apart.

At the front of the 20-meter-long capsule, the crew sit in their tiny control room; they won’t have much to do until the transport plane falls away and they maneuver to meet the cable’s grapple-craft when it drops in from space. Around you, the 29 other passengers in the full capsule sit and fidget. The Mach-3 trip to the space elevator is about to begin.

It was Konstantin Tsiolkovsky, the Russian space pioneer, who first understood that multistage rockets could carry us into space. Years after his death, this insight brought him fame as the Father of Space Travel.

But few people remember Tsiolkovsky’s second idea. Someday he said, we might erect a skyhook, a cable into space, and climb

PAINTING BY DEAN ELLIS

HIGH WIRE ACT

Really cheap space transport won’t use rockets, for that we need a cable car to the stars

BY ROBERT L. FORWARD AND HANS P. MORAVEC
it as would a beanstalk. Years later Yuri Artsutanov suggested that a shorter cable, rotating around its midpoint, might hurl objects into space like David releasing a stone with his sling. Now that we are accustomed to rockets, these concepts sound outlandish at best. Yet practical-minded engineers are starting to take a closer look at them.

Trouble is, rockets are expensive and wasteful. Most of their fuel goes to prevent them from failing, relatively little actually carries them farther from Earth. The space shuttle is reusable, and so it cuts our equipment costs. Still, it uses up a lot of fuel. For really cheap space transportation we will have to do away with rockets entirely. The skyhook or the rotating space elevator could be what replaces them.

Some 36,000 kilometers out we have put dozens of satellites into so-called geosynchronous orbit. At that distance, it takes a satellite 24 hours to complete its orbit, exactly as long as it takes our planet to rotate underneath it. On Earth, it looks as though the satellites stay fixed in the sky above the equator while the stars slowly pass from east to west.

Suppose one of those satellites carried a cable-making machine. If the cable were strong enough to support its own weight, it could extend all the way to the surface. For balance, the satellite would extrude another cable upward. The cables would be tapered, thin at the ends and thicker near the satellite, to support the weight below and counteract the centrifugal force above. At full length, the upper cable would be 110,000 kilometers long.

If the extrusion rates were carefully controlled, the pull of the cables on the satellite would cancel out and the cable machine would remain in synchronous orbit. The bottom end would eventually be attached to the ground, the outer end to a counterweight, probably a small asteroid. Gravity and centrifugal force would hold the cable exactly vertical.

Theoretically all there is to a skyhook. But an Earth skyhook would be an engineering marvel. Building the 36,000 kilometer-long segment down to the planet would be equivalent to erecting a suspension bridge around the equator. To finish the section in five years would mean building 20 kilometers of cable each and every day. To lift appreciable loads—say 100 tons at a time—the skyhook would have to weigh 600,000 tons.

To get up the cable, we'd use electric cars. For smaller cables, they would climb up the outside. For a greater carrying capacity we might arrange several in a hollow square. The cars would then climb inside the structure like a standard elevator inside its shaft. To make their trip in six hours or less, the cable cars would have to travel at 6,000 kilometers or more per hour. At that speed, rubbing or rolling contact would cause an instant catastrophe. The cars would be propelled by magnetic levitation instead of by wheels.

Each car would consume only a few dollars' worth of electricity per kilogram—far less than the cost of rocket fuel. If a car traveled beyond the central station in a geosynchronous orbit, it would be pulled along by the cable by centrifugal force, like a skater at the end of a crack-the-whip. The cars would have to break to keep from flying out too fast. If the brakes were used to turn a generator, they could provide energy to raise the next cable car.

And you would want to go out beyond the central station. As the cars climb, the cable's rotation would carry them horizontally through space at ever higher velocities. An object dropped from the cable during the first few kilometers of its trip would fall nearly straight to the surface. As the car climbed higher the impact point would migrate eastward. Dropped from 25,000 kilometers or beyond, the object would shoot past Earth's horizon and go into orbit. At the central station, 36,000 kilometers out, skyhook payloads could simply be floated out of the car to become synchronous satellites.

But move still farther out. At the ballast stone the cable car would be 150,000 kilometers from the center of the earth and moving horizontally at 11 kilometers per second. Let go of the cable and the car—now turned spacecraft—could coast all the way to Saturn on a minimum-energy orbit. The trip to all the nearer planets would be much quicker.

It may be a long time before we can build a skyhook here at Earth. The skyhook would require an unusual material something both strong and light. Even the best steel would be too heavy for an Earth-based skyhook. But crystalline graphite could handle the load. In theory it is 20 times as strong as conventional steel yet only one fourth as dense. A cable one centimeter square with the strength of crystalline graphite whiskers could lift 210 tons here on Earth.

Partially crystalline graphite fibers in plastic are the wonder material of aerospace and sports-equipment manufacturers. Their high strength and low weight make them ideal for tennis rackets, golf clubs and the like. And the space shuttle's main engines are extremely light because they were built using graphite fibers where otherwise the temperature would permit.

A crystalline graphite cable one centimeter square would weigh about 220 kilograms per kilometer of length. A piece nearly 1,000 kilometers long could support its own weight in Earth's gravity field. If the cable were built with a tape that thick at its supporting end, it could be much longer. With a tape of ten to one, a graphite cable could be built all the way in synchronous orbit and beyond.

But for the moment we don't know how to weave a large graphite cable with the strength of tiny whiskers. Today's graphite fibers are strong, but only one tenth as strong as theory postulates. Even at that, however, they are more than strong enough to build skyhooks on the moon and Mars.

A skyhook for Mars would be far easier. Mars rotates nearly as quickly as Earth once every 24 hours, but its gravity is less than one tenth as strong as Earth's. A skyhook at Mars capable of lifting 100 tons would mean only 1,000 tons. Mars even offers a 21-kilometer-high mountain, Mons Pavonis, on the equator and a small moon, Phobos, in almost the right orbit to act as a counterweight.

And the new version of the skyhook supplies the space elevator uses a much shorter cable that should be still easier to build. The space elevator rotates in orbit, the ends of the cable touching down near Earth's surface. One design calls for a cable 8,500 kilometers long, its central portion circling the earth every 183 minutes, in an orbit 4,250 kilometers high.

The long cable would rotate once every 122 minutes, like two spokes on a bicycle wheel. With the imaginary rim rolling along the surface below, three times each orbit once every 61 minutes. One end of the cable would touch down into the upper atmosphere. These entry points would be the elevator's ports of departure.

The bodies involved are so large that the ends of the cable would seem to come down only very slowly. But there is more to it than a rigid cable. Under maximum load graphite could stretch by nearly 2 percent of its total length—about 60 kilometers for the section of cable out to the midpoint. This means that a coupling vehicle could fly the cable's end to the rendezvous ahead of its nominal touchdown time and delay its return to orbit. This would allow almost a full minute to meet the transport and to exchange capsules carrying cargo and passengers.

The three-touchdown space elevator would need a taper of about 12 to 1. A cable with a mass of only 7,500 tons could lift a 100-ton cargo into space. At touchdown, the end of the cable would approach and leave Earth at 14 gravities—not comfortable, but much gentler ride than astronauts endure on the shuttle.

It would be even more practical on the moon. A lunar space elevator could be
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made with materials like the superplastic Kevlar which has about five times the strength to weight of steel. Kevlar is now used in such products as bulletproof clothing, racing tires, and parachutes. A 3,700-ton space elevator at the moon could lift and deposit 100 tons every 20 minutes, subjecting payloads to a maximum acceleration of only 0.86 g.

Rotating space elevators could be used on any of the solar system's moons. Jupiter's Ganymede and Saturn's Titan are larger than Earth's moon, but a Kevlar space elevator with a tendon of six to one could serve either of them.

Spinning cables orbiting the sun between the planets could act as shuttle points, cutting the travel time between any two places in the solar system. Instead of going slowly off to a distant planet on a path calculated to save energy, the capsules would head at high speed to the nearest transfer cable. Approaching the cable, they would attach themselves to the point along the spinning thread that matches their approach velocity. Then move along the cable to a position with the velocity needed for the next leg of their journey. After a short wait for the cable to rotate toward the departure point, the capsule would release itself from the cable, flying into space toward its goal.

The trip would be free. The cable would slow a lot as its energy was carried off by the disappearing capsule, then regain the speed when the capsule returned. As long as more mass dropped inward toward the sun than went out into space, the space elevator would need no energy source once it had been set in motion.

Graphite fiber technology is developing so rapidly that a rotating space cable will soon be feasible. Shortly after that we may be able to make cables strong enough to weave a stationary skyhook. Scientists are planning some shuttle experiments with tether cables up to 100 kilometers long. After that longer cables will come. Some day we may even see an international race to spin the first cable into space.

Well beyond the 50-kilometer altitude that once separated airplane pilots from astronauts, the cargo plane releases its latches and drops away as the passenger capsule soars on. If anything goes wrong, the capsule's parachutes will get you safely back to Earth. Overhead, the grapnel craft at the end of the space elevator dives downward to rendezvous with its control jets flashing to position it for pickup in order to exchange an incoming capsule for yours.

Carefully, taking their time, the crew attach the grapnel to the lifting lugs atop the passenger capsule. Upward acceleration slowly replaces free fall and the weight comes back onto your belly—just in time. In half an hour you are 260 kilometers up and moving at 9 kilometers per second. The grapnel releases, and again you are in free fall. It will be 12 hours before you get to the moon.
OMNI PROFILE

The mandarin of subatomic experimentation can make or break a theory in less than five billionths of a second

Close your eyes and think physicist. Chances are you see Albert Einstein: rumpled sweater, baggy pants, double-domed forehead, distant gaze. This image of the absent-minded theoretician today coexists with another breed of physicist: the experimentalist, surrounded by the apparatus of his laboratory, who craves hard facts rather than airy speculations.

Samuel C. C. Ting is the mandarin of modern experimental physics. His 16 years of experiments rewrite textbooks and produced a new map of the subatomic world. In 1974, for instance, Ting performed a dazzlingly complex and daring experiment at Brookhaven National Laboratory in Upton, New York. His work revealed the existence of an utterly unexpected particle, the J, which had no place in the accepted structure of the world. The experiment sent theorists rushing back to their blackboards. When the chalk dust settled, a new model for the structure of matter emerged, with the J particle as one of its cornerstones.

Ting shows an uncanny ability to devise experiments that rally or destroy the constructs of theorists. He blazes trails through the confused, complex maze of subatomic fragments where the differences between energy and matter...
grow murky and time can run backward. Each of his experiments sends a thrill of anticipation through the scientific world. Harvard University Nobel Prize winner Sheldon Glashow declares, "Frankly, experimental physics was pretty damned dull for a number of years before Ting's experiment on the J."

So important was the J particle's discovery that many physicists now refer to before J and after J, as historical eras. In 1976, only two years after he discovered the J particle, Ting received the Nobel Prize. He had just turned forty.

**BIG MONEY, SMALL TARGET**

Sam Ting dresses neatly in conservative blue business suits, white shirts, and ties that sport a regimental stripe. No fuzzy dudley physicist he! You could easily mistake him for a successful Chinese businessman. And you wouldn't be totally wrong. Either, because at Ting's level experimental physics is a multi-billion-dollar enterprise: a big business in its own right.

There is something paradoxical about the enormous expenditures of money and manpower, the gargantuan experimental engines required for Ting's brand of modern physics. It is strange that such huge investments are required to study the most minute workings of the universe. Yet physicists have long since accepted such expenditure, the larger the better the lock. This is nature's way of guarding its secrets. Vast amounts of energy both human and physical must be expended to break the lock, perhaps because we are not clever enough to pick it. But the very best and cleverest locksmith of them all is Sam Ting.

What does a high energy physicist like Ting actually do? The enterprise has been compared to a motion picture, a big budget project with years of planning and dozens of experts involved. All working to express the vision of a single auteur. "The difference is," Ting quickly points out, "that the motion picture is for entertainment, and afterwards people forget about it. We hope that our experiments will have some lasting value.

A good example of Ting's work is his current experiment at the Deutsches Elektronen Synchrotron (DESY pronounced daisy) in Hamburg, Germany. It employs 57 physicists from all over the world, as well as scores of technicians and costs in the tens of millions of dollars. And Ting's group is the smallest, using the giant electron accelerator PETRA at DESY.

The purpose of Ting's DESY experiment is to make careful observations of the transformations that matter and energy undergo in extreme laboratory conditions. Here new particles can be created, their internal structure examined, and their interactive forces measured. A high energy beam of electrons traveling at nearly the speed of light and another beam of positrons (antimatter twins of electrons) are run in opposite directions down a narrow vacuum tube. The inevitable head-on crash is arranged to occur inside Ting's experimental apparatus affectionately dubbed the Mark J by those who work the accelerator.

When these beams collide with one another, electrons sometimes bounce harmlessly off positrons. More often an electron and a positron annihilate each other in a burst of energy that can recombine into different kinds of matter. Other massive, unstable particles may be created only to decay, forming still more particles which in turn decay.

All this is noted by the Mark J as a flood of particles rushes by in about four billionths of a second (a light beam travels only 12 feet in that same time). Each event must be sifted, recorded, and interpreted. It is like re-creating the blueprints for a hand grenade after having observed only the pattern of its exploding fragments.

That any of this is possible remains a minor technological miracle. Ting's experiment at DESY is already producing some very impressive results.

Last summer for example the Ting contingent discovered a stunning clue to the fundamental binding force of nature: the power that holds all subnuclear particles together. According to current belief—current mythology as theorists like to say—all particles are composed of a few more fundamental particles called quarks. Combinations of the five known types of quarks create the hundreds of subnuclear fragments that underpin the universe.

There are two experimental problems. First, no one has ever seen a free quark. Plenty of evidence exists that quarks tangle around inside protons, but so far they have resisted all attempts to be shaken free. Something does an exceptional job of holding quarks together and this brings us to the second problem. What is the force that does the binding? Current mythology says that another particle, called the gluon, acts as a glue to hold quarks together. It's a nice theory, but until Ting stepped forward there was hardly a shred of evidence for gluons existed.

When an electron and a positron collide theory says their energy is sometimes converted into another particle that consists of a quark and an antiquark bound together by a gluon. The particle lives briefly then decays throwing fragments everywhere. Sometimes these fragments concentrate in two narrow jets indicating that the parent particle had consisted of two components. But what Ting and others at PETRA saw was somewhat different. Mixed in with two jet events and other phenomena were very rare three-jet events. The fragments of the decaying particle arranged into three almost parallel prongs, pointing away from one another like the spokes of a Mercedes-Benz insignia. One spoke was presumably caused by a quark, the second by an antiquark, and the third smaller spoke by a gluon.

Ting explains that this is one possible interpretation - I don't think you can guarantee that in a few years there won't be a different explanation for this phenomenon" he says. In dealing with subatomic experimentation, he says, the explanations one chooses derive from current mythology Einstein once said, "It is theory that decides what we can observe."

Still Ting is highly skeptical of theory and of theorists. He likes to remind us that theorists are useful people to talk to. "As long as you don't believe them you'll be all right."

If it holds up, Ting's discovery of the gluon will be an event of first importance. There is even talk of another Nobel Prize. The physicist is unimpressed with this, "It is not the business that I am in. I am interested in accomplishing something in the area of my excitement."

What would Ting do with this? He believes that theoretical physicists are the ones who will eventually make use of the new understanding of the world. For Ting, this is just business as usual.

Some of his discoveries have been special to him, though none more so than the first sighting of the J. When Ting began doing his experiments a decade ago high-energy physics was still a relatively modest enterprise. For instance, it took only four people to design, build, and interpret Ting's thesis experiment at the University of California at Berkeley. The basic ideas and goals then were the same as they are now but the scale of contemporary experiments is vastly larger.

**TO CATCH A RAINDROP**

When Ting went to Brookhaven National Laboratory in 1972 with a proposal to do the experiment that would win him the Nobel Prize, he was greeted with open criticism. The experiment of all was very difficult and expensive to perform. Ting likes to explain the complexity this way. During the rainy season in a city like Boston, it's possible to catch a billion raindrops in one second. Say one of them is of a different color. We had to find that drop.

The other criticism was more pointed. Even if Ting could get his experiment to work, an eminent physicist pointed out, it would be "worthless." Ting's experiment was described as "controversial" but "worthless."
FICTION

Her diplomatic mission was a pretense to get inside the Emperor's court.

THE PALACE AT MIDNIGHT

BY ROBERT SILVERBERG

The foreign minister of the Empire of San Francisco was trying to sleep late. Last night had been a long one, a wild, not particularly gratifying party at the Baths, too much to drink, too much to smoke, and he had seen the dawn come up like thunder out of Oakland (across the Bay, now the telephone was ringing). He integrated the first couple of rings nicely into his dream, but the next one began to undermine his slumber, and the one after that woke him up. He groped for the receiver and, eyes still closed, managed to croak, "Christensen here!"

"Tom, are you awake? You don't sound awake. It's Monty. Tom. Wake up!"

The undersecretary for external affairs Christensen sat up, rubbed his eyes, ran his tongue around his lips. Daylight was streaming into the room. His cats were glaring at him from the doorway. The little Siamese... pawed daintily at her empty bowl and looked...
up expectantly. The fat Persian just sat

"Tom?"

"I'm up. I'm up! What is it, Morty?"

"I didn't mean to wake you. How was I

supposed to know one in the afternoon—"

"What is it, Morty?"

"We get a call from Monterey. There's an

ambassador on the way up, and you've got

to meet with her."

The foreign minister worked hard at

clearing the log from his brain. He was

thirty-nine years old, and all-night partiees

looked more out of him than they once had.

"You do it, Morty."

"You know I would, Tom, but I can't. You've
got to handle this one yourself. It's prime."

Prime? What kind of prime? You mean, like

great dope deal? Or are they declaring

war on us?

"How would I know the details? The call
came in, and they said it was prime. Ms.

Sawyer must confer with Mr. Christensen. It

wouldn't involve dope, Tom. And it can't be

war, either. Shit, why would Monterey want
to make war on us? They've only got ten

soldiers. I bet, unless they're drafting the

Chicanos out of the Salinas calabazas and

besides—"

All right. "Christensen's head was buzzing.

"Go easy on the chatter, Okay? Where am

I supposed to meet her?"

In Berkeley."

"You're kidding"

"Say, I won't come into the city. She thinks

it's too dangerous over here."

"What do we do? Kill ambassadors and

barbecue them? Shall I be late here and

she knows it?"

Look I talked to her. She thinks the city

is too crazy. She'll come as far as Berkeley,

but that's it."

Tell her to go to hell."

"Tom, Tom—"

Christensen sighed. "Where in Berkeley

will she be?"

"The Claremont, at half past four."

"Jesus. Christensen said. "How did you

got me into this? All the way across to the

East Bay to meet a lousy ambassador from

Monterey! Let her come to San Francisco.

This is the Empire isn't it? They're only a

stinking republic. Am I supposed to swim

over to Oakland every time an envoy shows

up and wiggles a finger? Some bozo from

Fresno says no, and I have to haul my ass

out to the Valley ex? Where does it stop?

What kind of cloud do I have anyway?"

"Tom—"

"I'm sorry Morty. I don't feel like a god-
dammed diplomat this morning."

"It isn't morning anymore, Tom. But I do

it for you if I could."

"All right. All right. I didn't mean to yell at

you. You make the ferry arrangements.

"Ferry leaves at three-thirty. Chauffeur

will pick you up at your place at three-

okay?"

"Okay," Christensen said. "See if you can

find out any more about all this, and have

somebody call me back in an hour with a

briefing, will you?"

He fed the cats, showered, shaved, took

couple of pills, and brewed some coffee.

At half past two the ministry called. Nobody

had any idea what the ambassador might

want. Relations between San Francisco

and the Republic of Monterey were cordial

just now. Ms. Sawyer lived in Pacific Grove

and was a member of the Monterey Senate

that was all that was known about her.

Some briefing, Christensen thought.

He went downstairs to wait for his chauffeur.

It was a late afternoon; bright and
clear and cool. The rains hadn't begun yet

and the streets looked dusty. The foreign

minister lived on Franklin Street just off

Coke in an old white Victorian with a small

front porch. He sat in on the steps lean-

ing wide awake but surly and a few minutes

before three his car came pull-up-putting up

a venerable gray Chevrolet with the arm of

imperial San Francisco on its doors. The

driver was Vietnamese, or maybe. The

Christensen got in without a word, and off

they went at an imperial velocity through

the virtually empty streets, down to Haight

eastward for a while, then onto Oak up Van

Ness past the palace where at this momen-

t the Emperor Norton VII was probably

taking his imperial rap, and along Post and

then Market to the ferry slip.

The stump of the Bay Bridge glittered

magically against the sharp blue sky. A

small power cruiser was waiting for him.

Christensen was silent during the slow
dull voyage. A chill wind cut through the

Golden Gate and made him huddle into

himself. He stared broodingly at the low
rounded East Bay hills, dry and brown from a

long summer of drought, and thought about

the permutations of fate that had transfor-

mated an adequate architect into the barely

competent foreign minister of this barely

competent little nation. The Empire of San

Francisco, one of the early emperors had said

is the only country in history that was deca-

dent from the day it was founded.

At the Berkeley marina, Christensen told

the ferry skipper, "I don't know what time I'll

be coming back. So no sense waiting. I'll

phone in when I'm ready to go."

Another imperial car took him up the hill-

side to the sprawling nineteenth-century

splendor of the Claremont Hotel, that vast

annuitant survivor of all the castles. It was

seedy now the grounds a jungle. My

almost to the tops of the palm trees, yet

it still looked fit to be a palace with hun-

dreds of rooms and magnificent banquet

halls. Christensen wondered how often

if had guests. There wasn't much tourism

these days.

In the parking plaza outside the entrance

was a single car, a black-and-white Califor-

nia Highway Patrol job that had been deco-

rated with the insignia of the Republic of

Monterey a contorted cypress tree and a

sea otter. A uniformed driver lounged

against it looking bored. "I'm Christensen",

he told the man.

"You the foreign minister?"

"I'm not the Emperor Norton!"

"Come on. She's wailing in the bar."

Ms. Sawyer stood up as he entered—a

slender dark-haired woman of about thirty

with cool green eyes—and he flashed her a

quick, professional cordial smile which

she returned just as professionally. He did

not feel at all cordial."

"Senator Sawyer," he said. "I'm Tom

Christensen."

"Glad to know you. She pivoted and

gestured toward the huge picture window

that ran the length of the bar. "I just got

here. I've been admiring the view. It's been

years since I've been in the Bay Area."

He nodded. From the cocktail lounge

one could see the slopes of Berkeley the

bay the rumed bridges the still-imposing

San Francisco skyline. Very nice. They took

seats by the window, and he beckoned to

a waiter who brought them drinks.

How was your drive up?" Christensen

asked.

"No problems. We got stopped for

speeding in San Jose, but I got out of it."

They could see it was an official car but

they stopped us anyway."

"The lousy bastards. They love to look

important."

"Things haven't been good between

Monterey and San Jose all year. They're

spying for trouble."

"I hadn't heard. Christensen said."

"We thought they want annex Santa Cruz.

Naturally we can't put up with that. Santa

Cruz is our buffer."

He asked sharply. "Is that what you came

here for to ask our help against San Jose?"

"She started him in surprise. Are you in

a hurry, Mr. Christensen?"

"I'm not particularly."

"You sound awfully impatient. We're still

making preliminary conversation, having a

drink two diplomats playing the diplomatic

game isn't that so?"

"Well?"

"I was telling you what happened to me

on the way north. In response to your

question. Then I was filling you in on our

current political developments. I didn't expect

you to snap at me like that."

"Did I snap?"

"It certainly sounded like snapping to me,"

she said with some annoyance.
Christensen took a deep pull of his bourbon-and-water and gave her a long, steady look. She met his gaze imperturbably. She looked composed, amused, and very, very tough. After a time, when some of the red haze of irrational anger and fatigue had cleared from his mind he said quietly, "I had about four hours sleep last night and I wasn't expecting an envoy from Monterey today. I'm tired and edgy and if I sounded impatient or harsh or snappish, I'm sorry."

"It's all right. I understand."

Another bourbon or two and I'll be properly unwound," he held his empty glass toward the half-empty water. "A refill for you too?" he asked her.

"Yes. Please." In a formal tone she said, "Is the Emperor in good health?"

"Not bad. He hasn't really been well for a couple of years, but he's holding his own and President Morgan?"

"Fine," she said, "Hunting wild boar in Big Sur this week."

"A nice life it must be, President of Monterey. I've always liked Monterey. So much quieter and cleaner and more sensible down there than in San Francisco."

"Too quiet sometimes, I envy you the excitement here."

"Yes, of course. The rapeseed, the muggings, the arson, the mass meetings. The race wars, the—"

"Please," she said gently.

He realized he had begun to rant. There was a throbbing behind his eyes. He worked to gain control of himself.

"Did my voice get too loud?"

"You must be terribly tired. Look, we can confer in the morning. If you'd prefer, it isn't urgent. Suppose we have dinner and not talk politics at all and get rooms here, and tomorrow after breakfast we can—"

"No," Christensen said, "My nerves are a little ragged, that's all. But I'll try to be more civil. And I'd rather not wait until tomorrow to find out what this is all about. Suppose you give me a précis of it now and if it sounds too complicated I'll sleep on it and we can discuss it in detail tomorrow."

"All right," she said, "Put the drink down and sit quite still, as if arranging her thoughts. At length she said, "The Republic of Monterey maintains close ties with the Free State of Mendocino. I understand that Mendocino and the Empire broke off relations a little while back."

"A fishing dispute, nothing major."

"But you have no direct contact with them right now. Therefore this should come as news to you. The Mendocino people have been learned and have communicated to our representative there, that an invasion of San Francisco is imminent."

"Christensen blinked twice. "By whom?"

"The Realm of Wicca, she said, "Flying down from Oregon on their broomsticks?"

"Please, I'm being serious," Christensen said, "the Realm of Wicca is nonviolent, like all the neopagan states. As I understand it, they tend their farms and—"

CONTINUED ON PAGE 59
70 percent of the earth's surface, studded with valuable minerals—human survival depends on thin-skinned diving suits and submersible vessels. Clad in fiberglass and foam on a titanium frame, the 17-ton Alvin (right) can carry three Explorers to 13,200 feet. Alvin has recovered a nuclear bomb from the Atlantic off Spain and discovered vents spewing hot lava in the Pacific's Galápagos Rift. The embryonic JIM suit (below), made of magnesium with a
The JIM suit is designed for divers who must work underwater. It has universal joints, lubricated with vegetable oil, and a full set of interchangeably tools instead of hands. With a carbon dioxide breathing system, the JIM enables a diver to work 2,000 feet underwater for as long as 30 hours without surfacing from the surface. The suit provides an internal pressure of one atmosphere, so the diver can surfacemotion if necessary. It first used to decompress, instead of separate legs, the WAST suit (above) has a single piece bottom with four thrusters for getting around on the seafloor. Carried to a depth of 80 feet, JIMs' first in the open sea, set a women's depth record of 1,350 feet.

**Basically, JIM is a 6'6" tall, 3'5" wide, 910-pound pressure vessel with articulate arms and legs.**
Undersea habitats allow aquanauts to spend days at a stretch, instead of hours, studying marine ecology.

Drawn by scientific curiosity as well as commercial interest, pioneer aquanauts are establishing semipermanent bases for prolonged stays on the seafloor. The National Oceanic and Atmospheric Administration's Hydrolab, in 50 feet of water off St. Croix in the Virgin Islands, offers cramped quarters for a quartet of researchers in a 16' x 8' cylinder. On permanent station above, a life-support boat pumps air through an ambitious to maintain the lab's internal pressure of three atmospheres. Air bubbles, trapped under plastic domes moored around the Hydrolab (left), provide convoluted space for scientific toil - toil. Visitors can stay down for eight days before undergoing several days of gradual decompression to lower the blood's nitrogen level for the return to the surface. Preparing for emergency evocan (below), divers practice rapid surfacing techniques in the Navy's 50-foot submarine escape tower at Pearl Harbor, in Hawaii.
She survived a savage world to become the most revered artist of her time.

BLIND SPOT

BY JAYGE CARR

Some of a doctor’s duties are hard—and some even harder.

"You're blind." Lip unerringly caught between his teeth; he looked in the mirror. "Totally, incurably and permanently blind.

He held up a sheet of light at him, headless, pale skin over nearly mummified bones, a sensitive mouth, curiously shallow whorls, and E-norm ears flat to the narrow skull. And the eyes jeweled like an insect’s, glittering silver! The prosthetic eyes that could see microscopically rarefied, in a range of wavelengths much broader than human norm, in a full three-hundred sixty-degree scan, as if his head and body weren’t there or were transparent.

He ordered the hole in the mirror to show him in the latest fashion in reflective body paint: a patina of chrome—vernier-distortedhound-stooth check.

"You’re blind, and there’s nothing medical science can do."

He replaced the holed sheet with an intricate pattern of peacock tears in gold/orange/turquoise/ silver, his own natural skin color, a shadowy blue-gray, showing beneath.

There’s nothing medical science can do, but there are prosthesis that we can use.

He ordered his eyes to "feel" in infrared, decided he didn’t like the

PAINTING BY
HENRI ROUSSEAU
...and replaced two of the colors with heat paints. To normal vision, the heat paints were merely a subtle haze. In infrared, a transparent color unlike anything "seen" in normal range. He made a few minor adjustments to the pattern and shut his eyes. Holding his breath, he ordered the autovaat to spray and he felt the warmth envelop him. Very good! The pattern had been faithfully transferred. Only it looked a little incomplete.

"Prosthetics," he repeated aloud, his mind still with his Very Important Patient.

At his mental command, the hologo image added a long scarf in a complementary color. He experimented with various drapes; added a few hundred angstroms to the shade and nodded to himself. The autovaat obediently dispensed a long strip of cloth. He held it up against himself. Approved the shade and arranged it carefully with the neat movements of a man who splices living nerves. Some preferred to have the autovaat do it all, but he felt the results: when it came to actual synthetic materials, he was a little artificial.

He ordered true image again and stiffened his spine. He was ready.

The patient was sitting in the solarium as she always was when she was free of testing or therapy. Her face turned toward the sun she could no longer see except as the palest blur—and not even that for much longer.

She turned toward him as he approached the ruffled sofa lifting his feet along with her barely perceptible form. And despite the fine downy white hair that covered her face—and her body too—he knew that she knew what he was going to say. Her soft, "Well, Doctor, was antithetic.

He ordered a seat and the floor formed one He sat down before answering. I have the results of the latest test.

"How much longer?"

"Before the deterioration of the optic nerve is complete and total? Between twenty and thirty days,"

An" A deep, shuddering sigh. She took the blow well; he had to admire her gallant spirit. He wondered whether she looked as ugly to her own people, as she did to him or was her ugliness merely the product of a different world, a different culture? She was short and round, totally covered with the velvety milk white fur. She never used any kind of body paint. Her nose was broad, lying against her flat cheeks, the odor of her nostrils, the lips, and the naked tips of the huge tubed ears were black like an animal's.

"And the other possibilities?" she asked.

"We'll try autoreplantation first," he told her patiently as if she hadn't heard it all a dozen times before. "We'll control-clone new nerves and try to graft them in. It's a tricky procedure all around. It can succeed. I've used it successfully myself many times. You're the problem: he was thinking. Many High-T-worlds had low-T enclaves, peoples with those who rejected the technology for religious or other reasons or who had been isolated and had never developed it. And the records showed in an amazing number of cases that when those low-T people were exposed to high-T procedures especially delicate medical procedures, those procedures failed. The mind rejected or disbelieved and the body followed. Her preliminary tests had not been promising. But he was the best. He'd never failed a patient before. And he wouldn't fail this supremely important one.

"What if the grafts fail to take?" she asked, her ugly face with the visual augmenters that made it even uglier turned toward him.

"We've discussed that," he replied. "We'll have to go to the prosthetics with a direct mind interface.

Her hands clenched. She saw the effort she needed to unclench them. Her voice was calm but it was the callousness of a thin net holding back an avalanche. We've discussed it. Do you really think..."

...She was an ugly genius, whose works of art were revered throughout the galaxy. And it was his responsibility to restore that genius so that it could continue creating...
The chemist-turned-mystic who discovered LSD talks about the quarter of a milligram that changed his world forever.

**INTERVIEW**

**ALBERT HOFMANN**

On a gentle spring day in 1943 Dr. Albert Hofmann, an eminent research scientist working in his laboratory at the Swiss pharmaceutical firm Sandoz Ltd., was stunned by the unimaginable passage to another world. But the terra nova that Dr. Hofmann discovered was within himself. And the route to it was a fickle, obscure-sounding compound called lysergic acid diethylamide, which neither he nor anyone else suspected as a trapdoor to the self's secret chambers.

It was the hope of lifesaving medicines, not artificial paradises, that prompted Hofmann to turn to the study of the alkaloids of ergot, a parasitic grain fungus or rust, in the early 1930s. The common nucleus of these substances had been baptized lysergic acid. By isolating and synthesizing lysergic acid derivatives, Hofmann had developed the basis for crucial drugs to control postpartum bleeding and cerebral and circulatory disorders. But in 1938, one compound remained perplexing. LSD-25. Something about the drug drew the chemist back to it five years later.

As it happened, he accidentally absorbed some of it through his skin, and the peculiar genie of LSD-25 stepped forth unbidden in a daydream Hofmann knew he shouldn't be having. This was man's first acid trip. Subsequent experiments by Hofmann and his Sandoz colleagues confirmed that the substance had an awesome power to sever the mind from its ego.

But nothing Hofmann learned from his experimental illuminations with LSD, psilocybin, and other hallucinogens could have prepared him for what happened next. In 1963 he received a request from a Harvard lecturer named Timothy Leary for 3.5 million doses of LSD and psilocybin. Though the request was denied, the chemist's well had already spilled into the streets. The result was a decade of chemical heavens and hells.

How did the psychotherapeutic he harbored 40 years ago affect his own life—and Western culture? Out of Hofmann's ruminations come his book LSD—My Problem Child (McGraw-Hill, 1980) and the following interview with Omni reporter David Monagan.
Omn. Many people may be puzzled why you would write a book about LSD now—almost forty years since you discovered it and a decade since its use and presumably interest in it peaked.

Hofmann. As a scientist, I was trained to make experiments first and then describe the results afterward. The Sixties were really a cultural experiment with LSD. I wanted to watch how it would all turn out how it would end, how attitudes would evolve. My book is an analysis of that experiment.

Omn. Looking back, many people see Timothy Leary as the personification of the LSD culture. You corresponded with him in the Sixties and met him in Switzerland in 1971 and 1973. As the Father of LSD did you consider him your most charismatic disciple or were you wary of him?

Hofmann. I never could make out what he really intended. I had the feeling he was naive. He was so enthusiastic about LSD that he wanted to give it to everyone even to very young people. I told him, "No, give it only to people who are prepared for it; who have strong, stable psychic structures. Don't give it to young people." He said that American teen-agers are so experienced that they are like grown-ups in Europe. We did not agree about this at all. I had the same argument with my friend Rudolf Gelpke, the Islamic scholar and drug researcher. He told all his friends, "You must take LSD." I never said that everyone should take it. If someone asked me, I told him exactly what LSD does and I left it up to him to judge whether to take it. And I think that's the point of writing this book.

Omn. Could you tell us what that first moment was like when you discovered the psychotropic effects of LSD 25?

Hofmann. While working on ergot alkaloids in 1938, I first synthesized lysergic acid diethylamide but it didn't seem to produce any psychic effects when it was tested on lower animals. Only in working with the substance again, one day in 1943, when I somehow began to have this day-dreamlike but not disagreeable experience, did I discover it in my own body. Because I knew I hadn't ingested anything. I realized that the substance involved must be very, very active. I was determined to get to the bottom of it and three days later I arranged to take what I believed to be a very weak dose—0.25 milligram.

After about half an hour the effects started. I tried to take notes in my laboratory journal but after a few pages I realized I couldn't write anymore. Everything started to change. So I said to my assistant, "Let's go home. This won't be so easy after all." Automobile use was restricted during the war so we started home on our bicycles.

Omn. Thus the story about the drug-crazed Dr. Hofmann pedaling madly through the streets of Basel.

Hofmann. Yes. I kept pedaling harder and harder. I thought I was locked in one spot. Finally I got home and everything had changed, had become terrifying. My neighbor came in and looked like a horrible witch; my assistant's features grew twisted. I became very anxious because I didn't know whether I would be able to come back from this strange world. Because it was the first time.

Omn. Did you feel that you had left this world altogether? Or did you know anything that would help you explain it? Did you have any knowledge of mescaline or of Saint Anthony's Fire when medieval townspeople were stricken with wild visions from ergot fungus on their bread?

Hofmann. I knew nothing about mescaline then, and though I had heard about hallucinations and nervous disorders associated with Saint Anthony's Fire I had read could have prepared me for what I began seeing. The symptoms increased terribly until I lost all sensation of my body. I had the feeling that I was already dead; that my heartbeat had stopped, that I was completely out of my body.

It was a terrifying experience because there were my children and my wife to consider. But even while that was happening I realized I had just made a very important discovery because no known toxic substance in the world would have had any effect at all in such a small dosage. I was still able to think about that.

Omn. Yours sounds more like a terrifying experience than an uplifting one.

Hofmann. Yes. At first. But by the time the doctor got there the horror had softened somewhat and I was already starting to come back from the feeling that I had died. I started to see an endless variety of colors and even to enjoy them. I thought, "Yes. Now you have come back to life." It was beautiful to feel at home again to feel that I could come back to our everyday world from the strange world where I had been.

I had the feeling that things had changed their meaning and I watched with great happiness a kind of rapture as every sound—a car door closing or the doctor talking—was accompanied by a stream of corresponding colored images abstract pictures. That night I had a good sleep and awoke the next day without any hangover.

Omn. When you first reported such an unearthly experience, did any of your colleagues at Sandoz doubt the truth of what you were saying?

Hofmann. Only with regard to the amount of the drug, because nothing then existed in pharmacology with effects at a fraction of a milligram. But then Professor Rothlin, the head of the pharmacological department, and two of his assistants decided to check it out by taking only about a fourth of what I had taken—0.06 milligram. They too underwent impressive experiences.

Omn. Then you and others at Sandoz followed with a series of controlled laboratory tests of LSD—tests you have said weren't very satisfactory. Why not?

Hofmann. We used low doses—0.05 milligram—in a controlled setting with interviewers. Rorschach tests written explanations of what we were going through. These weren't especially meaningful experiences personally I thought would be more interesting to see how it would work in an artistic surrounding.

Omn. Did you feel that you not only had discovered a new area of scientific research but also through your personal experiments—opened a door into another world of individual experience?

Hofmann. The whole thing started within my normal work as a chemist. Then I became interested in the matter of how really the existing world or one's experience of it, could be changed and broadened so completely.

I arranged to explore these things in a nonlaboratory setting in 1951 with the pharmacologist Herbert Knozett, and the German novelist Ernst Junger. I would say it was the first truly psychedelic experience that it was a low dose and didn't go very deep. But it was beautiful. I believed I was in North Africa among the Berber tribes. I saw all these beautiful, exotic landscapes, and while a Mozart record played like a strange kind of symphony. However, it was not a religious experience.

Omn. When did you have your first religious experience on LSD?

Hofmann. Well, the very first time I had the feeling that I had left the world forever. It was frightening but nonetheless a profound experience because I was confronted with death and came back.

Omn. Did your LSD experiences with Junger advance your friendship to a higher plane?

Hofmann. I think that our friendship over the last thirty years would have been deep even without LSD. We should have two lives—one in which we take LSD and one in which we don't—to prove what its effects really are. One will never know but I think taking LSD was a very deep experience to have had together.

Omn. In those early days did you think that you were playing with fire, or did you feel you had found something marvelous?

Hofmann. My hopes for LSD were absolutely concentrated on the psychiatric field. From my own experience I realized that LSD could be a useful agent in psychoanalysis and psychotherapy that patients

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"We should have two lives— one in which we take LSD and one in which we don't—to prove its effects. I think that taking LSD together is a very deep experience."
could leave their everyday ordinary reality with it by getting out of their problems and into another sphere of consciousness. I also thought it could be important for brain research.

But my own LSD experiences had a touch of danger to them, and I never thought LSD would be used as a pleasure drug as it was when it hit the drug scene in the United States in the 1960s. Apart from psychiatric use I thought of LSD as being appropriate for an elite you might say for artists and writers and philosophers.

**Omni:** But you were impressed by Aldous Huxley who, while not advertising the drugs to the masses, remained very evangelistic about psychedelics?

**Hofmann:** Yes, I felt closer to Huxley's point of view than to Leary's, but even Huxley believed in LSD's potential for a much broader public than I did. I had no contact with Huxley until 1961, when we had a beautiful meeting at the Sonnenberg Hotel outside Zurich. We were together again a great deal at the World Academy of Arts and Sciences in Stockholm in 1963 but he was already suffering from cancer.

**Omni:** Regardless of your own intentions LSD use spread among perhaps millions of people in North America and Europe in the Sixties and more than a few of these people had intensely disruptive experiences. In your book you describe the many sadly confused and unstable hippies who made pilgrimages to your house in Switzerland. Did you ever regret your discovery and feel that you, like Einstein with the atom, had unwittingly created a monster?

**Hofmann:** No, I can honestly say that I haven't because I've always pointed out the dangers. The unstable people would have done something else perhaps something worse like heroin, if there had been no LSD. And the main point is that LSD was developed in the course of an investigation whose aim was to produce new medicines. It wasn't to produce a psychedelic. But I think the production of this psychedelic was very important.

**Omni:** You say that you used LSD yourself along with other hallucinogens such as psilocybin and morning-glory seeds about twenty times. Yet, like many others, you've stopped using them. Why?

**Hofmann:** The last time I took LSD was in 1972 with Jung, but I think I got out of LSD all that it could do for me and probably the same was true for many other people. It's really not LSD that produces deep effects. It can only stimulate what's in the person already. If there is nothing inside nothing comes out.

**Omni:** What about all the bad reactions?

**Hofmann:** The surroundings the setting are very important. Much of the Sixties drug scene involved mindless indiscriminate use in the wrong kinds of places like bars that led to all these bad accidents. Even in its medical and psychiatric use the surroundings should be special artistic not just a laboratory or office setting.

**Omni:** Do you think there was overuse as well as misuse of the drug in the Sixties? The late John Lennon for instance was reported to have done LSD more than a thousand times.

**Hofmann:** I don't see the reason for such repeated use. It's even destructive, because such a powerful experience should be respected—and worked out. When you use something habitually its value is decreased.

**Omni:** Leary and Richard Alpert or Baba Ram Das made pilgrimages to the East after taking LSD. Did tasting of the lotus tempt people to abandon this reality for an ever greater escape?

**Hofmann:** I've never been able to understand these people. What I got out of LSD I carry about inside me. I have to stay in my own daily life. To see the flowers in my own garden is to see all the mystical wonder of existence of creation. You don't have to get to India to see it.

I think the insight that many people got from LSD is that the Creator exists. If you see the wonder of creation it seems impossible that it was produced by accident. There must be something spiritual behind it, something we name God.

It is true that some people had negative experiences, too. You see we always have this ambivalence: the experience of the good and the bad together. They are always connected and never separated.
Omni: Someone once said that one thing LSD did was to give us back a sense of danger that had been effectively removed from our sanitized, middle-class life. Is there any truth to that?
Hofmann: Yes. Everyday consciousness is a balancing on a very narrow line—a line that falls on either side into the abyss. It is a balance we need in order to exist. Otherwise the danger is that we become crazy. The LSD experience is schizophrenic to the extent that you simultaneously remember your ordinary reality and also see another reality another world.
Omni: What about the rumors of long-term physical damage from LSD?
Hofmann: There's no evidence for lasting physical damage of any kind. The things that were said about chromosome damage, for example, were all based on isolated observations that later studies proved untrue.
Omni: Did the LSD experience change enough people to affect society in a way that is, to become a social force? Do you think there is less passion for the unknown now than during the Sixties?
Hofmann: I believe that the revolution of consciousness some people experienced during the Sixties will have an influence on them for the rest of their lives, whether they took LSD or didn't.

It is a crazier time now, but in a different way. In the Sixties there was a psychological revolution—a search for another reality. Now there is anxiety about the terrible things that could happen, fear of war and the destruction of nature, energy problems. These are more practical questions. The Sixties had a more mystical component. 

Omni: Were you yourself changed? Did the chemicals you examined alter the chemist who created and synthesized them?
Hofmann: As head of the department for natural-products research I remained the experimental chemist in the laboratory working on isolating the active principles of different plants for medicine. But through LSD I also became interested in mysticism and all the substances that affect the mind. Personally I had been changed, of course, especially in my conception of reality.

I realized that we have the choice to see things in different ways. That there is no such thing as an objective reality. We have the opportunity to choose a philosophical attitude corresponding to our personality. People may look at a grim aspect of reality and believe that it is the only true one. Not knowing that they have the potential to alter their lives by looking at another aspect.

Omni: But given this more rational state of mind that prevails in the Eighties, what possibility is there that people will again seek to delve into their unconscious in order to explore these inner alternatives and potentials?
Hofmann: I'm not sure how things will or should compare to the Sixties, but interest:

- in meditation, in getting behind this rational side to a deeper truth of things, has now become increasingly important. LSD can be used to help one make a breakthrough in meditation.

Omni: How do you envision the future of LSD? Can it still be used to leap through to another level of experience?
Hofmann: Yes, I see it having an important role as an adjunct to meditation, and in psychoanalysis, brain research, and treatment of the terminally ill. The final goal of meditation is a visionary experience of reality, and some people who have meditated extensively may feel prepared to go a step further. And this is where LSD might help them.

I don't mean that everybody should take it, only that meditation can be seen as a kind of medical application of LSD as a chance for people who are stuck in an unpleasant world view to get an otherwise unattainable view of reality. But of course it is much better if they just have a spontaneous expanding experience without it.

Omni: So are you talking about just one transforming dose of LSD?
Hofmann: Yes. About one or only a few doses more, for people who have taken all their fixed conceptions and shaken may find their first LSD experience frightening.

Omni: So the first time could take things apart and the second may be necessary to put them back together.
Hofmann: Yes. That's one way to say it.
Omni: But the LSD experience is unpredictable. Sometimes it has been said that LSD is positive because only when it is tied to a feeling of hope does the world make sense—modern-day anxiety, urban decay, the breakdown of the family—limit the potential of LSD.

Hofmann: Not really. Just as in earlier difficult times when people were more religious, we need religion now. But not the same kind. We can’t use the same old pictures for our religious imagination. The images of a God outside reality. We must try to get inside and feel that we are a part of creation in some way individually a part of God—that we are partners in creation and thus protected by it. Meditation alone or meditation with LSD can illuminate this new religiosity. The great weakness of the Western world is that we no longer have a strong religious belief that can be fused with our everyday reality. God is someone we talk to on Sunday.

Omni: Do you practice any particular type of meditation or espouse any technique?

Hofmann: Everybody should do it in his own way. I begin when I have the feeling, the knowledge that I have as a chemist that our human organism is made up of the same things, the same compounds, that are found in animals, plants, and all living matter around us. Then I feel united with nature and protected in it. The knowledge that we’ve gotten of reality from all our research in the natural sciences is really the myth of our time. We have to meditate on this knowledge in order to give it deeper meaning.

Omni: What kind of meaning?

Hofmann: We should experience the wonder of creation in our lives. I think that no one should be so deeply impressed by the as should a natural scientist, because if, as a chemist, I see a flower, I know all that is involved in synthesizing a flower’s elements. And I know that even the fact that it exists is not something that is natural. It is a miracle.

How can a plant synthesize these elements all by itself? How can it create these unique colors and forms? These are the questions we always have to ask ourselves, and we will see that the existence of every single flower is a mystical happening. We now have such a wonderful scientific picture of the universe—we know about the stars and nebulae and all these fantastic things—and we should meditate about just these things.

Omni: Do you believe in God?

Hofmann: Of course. I believe in the Creator and the Creator is God.

Omni: Do you believe in an afterlife?

Hofmann: Yes. I don’t know in which form but I believe that, as Goethe said, Things cannot disappear, they can only change. Science has also established this that nothing disappears completely. Matter is simply changed into new forms of energy. I believe this is true for the spirit, too.

Omni: Isn’t it extremely difficult for people living in cities which you characterize as dead, to have this religious experience?

Hofmann: Yes. It’s an immense problem that people living in cities are surrounded by dead things. One is not part of pavement or concrete. People become sick when they live in a secondhand man-made reality and no longer have contact with living nature and creation.

Omni: In your book you discuss a strange level of relations between man and nature. When you first took the Mexican mushroom Psilocybe mexicana, in Switzerland in the mid-Fifties, you were overwhelmed by Mexican imagery despite attempts to focus on other things. And you say that Gordon Wasson, the author of The Wondrous Mushroom, had this experience repeatedly. Are you suggesting that different plant hallucinogens carry their own images or archetypes?

Hofmann: I think that’s very possible. Not only did Wasson and I have that experience with psilocybin, but so did Rudolf Gelbke’s wife—in a very interesting way. She was a graphic designer and after taking the mushroom, she started drawing. She had never been to Mexico or even seen Mexican art, but she drew these startlingly Mexican designs. She didn’t even realize this until she took a look at some Mexican art a few months later and was amazed by the similarities.

Omni: Is this where you got your ideas about a crack in the rational concept of reality about hallucinogens working at a borderline where mind and matter merge?

Hofmann: No. I got those ideas from my experiences with LSD from the fact that a trace of this substance can transform one’s consciousness, even transform twenty thousand people. There is a poem by Goethe that says, ‘How could our eyes see the sun, unless they are sunlike themselves?’ I have changed that to say, ‘If there were not something of mind in matter how could matter change the mind?’ This does not mean that we are simply made up of matter but that the material world has a spiritual element.

Omni: Are there any natural substances in the brain with the same active principles as LSD or other hallucinogens?

Hofmann: None are identical, of course but the active principle of the magic mushroom Psilocybe is very similar to the new transmitter substance in the brain. The only difference between them is the position of a hydroxy group. It may be because these plant substances have a similar structure that they are able to intervene in the action of our brain hormones.

Omni: You have said you see a broader future for LSD in the context of meditation centers. Won’t there be the same potential for misuse that existed in the Sixties?

Hofmann: I don’t think so. The leader of a responsible meditation center should serve as something like a psychiatrist and know the people with him well enough to decide who should and shouldn’t use LSD—who is ready to use it as a pharmacological catalyst.

Omni: Do you think there’s a realistic possibility that Western governments will ever sanction this kind of LSD use?

Hofmann: Yes. But not in the near future. It’s more important that it become more readily available for psychiatry where its use should never have been stopped. But official Western medical schools are relying more and more on meditation as a means of treatment. Eventually LSD can be used as an aid to meditation, not just for the ill but for healthy people as well.

Omni: You also mention that LSD might be used for the terminally ill—to soften their experience of oncoming death.

Hofmann: Yes. In certain American clinics it has already been used for terminal cancer patients who are suffering from extreme pain and no longer responding to conventional medication. The reason LSD can alleviate or even abolish pain may be that patients under its influence are psychologically so dissociated from their bodies that their physical pain no longer penetrates their consciousness. There are many case histories of patients who, once freed from acute pain, gained meaningful insights about life and death and their fate—and died peacefully.

Omni: Huxley took a massive dose of LSD when he was dying. Would you use it if you knew your life ending?

Hofmann: I don’t know. Maybe I’ll be very happy without LSD when I am dying. Maybe if I were suffering as horribly as Huxley was from cancer I would. It’s a situation I can’t foresee.

Omni: You yourself haven’t used LSD since 1972. Do you anticipate doing it again?

Hofmann: Maybe sometime, but there’s no pressing need. I have a wonderful life now with my seven grandchildren and my home in the Jura Mountains. And I get a lot of visitors, young people from the United States and around Europe who come to speak about their problems about God and nature and the world situation. I like these young people and receive them whenever possible. We get into these long discussions. I’m still a kind of guru.
French sea, who is sterile, and her husband, Mark, plan to have a baby in a few years. The child will be five years old at the moment of birth. Infertile women giving birth to five-year-old newborns isn't as paradoxical as it seems. Before disease robbed Francesca of her ability to become naturally pregnant, she had three eggs fertilized by her husband deep frozen in suspended animation. Now several years later, doctors will reimplant the eggs in her womb, where she can carry them to term.

Three successive children—entire Mark's and her own—will have spent several years in a cryogenic tube before the journey toward birth.

The remarkable possibilities of freeze-drying livestock embryos are well-known. Within two years British researchers will bring the technique to humans. Couples like Francesca and Mark, may be having their offspring frozen before birth and saved to begin in the future.

Cryogenics involves plunging living cells into a bath of liquid nitrogen, where they rest on the edge of extinction. To prevent ice crystal formation and death, the cells are drained of their water content. This hails of their biological activity, before they are frozon. The "reduced" cells can remain at −196°C for generations and still be reactivated without damage.

Cryogenics: cattle breeding actually sprang from U.S. laboratories more than a decade ago. At Rio Vista, a primate, in boots, and Jackson Laboratory in Bar Harbor, Maine, embrionic freezing became fully commercially practical. Several American zoos are experimenting with the technic as a way to save rare or endangered species.

But it is in England and Australia where American techniques are finding their most exciting applications. Recently Australian scientists have frozen a dozen human embryos. When two embryos were thawed in the lab, they resumed normal growth.

"Freezing embryos," says Dr. Carl Wood, leader of the Australian team at Queen Victoria Medical Center, in Sydney, "completely the concept of reproduction so that I could not sanction the process before appropriate legal review. I am concerned about the ethics of it."

For instance, cryogenics would make it possible for a child's life to begin long after his father had died. Since the father's estate already would have been probated, what inheritance rights would the belated child have? If a mother dies, who becomes the child's legal guardian? What if both would-be parents die before they thaw their cryogenic embryos? Should the semiliving ice capsules be destroyed, or be implanted in a surrogate, or be left in the limbo of the deep freeze?

Theorists are convinced that an embryo conceived today can be held in suspended animation and reactivated hundreds of years hence—after both parents have died. The development of techniques to produce test-tube babies, so that an embryo can be implanted in any mother, not necessarily its biological mother, has cleared the last major obstacle to keeping embryos in suspended animation for as much as 1,000 years before birth. The Rup van Winkle legend is coming true in a modern scientific idiom.

It has just begun to dawn on scientists that cryogenics offers the potential for human survival after nuclear war. A nuclear population of frozen embryos from volunteer couples of healthy genetic stock could survive to inherit an otherwise doomed world. Viable deep underground, cradled in their leak-proof nitrogen casks, an embryo is difficult to differentiate frozen embryos from their superior environment (left), in a thick insulated steel tube (above).
Cryogenic techniques could be applied to storing human organs in transplant banks—creating perfect lab animals and preserving people of the present day as ambassadors to the future.

Cryogenics has long proved successful with farm animals. Ova are drawn from cows, for example (above), then artificially inseminated (lower left). A fertilized embryo (above left) is then sealed into a test-tube baby.

The population would sleep safely through the holocaust above. Researchers have yet to consider in any serious manner the creation of a human "population bank" held in suspended animation against such a catastrophe. But they acknowledge that, theoretically at least, the concept is scientifically feasible.

The trick in making cryogenics feasible isn't the freezing—scientists have long known the effects and problems of keeping living material, such as food, fresh and cold—but the thawing. Bringing a cell from such a low temperature back to life is a tricky process.

In the case of a human embryo, temperature in the steel tube where the infant slumbers is raised at a precise rate from -196°C to 37°C, normal body temperature, inside an electronically controlled thawing chamber. Embryologists culture the child in a body-temperature incubator until they are sure its cells are functioning and developing normally in particular microscopic checks identify the child's sex and determine whether chromosomes controlling the baby's genetic development are undamaged. Once the embryo's vitality is ensured, it is gently implanted inside its mother's womb with a quick and relatively painless procedure.

The science of applying cryogenics to biology grew unsoundly for 20 years following its birth in 1949, when scientists discovered that certain bird sperm can be deep-frozen then returned to normal. The big breakthrough came in 1959, as British researchers closed in on the possibility of creating a test-tube baby.

Scientists fertilized human eggs in the lab but were unable to implant them in women successfully. They determined that many failures that the eggs would take only when the mothers' hormone cycles and balances were in perfect harmony. That meant waiting at least a month from the moment biologists removed an egg from the prospective mother for fertilization until they attempted to implant it.

Dr. Patrick Steptoe, leader of the research, felt that it should be possible to freeze embryos for a month until the recipient's next reproductive cycle. He was not the only one with that idea. In 1978 another
British scientist Dr. David Whittingham reported the first successful freezing of baby mice in embryo form (Dr. Ian Wilmut a talented researcher at the Agricultural Research Council’s laboratories at Cambridge achieved a similar independent success. Unlike Dr. Whittingham he did not implant his thawed embryo for birth.)

At the time Whittingham was not concerned with human embryos. However, since the reproductive systems of mouse and men are similar in many ways he soon turned his attention to man. At Whittingham’s lab in the Medical Research Council’s Mammalian Development Unit at University College London pink-eyed white mice scamper around a cage. They live eat and mate quite normally after being revived from five years of embryonic suspended animation. They are perfectly healthy and normal.” Whittingham says. Recently some mice frozen for seven years—more than three times their natural life span—have been successfully thawed and have survived birth. This is probably the longest period after which any mammal has been successfully revived from cryogenic storage.

Three days after his mice mate Whittingham removes the colorless embryos which by then have grown from one to eight cells. from each mouse’s reproductive tract and prepares them for immersion in super-cold liquid nitrogen.

For the next few years the churn—its temperature kept constant—becomes the embryo’s artificial womb, though of course the cells cannot grow. The frozen creatures clamp into an unrecognizable, grayish mass. There are about thirty frozen mouse embryos in a test tube. Whittingham’s technician Alison Halsey explains Tapping a container of nitrogen on the floor with her toe she continues. We still have mice from the original batch of several hundred frozen in 1973 in here. Whittingham has achieved an 80 percent survival rate after freezing and thawing more than 10,000 mouse embryos, up to 70 percent of the mice were actually born Today more than 20 laboratories use this technique some in modified form to freeze embryos of rats, rabbits, sheep, goats and cattle successfully.

So what are the chances for the human race? If the woman is made to produce extra eggs they could be fertilized and stored at the eight-cell stage. Whittingham has stated. An embryo could then be reimplanted in a subsequent cycle say three months later.

If the first attempt was not successful you could easily repeat the process, he notes. The procedure could also be repeated when the woman wanted a second child without going through the initial process of superovulation. This raises the possibility of egg banks of or having children by donor.

Whittingham recently collaborated with London gynecologists who hope the technique can produce test-tube babies much more reliably. So far he has not reported any success. Of two human embryos frozen one was lost and could not be recovered. The other was dead after thawing.

Many biologists believe success is only a relatively small technical step away. Closely to achieving a viable cryogenic baby is probably Dr. Ian Craft of the Royal Free Hospital in London. It is ironic that Dr. Craft’s attempts to open a new realm of possibility for women who want babies depends so much on women who want to avoid having children. His lab specimens for artificial fertilization and freezing are human eggs donated by women about to be sterilized. Craft’s research program is approved by the hospital’s ethics commit tee.

At present the biologist is perfecting the basic technique of freezing and reviving two cell human embryos that were fertilized in the lab. These experiments will continue until Craft is satisfied he can safely transfer a defrosted baby into one of his 45 hopeful patients. When is that likely? “I would hope within the next two years to have some success in freezing an embryo and replanting it into a mother” he says. Craft says that he is prepared to use frozen embryos to help sterile patients conceive but he would stop short of using a surrogate mother.

Eventually some doctors think cryogenic techniques may be applied to the extremely difficult problem of storing complete human organs with their many different cultures in transplant banks. Once these organs can be safely frozen the surplus of kidneys, livers, hearts and other transplantable tissues would be used to produce organs to use much better matching to prevent rejection by the recipient’s immune system.

The potential of human cryobiology is presaged in agriculture’s incredibly successful results with cryobirth. Among farm animals the success rate for frozen-embryo birth is 50 to 60 percent.

Cattle and sheep grazing contentedly in the emerald pastures of England’s Institute of Animal Physiology in Cambridge are testimony to this. Healthy calves and lambs have been born there after spending up to three years in suspended animation. Visitors are invited to the aptly named Frostie a brown and white cow born after having been frozen for three months.

Animal research biologist Dr. Christopher Polge is collaborating with Craft in adopting similar techniques for humans. Dr. Polge says “These animals are quite normal and produce healthy offspring of their own after freezing. So reliable is the liquid-nitrogen storage technique that the institute and commercial companies have begun exporting high-grade strains of farm livestock to New Zealand and Poland. Polge asks pointedly. Why export a cow weighing half a ton when you can send one hundred frozen embryos by airplane in an insulated flask?

As for the safety of long-term freezing Polge discloses that he carried out a unique experiment, perhaps the strangest activity to mark the silver jubilee of Queen Elizabeth II in 1977. He defrosted bull sperm that had been frozen in 1952 the year of her accession. “It was perfectly healthy and produced a normal calf” he says. This quarter of a century survival is regarded as the longest cryogenic storage of living sperm.

Such success augurs well for man’s future. A number of scientists agree that once a human embryo is frozen, biological aging becomes irrelevant. Theoretically it can exist virtually indefinitely in a state of suspended animation, provided it is capable of withstanding freezing to a temperature at which there is no further biological activity” Polge asserts.

Could there ever be a need to store animals or humans in this way and awaken them 200 or 1,000 years from now? Who knows? Anthropologists in a thousand years might decide it would be interesting to resuscitate a human being from the present century to see how genetically he would differ from the population of the world in the future. Polge declares “It is not fictional. In theory it could be done. Farm animals such as Frostie, laboratory mice, and human test-tube births have shown the way.”

Scientists however shy away from any projection of their research into the arena of surviving nuclear war. And clearly such a use poses extreme problems. One immediate challenge of a nuclear attack is to withstand the cessation of essential services and the failure of all utilities. If the embryos were to survive one would have to ensure that refrigeration equipment would be developed to keep them at the temperature of about 1963 degrees centigrade for some years” one scientist points out.

They would need developments in low energy long-term refrigeration techniques. Probably utilizing solar nuclear wave or some other form of energy. Further research may enable embryos to be stored at higher temperatures reducing power demands. Self-contained power sources that would be safe from nuclear attack are also needed.

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**In cryogenic suspended animation, the span from conception to birth can be extended forever.**

"An embryo could be revived after 1,000 years --- It's Rip van Winkle come true"
Strange experiences among the alien races of Magellan’s Cloud

TOUR OF THE UNIVERSE

BY ROBERT SHECKLEY

...weird what? Caroline and I just won a tour of the universe! We'll see Dykstra's World, where mucoid parasites communicate with their host through dreams. And Addler's Planet, where time oscillates across a two-hour span, making everyone late for work. We'll also see the Magellan Singularity, where the space/time distortion can do strange things to cosmic voyagers. Good-bye Ring City (right), hello Universe.
We got off the Jupiter shuttle on Ganymede and were taken to the interstellar terminal (left). On the lower far right you can see the Starship Magellan parked on the Singularity that makes our trip to another galaxy possible. Some ruins we visited on Pluto (lower near right) are supposed to have been left by a people so alien they didn't possess the numbers 9 through 72. In the Magellan System we visited two arachnid life forms that gave us some interesting tips on double-entry bookkeeping. The creature between them is Caroline. When we passed through the Singularity, her molecular-reassembly process went haywire. Our ship's doctors say she'll snap out of it after our next space/time jump. You'd think they would have worked out the kinks by now.

"The association of Pluto's most ancient ruins with these long-vanished aliens is dubious."
The vibrating Prismoids of Annax IV are the most enigmatic of known intelligent life anywhere.

On our next stop we met the carnivorous Behemoths of Ononi Delta III (far left). Intelligent and sullen, the Behemoths would be extremely dangerous if their teeth hadn't grown together in an evolutionary development whose meaning is still not entirely clear. On the lower left is an artist's rendering of a coffee break during the Battle of Shiva's Rift. At the upper near left are some of the intelligent crystal forms of Annax IV emitting short bursts of light (their way of clearing their throats). Finally on the right is a complex symbiotic multiple organism from the Pixa System. Caroline is visible as one of the spires in its upper left-hand corner. That last space-time jump was too much for her. The doctors advised her to stay put. I'll miss her on the trip back to Earth.
something in her rejected them. A normal person would have been satisfied with the sight they gave her. But she was not normal. She was a genius. She demanded perfection of perhaps something beyond, something that made her seem criable to others. She would not be satisfied with anything less and three times the implanted nerves withered and died.

They tried the prosthetics next. He did the delicate work. The implanting of the organically neural interfaces, the almost unnoticeable (because he was sure that this was what she wanted) external scanners. And though it wasn't his personal responsibility, he watched over her therapy. His face twisted into a frown as again and again she lurched through the obstacle course. A genuinely blind subject would have done better. And this from a mind that could curve shapes together into the subtlest of relationships. An artist whose works were balanced to within a microgram a millimeter.

"I can't see," she insisted over and over. "I can't see." She accused him. And she would pound on the nearest objects with her hard, bony fists, brushing those fingers that had worked miracles.

He had carefully adjusted her prosthesis to normal vision. He tested them repeatedly showing her how the graphs matched up; how the prosthetics were well within the tolerances.

And still she fought—or wept. "I can't see."

He tried to comfort her but she only turned away. No one else in the giant hospital complex had any better luck. He thought of getting her foster parents to help. But they were missionaries of a rootless sect on whose homeworld religion had died centuries before. He had already moved on. Not wanting to linger in a world that denied the need for what they offered. Now they were on another endless voyage to another primitive world, ruling one of the giant worlds, hollowed-out asteroids that carried the necessities of life from world to world. Wombships traveled more slowly than light but they were fast enough. Their voyages involved relativistic time contraction. People aboard the ships lived months while decades passed on the worlds they visited. Only simultaneously projectors could exceed the speed of light and they were limited to transmitting knowledge. Programs and nonmaterial information.

"Don't keep showing me your machine made charts. They're wrong. They're all wrong. I can't see!"

He searched for others on this world who might help—teachers, lovers, friends. But she had so surpassed all others, and so quickly, that she had formed no lasting relationships with any of them. As for lovers or friends, she was an alien, an odd-wonder obsessed with her work. She had none. Her life had been her art—and her art her life and now she had lost it.

There were a dozen rehabilitation centers in the giant medical complex. Psychiatric therapy, occupational therapy, (the cruellest failure of all) many varieties of mental gymnastics—and she tried every one of them unsuccessfully.

"I can't see."

Failure. His failure. His first failure. He should have been glad when she announced, "I'm going home."

But in his own way he was as fanatical about his work as she was about hers. First he ordered no as her doctor. When she laughed in his face he threatened, called her. begged to have her declared mentally incompetent. "Sulked when that failed and always always always argued. Usually she ignored him. Once he accused her of deliberately denying her art to the world. She answered waggily. "My world has simultaneously projectors now like any civilized world. Or at least the cresters do."

It was the first time he realized that her world was populated by two separate races.

"I'm a trog," she asserted matter-of-factly. "But the cresters aren't fools. They've enjoyed the prestige of my work for years. Simply because I come from their world. If I ever manage to work again."

He had excavated. He had explored. He had searched for knowledge. For programs and nonmaterial information. But the cresters were not so foolish as to pass on the secrets of their skills.

"I'm going with you," he declared.

"What?"

"I'm going with you."

"Then you'd know better than I. But haven't stopped—the infuriates the workings those who tried to translate artistic admiration into something more physical."

"I'm a doctor," he reminded her.

"You're my patient."

She shook her head. "You don't know the floor. You can't imagine."

"There's nothing you can do."

For once inmovable object met irresistible force. "Your world is primitive except for a few high-tech enclosures. I know that. All right. I'll just have to be careful to bring everything I might need with me. That's all."

"Doctor. She took a deep breath for the first time moving those unseen eyes away from him. 'It isn't just the primitive-ness. My world is far away. We couldn't get a direct route. We'll be lucky if we have to change womships only once. In real time that's fifty years. A hundred, or more, for the trip. If you ever return here, all your friends, children, family—all will be dead or changed almost beyond recognition. And your profession—"

"I'll return. I'll catch up, professionally and personally. But it's such a bad trip. Why are you taking it?"

I'm going home," she muttered. And he told himself he'd hear two more unsaid words to die.

He consulted a reference library about her world and found out why she didn't want him to go. Her world was even more primitive than he had thought. The trogs liked the forest floor in an eternal night produced by the shadows of the giant leaves in the cresters, the giant trees among animals without language, clothing, tools or society.

The cresters were a different race entirely. They lived in the sunlight in the tops of the huge trees. Not much was known about them except that they were engineers. They were inventors. With the highest skills. Crester plants for food or cloth. It's only exotic beauty were valuable exports that had paid for the simultaneously projector that was installed and for the technicians willing to exile themselves from their homeworlds to keep the device running.

Some of the other information about them was confusing or simply unbelievable. (Cultivating on giant leaves? Insect leaves?) Most physical trading was done through the womships. And the simultaneously projectors disseminated all kinds of art and information. But the cresters were not so foolish as to pass on the secrets of their skills.

The doctor absorbed all the information he could. And when his patient boarded the womship he was right behind her.

The wormship refused payment. (They revered the artist and her work.) And the doctor agreed to spend time and skills on patients aboard the ship. He even trained as many healers as possible in whatever skills he could pass on.

He never asked what the womship's thought of her as a person or what they thought of him for that matter but he was fascinated by them.

For thousands of years womshipers had been pariahs. But they were also the only breed that held the human worlds together that is the worlds colonized by humans. Or what had been humans before they adapted to their new environments.

And the wormship's were
think you’re off the mark. Way off. I’ve talked to myself, and I think she’s just following instinct. Sometimes following one’s instinct is the simplest thing to do.

“Even if it means going back to a primitive, scratch-for-a-living world?”

Came shrugged. You see it that way. But she wanted to go home—she led the people to a permanent home for generations contained in that one word.

“Sometimes that’s the best—and only—medicine.”

He grew to like the wombshoppers, to find in their company a relief from the continual frustration of his primary task. He was almost sorry when the voyage ended.

But nothing on the tapes had prepared him for the frantic vitality of the world called (not by its own people) Sequoia Upper.

It was hard to remember he was in the crest of a giant tree. He seemed to be walking on thick resilient carpet, muddy aqua (the basic plant color here). The gently

As he watched, the body disintegrated. The teethed appetites of the swarm ate it, bite by bite. It wasn’t a body any longer, it was a heap of crawling things.

moving ever-changing walls were like a hole abstract actually they were leaves, vines, stalks growing saprophytes tendrils some close some far away the whole blurring into a panarama of relentless growth.

“It’s as if the air were alive and growing,” he told his guide, a short prehensileailed male whose costume revealed no fewer than six apparently functional nipples as well as indisputable evidence of masculinity. (The doctor learned later that the costumes—all the clothes in fact—were plants, skin and hair roots concealed somewhere in the fur or mane: the rest growing in a controlled pattern around the Sequoian wearing them.)

“Rainforest, I believe it’s called,” the guide commented politely. Though I understand on other worlds what they call rainforest would be a strand of sprouts not yet ready to be transplanted here. Now this tree, called baldcypresses—he waved his hand, and the doctor, who hadn’t seen any trace of structure or point of division, wondered whether everything he saw wasn’t part of a single organism—has sprouted an ancient and honorable family. I my

self—a decaying gesture, but a smug grin over it—am proud to be an acknowledged branch of the hundred ninety-seventh generation nurtured within its leaves. He obviously expected a reaction. When it didn’t come, he made a disappointed move and went on, “So this entire tree is quite well cultivated and most tame. If you wish to visit one of the wilder trees, it can be arranged.

The doctor heard his patient mutter something under her breath.

‘And of course—the guide was obviously working up to an oration—if there’s anything you need for any reason we’ll be pleased and proud and honored, to be allowed to serve, in however minor a fashion—’

The doctor tuned out the rest he’d sat through baronets before.

It was then that a fluff of silver tendrils shifted against his patient’s cheek. Automatically he reached over to pluck it off, but her hand was quicker. With a facile gesture that spoke of long habit she grasped it, slid it into her mouth, and sucked on the arsenic-green roundness below the pale parachute.

He opened his mouth to protest, but she had already spit the thing out. Not a gesture of disaste, but rather an absent-minded expulsion of something sucked dry of interest. It tumbled along the surface until he couldn’t see it any longer.

She didn’t drop dead—before he could lick his dry lips and ask his guide interrupted his monologue long enough to repeat the gesture—this time with a thing like two gray wings run together but no bigger than his finger.

This time he did ask and the guide laughed and sought something from the air and put it to his lips. Five minutes later the doctor was still mulling over the multiple subtleties of his first taste of sequoia.

There was so much to esaminate so many flavors and smells and customs and whatnot that adapting to life on the wombship had been like preform play while this was final specialization residency. But he was enjoying it—part of him even wallowed in the VIP treatment—until his patient told him the truth.

“We’re both pariahs, you know.”

He didn’t believe her. He’d been escorted through some of their finest research reserves of planting (though he still wasn’t sure whether the sprouts were merely being nurtured on their leaf fields or whether they were products of the leaves themselves) wired and dined and deferred to and fatterted and listened to and even entertained in an ancient but still appreciated fashion.

She interrupted his protests by reaching over and taping the wall of the room they were in, one of several that was “there” for the duration. “Dead tree,” she said simply. “Dead wood.” She tapped again and it was a dull sound. “The ultimate insult in their language is ‘Go live in deadwood.’”

She spat and he watched the green things
...liquid disappear into the floor. Or is it merely the penultimate insult? she mused aloud. "Go live with the trogs. Yes, I think that is the ultimate. And I wonder which of us they despise more, me, the trog, or you, the trog lover." A breath. 

"Doctor."

"Yes?" He wondered about something himself. What penalty was here for a doctor straggling his patient? "Take my advice. Take the next woodship away from here, no matter where it's going. Just get on. This isn't your world, and ultimately it will reject you."

"You're my patient, and I'm going to cure you. I promise."

"Blind..." she murmured. "But which of us is it that will not see?"

Three days later she was gone.

"Once a trog, always a trog," said the incredibly old woman coldly.

And that is it. Throw her and her potential away. He had built his way up to this Sequoian Ultimate Authority in a barely controlled rage.

"She's a trog," the woman muttered. Something fluttered through the air and landed against her cheek. Her fingers went up in a caressing gesture — he blinked — had those fingers somehow flapped the airborn wrap away or had it been absorbed into the crepey powderly old skin?

"And that covers it," he heard himself snarling. Some of the leaves from the plant he'd been forced to wear fluttered away from his mouth and he saw her clinch. That plant had driven home his patient's point about his being a pariah. It clung to and covered every inch of skin and gave off a rank odor. Even the woundborne kept away from him, and he knew it for what it was. This world's equivalent of a contamination suit. Nothing of him must infect their happy lives. "Just throw her away. She's a trog, a worthless useless animal of a trog. All right, all right then. But don't be surprised at how other worlds react to what you've done. Other worlds have values different from yours. They might see your actions in an unflattering light. Other worlds racial prejudice is considerable.

"Prejudice!" She was slight and slender and pale and fragile. "Offworlder! You came here knowing you knew all there was to know about us. You look and you do not see. You are a — a dissonance, a flaw in our lives. A wrongness we cannot right. Yet we have made you welcome. And in return you would tell other worlds about the sins that we committed only in your mind."

She stood, one hand against a leaf that formed the wall of her noisy and tiny tendrils twisted around her arm. He had a sudden vision of woman and tree entity, a single living organism.

"Your prejudice," he said, but more calmly. "Drove her off this world in the first place. And now it has driven her down to her death.

"Our prejudice? Prejudice means pre-judging, doesn't it? Were we given a chance, or were we prejudged off wonder? Some people see only what they want to see and perhaps the motives of those so-called selfless missionaries ought to be examined more closely. He caught his lip, remembering a news hologram an awards ceremony, there had been several offworlders with the artist then. All of them radiating a complacent, almost arrogant pride. "The trog was spirited away from here. Did you know that? Because my predecessors protested at the very thought. And after when we warned that she would be damaged away from her home, which when we asked that she be returned, we were sneered at. Accused of wanting to keep her treasures selfishly to ourselves. Accused — it was sickening. And no one believed us. As you don't believe us now." She shrugged. "We could prove all we have said, but you outlander with your closed mind have already determined our guilt. Would you believe the truth if it were right in front of you?"

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- He didn't see the chief make a gesture to a guard standing directly behind him; he didn't see that guard move. Then he didn't see anything at all.

- Try me.

- If it will be dangerous.

For you or for me? He couldn't help sneering.

So be it. Her pale lips were tight, and the very wall of living plant seemed to shudder with her restrained anger.

The only way down, short of the dangerous climb down the cliff-like trunk, was by being lowered at dizzying speed on immensely long vines.

The others were armed with a variety of weapons — only some of them recognizable. His companions were all grim. Their prehensile tails stiffly erect, and he knew that it looked could kill, he wouldn't survive to reach the floor.

The floor itself wasn't as totally dark as he'd imagined. Because many of the plants — and animals too — phosphoresced. A phrase he'd heard only once long ago kept echoing through his head. The caves of night. He was wandering lost through the caves of night. Above was a leafy canopy of solid darkness. And beneath.

The trunks of the giant trees were tensome even hundreds of meters in diameter and grading their lower reaches were living buttresses. Great knees of wood larger than most of the trees he was accustomed to. And in and around and under and through and above was all living forest. A verdant ocean song with life compelling, growing, dying, layer on layer. Predator on predator. A normal rainforest (he had consulted the records he had brought) was actually scant of life on its floor, because the canopy above shut out too much light. But here, even without light, there was enough organic material raining down from the giants above to provide the basis for an ecology. And what an ecology! What a competitive, feticious ecology! And so complex!

He saw vines climbing up a treecling a mere ten meters or so high. He blinked and the vines swarmed upward and spread out sending in tendrils to tap the trees life fluids, round and round leaves unfurling and sending spines into the treecling until between one breath and the next what had been a tree was a mound of pulsing leaves.

Stranglervine, one of the guides (guards) answered to his stammered question. By tomorrow it'll have sucked the infant dead and dry. Then it'll curl up in a ball and tumble away until leaf breath wind brings it to another vine.

Will it. She snorted. Her swishing tail imperiously contemptuous.

You wouldn't taste right. But there are threats here. Plant and animal. The stranglervines seem like Anna Sweetfeet.

He glanced. But in minutes he knew she had spoken the simple truth. The floor was a pesthole a hothouse and breeding ground for desperate appetites. Animal plant — and trog.

Two strong cresters were at point hacking with off-world metal machetes at the living mass. - Hacked and headless corpse small animals were trampled underfoot along with the severed plants. The cresters progress was measured in meters. He could still see the doomed tree under its mound of stranglervines when a shapeless, man-lagged horror dropped onto the shoulder of a crester walking not two paces in front of him. The victim dropped without as much as a gasp. But another guide reached over and touched the wolly glistening horror with a vine wrapped around her wrist, and with a teeth-bearing keen legs convulsing the horror shrieked and fell off to be kicked away into the dimness. Its victim was loaded onto a sling and carried by his fellows.

The attacks were almost continuous. From above behind the side the front. Things even slithered up out of the crushed-down matter they were walking on. Big things little things all bristling with every natural weapon he'd ever heard of. And a few he wouldn't have dreamed existed. Things cracked by lasers hacked by machetes, destroyed by the symbolic plants. Still they came on claws.
grasping tendrils reaching, teeth slaver-
ing spitting acids, dribbling caustics limbs failing tentacles reaching-reaching--

Despite all their efforts, there was no second casualty and even before that victim could be settled in a sling to be carried. a third one

The trogs, his guide informed him between attacks, are among the most dangerous of the floor dwellers, thanks to their claws and teeth, their running and ferocity. They glide through the ground like sunbeams through broken clouds. They kill and eat and breed prolifically a dozen or more to the litter and so survive. They're marsupial and it the mother's killed, the tough pouch convulses shut, protecting the litter against all but the worst of tooth and claw and acid. Then they are tiny and the pouch is small, often the killer swallows it whole. But inside the stomach, the dissolvents act on the pouch in a curious way. The pouch is a small nervous system of its own, it attaches itself to the stomach wall and absorbs nutrients from its surroundings to feed the litter. The litter grows until it completely blocks off the stomach, and the killer starves. Then the litter eats its way out of the pouch fast, before the floor dwellers can devour corpse pouch litter and all.

But would you have believed this? she finished with a grim nod to the voracity around them. 'Any of this if you hadn't seen it with your own eyes. Actually experienced-the-fact?'

Around him birth and death alike exploded in the green white light. 'How long do you think a blind trog would survive?'

"Seconds," he admitted. "I minutes, no more. But can you understand? I have to try!" Despite the protective clothing he'd been given things had burrowed under it. He could feel the skittering legs-or were they tendrils?-in a dozen places. He jumped abruptly as a white-hot needle bored in just below the point of his left shoulderblade.

And then a trog attacked. It had the cunning to go for one of the back points, but the trogs were all watching one another and a loud voice gave the alarm before the victim hit the ground. The trog tore off a great chunk of its victim with its teeth and ran, the bleeding strip dangling from its mouth. One of the guards made a throwing motion with his arm, and the trog went down, its body still clamped tightly between its teeth. By the time they ran up to it, both the trog and its gruesome treasure were being swarmed over by hundreds of tiny crawling and flying things.

He watched, gulping and unable to speak. Dead eyes yellow green like hers stared up at him, the white fur was slimed with dark blood, the teeth glistening with it. As he watched the body disintegrated and the swarm ate it, bite by bite. It was no longer a body; it had become something but a heap of crawling, fighting-

Fascinated, he continued to watch until he was staring at a scatter of yellow bones polished gleaming clean. Something no bigger than his hand, a cattily gray ball of living velvet ambled over snapped off a rib, and chewed it with gusto. The rib went down in seconds, and the ball cracked off a second and began chewing but an odd growled rumble made it freeze and then scurry hastily away.

The dead guard was being attended to by one of the trogs. The doctor was embarrassed professionally. It was his duty after all to tend the wounded. He had seen the bright arterial blood spurtting from the torn throat, but the trog had been the greater complication. Even so, he told himself, what could he have done with the few supplies he'd brought with him? He was about to ask why the corpse hadn't been attacked by the crawling things when the "corpse" fluttered her eyelids.

An even chance for her if we turn back now, the chief of the guard said.

"But why?" It would have taken a high-T machine to have stopped the bleeding in time; I don't understand.

She shrugged. "What do you do with machines? We do with life." Impatiently. "How many of us must die before you are convinced?"

His head flicked back the way they'd come when again forward drawn by the inexorable compulsion drawn to the floor, the hotbed of life knowing he was a tool, knowing it was failure. His failure he couldn't face and yet, he licked his lips and said, "As long as there's a chance, any chance that--"

He didn't see the chief make a gesture to a guard standing directly behind him. He didn't see that guard move. Then he didn't see anything at all. Not even the guards' rufus mixture of regret and admiration as she gazed down at his limp body.

He opened his eyes to an almost perfect replica of his room back at Continental General. It wasn't until he reached out his hand to the intercom that he realized it was a clever fake. Everything was plant growth. But even as intellect recognized falsely, his instincts were relaxing so that he was already smiling muzzily when the great boulder crumbled in clothes in the traditional blue of surgery service.

"Don't tell me plants, murmured a man purged temporarily at least of every emotion but a sort of languid curiosity. But how did you get them the right shade of blue?"

She twirled at him, her fair curling and uncurling jovously. 'Oh you're feeling better at last. Wouldn't a little sun be nice eh? Easy over now-

He had a lot of time to think sitting in the warm sunlight shaded by a friendly leaf. 'I can teach you as much as you can teach me," he told them. And it was true. He never found their secret, how they grew the plants they did, but he isolated a dozen useful ones and helped them develop a dozen...
more from the little saprophyte that could be clamped on an open wound and would seal in seconds, reducing blood loss immeasurably to a seed that when swallowed went directly to an ulcer and grew over it, protecting all the delicate tissues. He taught them new medical techniques: how to set a bone pin, how to treat the stump of a limb so that when it healed, it could be fitted with a (hand-carved) prosthesis; how to transplant organs and how to do a bypass.

And then the workshop came. When it left, he went with it, taking supplies of all the plants he thought would be useful on other primitive worlds, as well as the Agnosa seeds he had learned to love chewing.

His patient had been right as much as he loved his work: this was the world, and it was better that he leave it.

He knew that he could never go back to his own world. Too many years, too many changes, had alienated him as much as any of the wombers.

And the years passed. Few for him many for the worlds spinning warm and smug around their suns and he discovered that thanks to relativistic time contraction and the simultaneity projector (were people really going through the projector now?) he was becoming a legend. Whole worlds were grateful to Johnny Healersend.

Even the wombers took to calling him by that first in gentle derision later from habit, and he gradually forgot he had once been called by any other name.

It was on a world called Gatchegoaat that he found the last piece of his personal puzzle. Gatchegoaat had projectors, and a fairly high level of technology, so that he was learning as well as teaching. When he learned and taught as much as he could and knew that his ship would be orbiting for several standard weeks yet he asked as he had on many other worlds what sights his colleagues recommended he see.

Everyone agreed that the one thing he mustn't miss was the Pan-Art Exhibition in the Septmillennial Memorial Auditorium. The Auditorium was multilevel, a freeform huggeness in transparent weather shielding.

He hastened in the slitting entrance, a radiation-scarred old man, and an ovoid shimer materialized at his elbow. May I direct you to any specific exhibit?" the ovoid inquired.

"Have you anything here by the Sequoan frogulode Inanna Kintanktan?"

"A man of taste! the ovoid purred. Do you prefer Early Mature or Final period?"

"All three," he said.

In the Early display he was pleased to see a copy of Mayflight in the Morning enlarged so that it sang baritone instead of soprano. When they tried to arrange some sort of credit so he could have another copy to replace the one left behind somewhere long ago, he was embarrassed because they refused any exchange. A middle-aged man, attired only in Mercury's winged shoes, came sailing out on a striped orange and lime flying disc. He was holding a large sized copy in his arms and he refused to take anything. The artwork would be the smallest possible appreciation to Johnny Healersend from the grateful world of Gatchegoaat.

It was the man—"My current label is Drifting-through-Anomie," he said—who insisted on guiding him through the rest of the display which ended in a series of unitized pieces. "Why unified?" he wondered aloud, his hands caressing a piece that curved subtly around and through itself. "It's the custom here, with pieces unified by the artist, or where the title is unknown or has been lost!"

"Solitism," he said, still playing with the piece.

"Good, good, very good!" Drifting-through-Anomie beamed. "Should I add it to the list of suggested titles?"

"No." He continued to turn the piece shaking his head. "So many pieces I don't recognize and I thought most of her work I must be getting senile."

"Ideas super laden!" Drifting-through-Anomie was appalled. "No these would be the pieces discovered on Sequoia after you left there to begin your pilgrimage I'm sure!"

"Discovered after—" His mouth dropped open. "You mean she was alive after all! She was alive, and I left her!"

"I'm sure not! Drifting through Anomie cooked his head to one side as if listening to unheard silent voices, as he undoubtedly was. No, the first work of her final period was discovered in Staryear 809 at least two hundred years after she returned to her native world. The next three—"

"Two hundred?"

"Oh dear! How mannerless of me! You'd like to see it in situ, wouldn't you?" Between them a tiny sphere appeared and the doctor realized it was a hologram taken from the crest. It was a wobomer who spotted it—"The view descended, hovered over the treetops, and focused on the oddly convoluted crest of one particular tree, Acenulplius."

"The style is unmistakable, of course. The original is about seventy meters high and about twenty-five meters in diameter and its song has been recorded—a deep rumble of triumph filled the air around them. Though how that great genius managed to shape the growth of the trees we don't know!"

"The doctor thought of a hand putting a seed into a mouth, the mouth spitting it out again—of chemical signals of amazing complexity that make a body grow and change—of a world where plants and animals had grown so interrelated that he had often thought of it as one immense complex single living organism a living world that isolated outside contaminants in deadness—and he knew how his hosts grew their medical and other miracles and why the host had had to return. He smiled gently at Drifting-through-Anomie.

"They ate her soul with her bones!" he said.

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**BIRTH ON ICE**

CONTINUED FROM PAGE 50

...ready being researched for use in emergency government burkers.

But before they can prove that cryogenic embryos can outlast a nuclear attack, scientists have evaluated the potential damage to frozen animals from the natural radiation to which we are all exposed daily. During cryostorage normal enzyme repair mechanisms of cells do not function. Even so, normal levels of background radiation would be so low that 50 percent of mouse embryos stored between 200 and 1,000 years would be able to survive. Whittingham predicts.

This is based on collaborative work with geneticists Dr Mary Lyon and Dr. Peter Glenister at the Medical Research Council's Radiobiology Unit in Harwell England. Dr Lyon bombarded frozen mouse embryos with up to 100 times the natural background dose of radiation for periods of six months to 27 months.

At all radiation levels the embryos were capable of development to the implantation stage Those transplanted into adult females mice developed into fetuses. Some were allowed to proceed to normal birth and the resulting mice mated.

Twenty to 30 percent of the 7,000 embryos used in these experiments were born. Although researchers are confident that they can improve with better techniques, Lyon has calculated that about 500 mouse embryos would have to be stored in ice to provide a surviving colony with a good safety margin. Thus the preservation of unique genetic stocks of mice by storage as frozen embryos is now a feasible proportion she has reported.

If the finding proves to be similar in man then anthropologists in 32,000 years might decide to retrieve one of our contemporaries from suspended animation. By then, if history is anything to go by the average human could be as different from us as we are from the hairy Neanderthals.

Long before that day the benefits of frozen-embryo storage will be reaped in medicine and agriculture. In research, for instance, the major advantage of using inbred animals is to maintain uniformity. Unfortunately genetic drift is difficult to control because of the continual natural mutations that gradually accumulate in lab animals. This can distort the results of similar animal research carried out at different centers. Alternatively cryogenic animals can remain constant, created specifically for a set of tests.

Despite present progress, we are still exploring the footills of the cryogenic potential for man. Within the next few years cryogenic storage should begin to ameliorate the widespread problems of infertility in marriage such as those faced by Francesco and Mark. For the future it just might be the closest we'll ever come to attaining immortalty.
Our readers love to test themselves. After we published "The World's Hardest I.Q. Test" in April 1979, so many of you sent in answer sheets—about 25,000 at last count—that the California society scoring the test was overwhelmed by the volume and fell several months behind in processing. We apologize again for the inconvenience this caused you.

The results of that test are now in, and we couldn't be prouder. Among the first 20,000 persons whose answer sheets were scored, the average I.Q. was 137. An I.Q. of just 133 on a standardized test puts you above 98 percent of the general population and makes you eligible for membership in Mensa, the high-I.Q. society. Well over half of you scored above the Mensa qualification level.

Ten percent of the Omni readers who entered had I.Q.'s of 154 or higher. Two percent of you scored above 163, the cutoff for membership in the Four Sigma Society makers of the test. Four hundred Omni respondents qualified for membership in this elite club. Twenty of you had I.Q.'s in the intellectual stratosphere above 171.

The volume of response more than confirmed the popularity of this I.Q. feature. We have decided to try it again, this time with the help of Mensa, and with a test that readers may score themselves. The answers and a complete analysis of the test will appear next month.

Mensa is an international society with more than 42,000 members in the United States alone. Each year about 35,000 people try to qualify for membership and 15,000 succeed. Some of these people go on to become active members, most are satisfied merely to know they made it. There is only one qualification for membership in this organization—a score on any standardized intelligence test that is in the upper 2 percent of the general population. On the Wechsler Adult Intelligence Scale (WAIS) this corresponds to an I.Q. of 130. On Scholastic Aptitude Tests a qualifying score is 1250 (verbal and math combined).

Other than their ability to get high scores on intelligence tests (which may measure nothing more significant than test taking skills), Mensa members have little in common. The society has no restrictions on race, religion, sex, and age (there are currently three members who are four years of age and several in their nineties).

With the help of Alice Fixx, public relations director for Mensa, we prepared a preliminary test consisting of 46 items similar to those found in standardized intelligence tests. Marvin Grossworth, a past chairman, helped organize a session of the New York City Mensa, at which 88 members jointly took this test.

After scoring the test (each scored another's paper), we went over it item by item. Members were asked to criticize or praise the items, point out ambiguities, suggest alternate interpretations, or judge items too difficult or too easy. As a result of this session, 7 items were discarded, leaving the 39 items presented here.

We did not impose a time limit on the Mensa tests, but we asked them to work as fast as they could to raise their hands when they were finished. A tally indicated that most took about 35 minutes to complete the 46-item test. For this 39-item test, allow a limit of 30 minutes to make your score comparable to those of the Mensa sample.

Next month we'll give you the answers, with explanations and some data that will help you make sense of your score. (1) A report on which questions were easiest and which were hardest for Mensa's members; (2) a test profile showing how the 88 Mensa members scored; and (3) guidelines for converting your raw score into a rough estimate of your I.Q.

Scores on this test are not recognized for membership in Mensa, but they can indicate whether you would be likely to do well on an official test. The procedure for applying to Mensa will be presented here, with the scoring instructions, next month. Good luck!

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4 Study the four drawings in the top row. Which of the four drawings in the bottom row should appear next in the series?
5. The arrows spell a simple word. What common English word do they spell?

6. In the square below, a rule applies both from top to bottom and from left to right. Find the rule and figure out the missing number.

Example:

<table>
<thead>
<tr>
<th>2</th>
<th>7</th>
<th>9</th>
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<td>7</td>
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<td>4</td>
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<td>4</td>
</tr>
</tbody>
</table>

7. Which drawing in the bottom row logically comes next in the series that is shown in the top row?

(a) (b) (c) (d)

8. Complete the analogy by writing one word on the lines ending with the printed letters.

bead is to (second word) as (first word) is to (third word)

9. Underline the two words in parentheses that have the same relation as the two words in the first phrase.

Island is to water as (without, hatching, counter, diagonal, parameter)

10. If Dorothy either left or right at the stop sign, she will run out of gas before reaching a service station. She has already gone past a service station to turn around and return to it. She does not stop at a service station ahead of her. Therefore:

(a) Dorothy may run out of gas.
(b) Dorothy will run out of gas.
(c) Dorothy should have taken this route.

11. Find the number that logically completes this series.

1, 2, 6, 12, 36, ...

12. Which building logically is next in the series?

(a) (b) (c) (d) (e)

13. M is above N and O.

N is above O and below P.

Therefore:

(a) M is not above O and P
(b) O is above N
(c) P is above O
(d) P is above P

14. In the group of words below, underline the two words that are most similar in meaning.

Example: nail, lime, sun, floor, mug, beam, jump, wood, my, chuckle, silver

15. Which figure in the lower row should appear next in the series of figures in the upper row?

(a) (b) (c) (d)

16. If A*B = 24, B*C = 24, B*D = 48, and C*D = 96, what then does A*B*C*D equal?

(a) 480 (b) 744 (c) 768 (d) 874

17. Complete the top series with one of the lattice figures.

(a) (b) (c) (d)

18. "Don't throw good money after bad" means:

(a) Take your loss and walk away from it.
(b) Don't gamble; think of the future.
(c) Don't invest in a losing proposition.
(d) Don't borrow to gamble.

19. Sam, Fred, Steve, and Joe are weight lifters. Joe can outlift Sam and Fred can outlift Joe. Steve can outlift Sam. Therefore:

(a) Both Sam and Fred can outlift Joe.
(b) Joe can outlift Sam but can't outlift Steve.
(c) Joe can outlift Sam by more than he can outlift Steve.
(d) None of the above is true.

20. Select the two figures in the following series that represent mirror images of each other.

(a) (b) (c) (d) (e)
21. Determine what process was followed in arriving at the prices below and find the price of the last item.

<table>
<thead>
<tr>
<th>Item</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shirt</td>
<td>$50</td>
</tr>
<tr>
<td>Tie</td>
<td>$30</td>
</tr>
<tr>
<td>Pen</td>
<td>$40</td>
</tr>
<tr>
<td>Sweater</td>
<td>$70</td>
</tr>
<tr>
<td>Blouse</td>
<td>$7</td>
</tr>
</tbody>
</table>

22. Which plate in the bottom row belongs next in the series in the top row?

(a) (b) (c) (d)

23. What number logically comes next in this series?

7, 12, 17, 22

24. The old saying "The good is the enemy of the best" most nearly means:

(a) If you are good, you will beat your enemy
(b) Be good to your best enemy
(c) Don't accept less than your best
(d) The good struggle against the best

25. What is to X as

X is to Y as

(a) (b) (c) (d)

26. Alex, Allen, Carol, Celia, and Sharon took intelligence tests. Celia scored higher than Carol but Allen scored higher than Celia. Carol outscored Alex but Allen outscored Carol. Sharon scored lower than Allen. Therefore:

(a) Celia scored higher than Alex but lower than Carol
(b) Both Alex and Allen outscored Carol
(c) Sharon scored higher than Carol
(d) Celia outscored Alex by more than she outscored Carol
(e) None of the above is definitely true

27. What number follows logically in this series?

9, 12, 21, 43

28. Which one of the lettered diagrams in the bottom row can be turned over or rotated to become the same as the diagram below?

(a) (b) (c) (d)

29. In the group of words below underline the two words that are most nearly alike in meaning:

this, flower, volume, story book

30. If Barbara's daughter is my grandmother, what relationship am I to Barbara?

(a) Her grandson
(b) Her mother
(c) Her daughter
(d) Her granddaughter
(e) I am Barbara

31. In a row of four houses, the Whites live next to the Carsons but not next to the Reeds. If the Reeds do not live next to the Lanes, who is the Lane's next-door neighbor?

(a) The Whites
(b) The Carsons
(c) Both the Whites and the Carsons
(d) Impossible to tell

32. Wall is to window as knife is to

(a) skin
(b) hair
(c) eye
(d) tooth

33. Select the two figures in the following series that represent mirror images of each other.

(a) (b) (c) (d) (e)

34. What is the next number in this series?

11, 20, 31, 44

35. Underline the two words in parentheses that have the same relation as the two words in the first phrase:

Eyelet is to eye as (window, glass, view, curtain, lash)

36. Complete the following analogy by writing one word on the lines, ending with the printed letter:

Skull is to brain as shell is to __________ K

37. Complete this diagram:

(a) (b) (c) (d)

38. A stream cannot rise higher than its source" means:

(a) You decline after achieving your highest level
(b) Streams of knowledge can't come from high sources
(c) Your stream of consciousness is highly resourceful
(d) Your stream of achievement is limited by your background

39. Underline the two words in parentheses that have the same relation as the two words in the first phrase:

Hair is to head as (spout, kettle, handle, pepper, lid)
practise their little pagan rituals and do a lot of dancing around the Maypole and chanting and screwing. You expect me to believe that a bunch of gentle, goofy witches are going to make war on the Empire?"

She said. "Not war. An invasion."

"Explain."

"One of their high priests has proclaimed San Francisco a holy place and has instructed them to come down here and build a Stonehenge in Golden Gate Park in time for proper celebration of the winter solstice. There are at least a quarter of a million pagans in the Willamette Valley and more than half of them are expected to take part. According to our Mendocino main the migration has already begun and thousands of Wiccans are spread out between Mount Shasta and Ukiah right now. The solstice is only seven weeks away. The Wiccans may be gentle but you're going to have a hundred thirty thousand of them in San Francisco by the end of the month pitching tents all over town."

Holy Jesus," Christensen muttered.

"Can you feed that many strangers? Can you find room for them? Will San Franciscans meet them with open arms? Do you think it'll be a love festival?"

"It'll be a fucking massacre," Christensen said tonelessly.

Yes, the witches may be nonviolent, but they know how to practice self-defense. Once they're attacked, there'll be rivers of blood and it won't all be Wiccan blood.

Christensen's head was pounding again. She was absolutely right. Chaos, bloodshed, and a merry Christmas to all. He rubbed his aching forehead turned away from her and stared out at the deepening twilight and the sparkling lights of the city on the other side of the bay. A bleak, bitter depression was taking hold of his spirit. He signaled for another round of drinks. Then he said slowly. They can't be allowed to enter the city. We'll need to close the imperial frontier and turn them back before they get as far as Santa Rosa. Let them build their god damned Stonehenge in Sacramento if they like. His eyes flickered. He started to assemble ideas. The Empire might just have enough troops to contain the Wiccans by itself, but I think this is best handled as a regional problem. We'll call in forces from our allies as far out as Petaluma and Napa and Palo Alto. I don't imagine we can expect much help from the Free State or from San Jose. And of course Monterey isn't much of a military power, but still..."

"We are willing to help," Ms. Sawyer said. "To what extent?"

"We aren't set up for much actual warfare, but we have access to our own alliances from Salinas down to Paso Robles and we could call up say five thousand troops all told. Would that help?"

"That would help."

Christensen said.
"It shouldn't be necessary for there to be any combat. With the imperial border sealed and troops posted along the line from Guerneville to Sacramento, the Wicans won't force the issue. They'll avoid their revelation and celebrate the scostice somewhere else."

"Yes," he said, "I think you're right. He leaned toward her and asked, 'Why is Monterrey willing to help us?'"

We have problems of our own brewing—San Jose. If we are seen making a conspicuous gesture of solidarity with the Empire, it might discourage San Jose from proceeding with its notion of annexing Santa Cruz. That amounts to an act of war against us. Surely San Jose isn't interested in making any moves that will bring the Empire down on its back.

She wasn't subtle, but she was effective. Oud pro quo: We help you keep the witches out, you help us keep San Jose in line, and all remains well without a shot being fired. These goddamned little nations, he thought, these absurd jerkwater sovereignties, with their wars and alliances and shifting confederations. It was like a game, like playground politics. Except that it was real. What had fallen apart was not going to be put back together not for a long while. And this miniaturized Weltpolitik was the realist reality there was just now. At least things were saner in Northern California than they were down south, where Los Angeles was gobbling everything and there were rumors that Pasadena had the Bomb. Nobody had to contend with that up here.

Christensen said, "I'll have to propose all this to the Defense Ministry of course. And get the Emperor's approval. But basically I'm in agreement with your thinking."

"I'm so pleased," she thought. "And I'm very glad that you took the trouble to travel up from Monterey to make these matters clear to us."

"Mmm. Yes. He found himself studying the sharp planes of her cheekbones, the delicate arch of her eyebrows. Not only was she cool and competent, Christensen thought, but now that the business part of their meeting was over he was coming to notice that she was a very attractive woman and that he was not as tired as he had thought he was. Did international politics allow room for a little recreational hanky-panky? Metternich hadn't jumped into bed with Talleyrand nor Kissinger with Indra Gandhi but times had changed after all and—No. He shook off that entire line of thought. In these shabby days they might all be children playing at being grown-ups but nevertheless international politics still had its code and this was a meeting of diplomats; not a blind date or a singles bar pickup. You will sleep in your own bed tonight—" he told himself and you will sleep alone."

All the same he said, "It's past six o'clock. Shall we have dinner together before I go back to the city?"

"I don't know much about Berkeley restaurants. We're probably better off eating right here."

"I think that's best," she said. "They were the only ones in the hotel's enormous dining room. A staff of three waited on them as it they were the most important people who had ever dined there. And dinner turned out to be quite decent. He thought—calm and alone and sand dabs and grilled thresher shark was washed down with a dazzling bottle of Napa Chardonnay. Even though the world had ended it remained possible to eat very well in the Bay Area and the breakdown of society had not only reduced maritime pollution but also made local seafood much more readily available for local consumption. There wasn't much of an export trade possible with eleven heavily guarded national boundaries and eleven sets of customs barriers between San Francisco and Los Angeles."

Dinner conversation was light relaxed—diploomatic chitchat gossip about events in remote territories reports about the Voodoo principality expanding out of New Orleans and the Sioux conquests in Wyoming and the Prohibition War going on in used to be Kentucky. There was a bison herd again on the Great Plains she said close to a million head. He told her what he had heard about the Suicide People who ruled between San Diego and Tijuana and about King Barnum & Bailey III! who governed in northern Florida with the aid of a court of circus freaks. She smiled and said, 'How can they tell the freaks from the ordinary people?' The whole world's a circus now isn't it? He shook his head and replied, 'No, a zoo,' and he beckoned the waiter for more wine. He did not ask her about internal matters in Monterey and she tactfully stayed away from the domestic problems of the Empire of San Francisco. He was feeling easy buoyant a little drunk more than a little drunk to have to answer questions now about the little rebellion that had been suppressed in Sausalito or the succession thing in Walnut Creek would be a bringdown and bad for digestion.

About half past eight he said, 'You aren't going back to Monterey tonight are you?"

'No!' It's a five-hour drive assuming no more troubles with the San Jose Highway Patrol. And the road's so bad below Watsonville that only a lunatic would drive it at night. I'll stay here at the Claremont."

'Good. Let me put it on the imperial account.

'That isn't necessary We—"

The hotel is always glad to oblige the government and its guests."

Ms. Sawyer shrugged. 'Very well. We'll reciprocate when you come to Monterey."

Fine."

And then her manner suddenly changed. She shifted in her seat and
tigated and played with her silverware looking awkward and ill at ease. Some new and big topic was obviously about to be introduced and Christensen guessed that she was going to ask him to spend the night with her. In a fraction of a second he ran through all the possible merits and demerits of that and came out on the plus side and had his answer ready when she said, "Tom, can I ask a big favor?"

"Which threw him completely off balance. Whatever was coming, it certainly wasn't what he was expecting. I'll do my best."

"I'd like an audience with the Emperor. What?"

"Not on official business. I know the Emperor talks business only with his ministers and pravvycouncillors. But I want to see him, that's all."

"Color came to her cheeks. Doesn't it sound silly? But it's something I've always dreamed of, a kind of adolescent fantasy. To be in San Francisco to be shown into the imperial throne room to kiss his ring. All that pomp and circumstance, I want it, Tom. Just to be there, to see him. Do you think you could manage that?"

He was astounded. The facade of cool tough competence had dropped away from her revealing unanticipated absurdity. He did not know what to answer. She said, "Monterey's such a poky little place. It's just a town. We call ourselves a republic, but we aren't much of anything. And I call myself senator and diplomat but I've never really been anywhere. San Francisco two or three times when I was a girl, San Jose a few times. My mother was in Los Angeles once, but I haven't been anywhere. And to go home saying that I had seen the Emperor— Her eyes sparkled. "You're really taken aback aren't you? You thought I was all ice and microprocessors and instead I'm only a hick, right? But you're being very nice. You aren't even laughing at me. Will you get me an audience with the Emperor for tomorrow?"

"I thought you were afraid to go into San Francisco."

"She looked abashed. That was just a ploy to make you come over here to get you to take me seriously and put yourself out a little. Diplomatic wiles. I'm sorry about that. The word was that you were snotty that you had to be met with strength or you'd be impossible to deal with. But you aren't like that at all. Tom, I want to see the Emperor."

"He does give audiences—doesn't he?"

"In a manner of speaking, I suppose it could be done."

"Oh, would you? Tomorrow?"

"Why wait for tomorrow? Are you being sarcastic?"

"Not at all. Christensen said. "This is San Francisco. The Emperor keeps weird hours just like the rest of us. I'll phone over there and see if we can be received."

"He hesitated. "I'm afraid it won't be what you're expecting."

"What do you mean? In what way?"

"The pomp, the circumstance. You're going to be disappointed. You may be better off not meeting him. Actually stick to your fantasy of imperial majesty. Seriously, I'll get you an audience if you insist. But I don't think it's a great idea. Can you be more specific?"

"No."

"I still want to see him. Regardless."

"He left the dining room and with misgivings began arranging things. The telephone system was working sluggishly that evening, and it took him fifteen minutes to get the whole thing up, but there were no serious obstacles. He returned to her and said, "The ferry will pick us up at the marina in about an hour. There'll be a car waiting on the San Francisco side. The Emperor will be available for viewing around midnight. I tell you that you're not going to enjoy this. The Emperor is old and he's been sick and he isn't a very interesting person to meet."

"All the same, " she said. "The one thing I wanted when I volunteered to be the envoy was an imperial audience. Please don't discourage me."

"As you wish. Shall we have another drink?"

"How about these?" She produced an enameled cigarette case. "Humboldt County's finest. Gift of the Free State."

"He smiled and nodded and took the joint from her. It was elegantly manufactured, finely coiled, paper gold monogrammed lighter cap even with the filter. Everything else has come apart. He thought that the technology of marijuana is at its highest point in history."

"He flicked the cap, took a deep drag, and passed it to her. The effect was instantaneous, a new high cutting through the woof of bourbon and wine and brandy already in his brain clearing it expanding his limp and sagging soul. When they were finished with it they floated out of the hotel. His driver and hers were still waiting in the parking lot. Christensen dismissed his and they took the Republic of Monterey car down the slopes of Berkeley to the marina."

"The boat from San Francisco was late. They stood around shivering at the ferry slip for twenty minutes peering bleakly across at the glittering lights of the far-off city. Neither of them was dressed for the nighttime chill and he was tempted to pull her close and hold her in his arms but he did not. There was a boundary he was not yet willing to cross. He thought, "I don't even know her first name."

"It was nearly eleven by the time they reached San Francisco."

"An official car was parked at the pier. The driver hopped out saluting bustling about— one of those preposterous little civil service types. Doubtless keenly honored to be taking bigwigs around late at night. He wore the red and gold uniform of the imperial dragoons, a little frayed at one elbow. The car coughed and sputtered and reluctantly lurched into life up Market Street to Van Ness and then north to the palace. Miss Sawyer's eyes were wide and she stared at the ancient high-rises along.
The envoy from Monterey seemed to draw back tense and rigid repelled unable or unwilling to go closer but Christensen persisted urging her onward until she was no more than a dozen feet from the throne. A sickly-sweet vaguely familiar odor emanated from the old man.

What do I do? she asked panicking.

When I introduce you I go forward courteously if you know how to touch the orb then step back. That's all. She nodded.

Christensen said Your Majesty the ambassador from the Republic of Monterey Senator Sawyer to pay her respects.

Trembling she went to him curtseyed touched the orb. As she backed away she nearly fell but Christensen came smoothly forward and steadied her. The Emperor giggled again a shrill horrid cackle. Slowly carefully Christensen guided the shaken Miss Sawyer from the stage.

How long has he been like this? Two years three maybe more.

He thought about the Realm of Wicca far off up there in green happy Oregon sending kindly goddess-worshipping neopagans to California to celebrate the rebirth of the sun - a mess.

They emerged into the clear cold night Christensen said I'll ride back to the ferry slip with you before I go home. Where do you live?

In the other direction Out near Golden Gate Park.

She looked up at him and moistened her lips I don't want to ride across the bay in the dark alone at this hour of the night is it all right if I go home with you?

Sure he said.

She managed a jaunty smile You're straight aren't you?

Sure Most of the time anyway I thought you were Good.

They got into the car Frederick Street he told the driver between Clayton and Cole.

The trip took twenty minutes. Neither of them spoke. He knew what she was thinking about the senile Emperor dawdling and babbling under the bright spotlights. The mighty Norton VII ruler of everything from San Rafael to San Mateo from Half Moon Bay to Walnut Creek. Such was pom and circumstance in imperial San Francisco in these latter days of Western civilization.

Christensen sent the driver away and they went upstairs. The cats were hungry again.

It's a lovely apartment she told him.

Three rooms bath hot and cold running water No bad for a mere foreign minister. Some of the boys have suites at the palace but I like it better here. He opened the door to the deck and stepped outside. Somehow now that he was home the night was not so cold. He thought about the Realm of Wicca far off up there in green happy Oregon sending a hundred fifty thousand kindly goddess-worshipping neopagans down here to celebrate the rebirth of the sun. A nuisance a mess a headache Tomorrow he'd have to call a meeting of the Cabinet when everybody had sobered up and start the wheels turning and probably he'd have to make trips to places like Petaluma and Palo Alto to get the alliance flanged together Damn but it was his job.

Someone had to carry the load he slipped his arm around the slender woman from Monterey.

The poor Emperor she said softly.

Yes he agreed The poor Emperor Poor everybody.

He looked toward the east. In a few hours the sun would be coming up over that hill out of the place that used to be the United States of America and now was a thousand thousand crazy fractured fragmentated entities. Christensen shook his head. The Grand Duchy of Chicago he thought. The Holy Carolina Confederation The Three Kingdoms of New York The Empire of San Francisco. No use getting upset much too late for getting upset. You played the hand that was dealt you and you did your best and you carved little islands of safety out of the night. Turning to her he said I'm glad you came home with me tonight. He brushed his lips lightly against her Come. Let's go inside.
Usually I have range--I have.

I saw a group there, and immediately I glanced around. I couldn't believe the size of the machine. It was a 4-GeV high-energy accelerator (SLAC).

The size was overwhelming. Richter, the physicist, was operating the machine. He was dressed in a white lab coat, and he looked like a giant compared to the machine.

At 10 a.m., the machine was running. Richter was at the controls. He was wearing a headset, and he was talking into it. He seemed to be in a hurry. He was making adjustments to the machine. Richter was a genius, and I knew it. He was operating the machine with such ease.

At 10:30 a.m., Richter stopped the machine. He was wearing a headset, and he was talking into it. He seemed to be in a hurry. He was making adjustments to the machine. Richter was a genius, and I knew it. He was operating the machine with such ease.

Finally, at 11 a.m., the machine was running. Richter was at the controls. He was wearing a headset, and he was talking into it. He seemed to be in a hurry. He was making adjustments to the machine. Richter was a genius, and I knew it. He was operating the machine with such ease.

At 11:30 a.m., Richter stopped the machine. He was wearing a headset, and he was talking into it. He seemed to be in a hurry. He was making adjustments to the machine. Richter was a genius, and I knew it. He was operating the machine with such ease.

At 12 p.m., the machine was running. Richter was at the controls. He was wearing a headset, and he was talking into it. He seemed to be in a hurry. He was making adjustments to the machine. Richter was a genius, and I knew it. He was operating the machine with such ease.

At 12:30 p.m., Richter stopped the machine. He was wearing a headset, and he was talking into it. He seemed to be in a hurry. He was making adjustments to the machine. Richter was a genius, and I knew it. He was operating the machine with such ease.

At 1 p.m., the machine was running. Richter was at the controls. He was wearing a headset, and he was talking into it. He seemed to be in a hurry. He was making adjustments to the machine. Richter was a genius, and I knew it. He was operating the machine with such ease.

At 1:30 p.m., Richter stopped the machine. He was wearing a headset, and he was talking into it. He seemed to be in a hurry. He was making adjustments to the machine. Richter was a genius, and I knew it. He was operating the machine with such ease.

At 2 p.m., the machine was running. Richter was at the controls. He was wearing a headset, and he was talking into it. He seemed to be in a hurry. He was making adjustments to the machine. Richter was a genius, and I knew it. He was operating the machine with such ease.

At 2:30 p.m., Richter stopped the machine. He was wearing a headset, and he was talking into it. He seemed to be in a hurry. He was making adjustments to the machine. Richter was a genius, and I knew it. He was operating the machine with such ease.
only difference in them is that Ting called his discovery the J and Richter called his discovery the psi. Today diplomacy dictates its proper name. On the East Coast it is the J, on the West it is the psi. And if you aren't sure just call it the J/Psi, or gypsy.

What is the J? After some wrangling, physicists now believe it to be the first of a large new class of particles that contain a special kind of quark called the charmed quark for strictly whimsical reasons. The particle itself reveals the richness of matter's structure and provides a new tool for exploring this structure. In 1976 Richter and Ting received the Nobel Prize for their simultaneous and independent discovery. Richter, himself a Nobel laureate, sent Ting a telegram the day the prize was announced. Dear Sam, he asked, why do they give a prize to somebody who discovers something I couldn't understand?

The Nobel Prize has had surprisingly little effect on Ting's life-style. The only solid advantage he sees is that he goes to a Chinese restaurant people know who he is — without an American Express card. And I certainly get better service. Oh, yes, he adds, my daughters were even nice to me for about a month.

**A CHINESE REFUGEE**

If great events don't shake Ting's life much, it is because his roots run deep — all the way back to a vagebond childhood in China. Ting was born in Ann Arbor, Michigan, 45 years ago, but both parents were Chinese students at the University of Michigan, and returned home shortly after his birth because Japan had invaded China. Being patriotic sorts, they decided to go back to China. I was exactly point three years old at the time.

The future physicist spent the next nine years as a refugee. One step ahead of the Japanese. He saw quite a lot of China, though scarcely a glimpse of its classrooms. When you are a refugee, he says, you're worried about survival, not education: I went to first grade once, but only for a few days. Then I had to leave because there was bombing every day. If this experience left him with any scars they don't show. Asked what it was like during the war, Ting only smiles and says, Well, it was very good. Because I never had to go to school.

But all good things must end, and for Ting's family the end came with peace in 1945. They moved to Taiwan where Ting's parents taught at a university and he finally went to school. He was nine and could barely read. But he notes archly, I managed to catch up rather quickly.

In school. Ting became deeply engrossed with the concept of truth. The pursuit of truth ultimately sent him back to the United States to study at the University of Michigan. He enrolled in the school of engineering and nearly flunked out. I couldn't understand engineering drawings. So the next term I took some physics and mathematics courses. And then the Fermi

after that I wanted to take some more. But my advisor told me. You have taken more than your share in the engineering school. You should take some more circuitry or mechanical drawing. Well, I couldn't do that. I'd lose my scholarship. So my advisor said. Then you have to transfer to physics.

Ting says, I was interested in theoretical physics but because of this seduction I went to Berkeley Just as a helping hand. At Berkeley Ting was first exposed to the rigorous demands of high energy experimentation. Often he was expected to work round the clock readying an experiment for operation, making hasty repairs or monitoring voltage levels and particle counts. This dizzying breakneck pace is necessary because only a few experiments can be done at any given time on an accelerator, just as only a small section of the heavens can be examined at a time through a large telescope.

Ting now legendary for the long hours he spends on an experiment, took a while to adjust to the pace. I remember the first time I spent on the night shift. The next morning was really bad. Who on earth would do such a stupid thing spend all night running a stupid counter? But after some time I came to understand most of it: the importance of actually doing something, actually managing to get something working.

By the end of the summer Ting was hooked. Not so much because he thought the work particularly gratifying but because Perl said that if he stayed he would get his degree quickly. A graduate student can hear just about no sweeter words.

It took just a bit of prodding — however, to turn Ting into an experimental physicist. This added impetus came from George Uhlenbeck, a professor at Michigan who is famous for his discovery of the electron's spin.

Ting asked Uhlenbeck whether he should become a theoretical physicist. Well, Uhlenbeck said. If I were to do it over again I would do experiments. Why? An average experimentalist is very useful, and an average theoretician is not. In theoretical physics only a few theoreticians are really important. In an experiment whatever you do can make a contribution. Above all, Ting wanted to make a contribution. It was a standard talk of mine, Uhlenbeck recalls. Some people took it seriously. Thank God!

**AN AIRBORNE TASKMASTER**

Today Ting lives with his wife, Kay, and two daughters in a ranch-style house in Lexington, Massachusetts, a suburb of Boston. Kay is an architect designing a new home with their Nobel Prize money. But if the past is any indication, Ting won't spend much time in it.

Officially, he is a professor at MIT, but he spends much of his time en route from one giant particle accelerator to another. He makes 20 transatlantic crossings each year and spends only every other weekend at home.

Ting is notorious among particle physicists — hard workers in their own right — for his dedication and energy. He demands no less from his colleagues. Once students put up a gag sign in his office that demanded staff work 16 hours a day and seven days a week. Some weeks in reality that schedule would seem a vacation.

Ting is known for taking naps in the middle of the afternoon so he can turn up late at night, full of energy to prevent people from quitting early. Staffers grumble, but most members of the group seem to thrive on pressure. They know that these are the sacrifices they must make to live on the frontier of physics.

The working pressure is enhanced by another patented Ting trick. To make sure nothing is overlooked, he divides his group into two competing factions. As Ulrich Becker Ting's right-hand man, explains, One must avoid that famous dangerous thing — common sense belief. Everything is done twice double-checked. This meticulous care allows Ting to make an almost unprecedented claim. His only published mistakes are typographical errors. I think that if we were to make a mistake it would bother me, Ting says without a trace of a smile.

For Ting, physics is the only thing and experiments are the only truth. He is already planning projects into 1986. For him, experimental physics is not a job; it is a quest. Unless a thing is measured and confirmed Ting states. It does not exist. Ting's discoveries in particle physics confirm his existence and define the ultimate limits of reality.
Fantasy and surrealism dominated the more than 1,500 entries we received for our Cover Photography Contest, announced last January. Readers were asked to capture Omni's special editorial emphasis in a single photograph. Robert Kittila's winning entry appears on Omni's June cover (see last month's issue). This month, at right, we present the runners up. All finalists were selected by Omni Publisher and Design Director Bob Guccione.

John Pisano, of Fort Lewis, Washington, produced the second-place winner—a symmetrical, well-framed depiction of the Seattle Aquarium at sunset (shown at top, left). Pisano photographed this sea gull, which unknowingly crowns a triangular pattern in nature, on Ektachrome 64 film. Pisano received a silver-embossed certificate from Omni.

The third-place winner (shown at top, right) was created by Joseph Mauro, of Bethel, Connecticut. His rose-and-egg still life is the result of several developmental stages, including hand-coloring the two subjects with pigment before rephotographing them. Mauro used a Forox SD camera and a Nikon macro lens to record the compelling textural differences between egg and flower. Mauro included the Omni logo—presumably to help influence our decision. It didn't help. He received a bronze-embossed certificate of achievement for his effort.

Photographer Rick Ueda says his runner-up entry (shown at bottom, left) deals with man as an everlasting source of thought, energy, and imagination, no matter what environment he chooses to live in. Ueda built the set by hand in his studio. His photograph was taken with a 4" x 5" view camera loaded with Kodak Ektachrome sheet film, which was double-exposed.

"Streto Spheres" is the title of Erich Schrempp's runner-up (shown at bottom, right). Perched atop Chicago's Sears Tower, Schrempp shot a night-lit cityscape on high-speed Ektachrome film. The 35mm slide was then enlarged to a 4" x 5" transparency and rephotographed with ball bearings and Christmas ornaments.

The final product, Schrempp says, "is a squadron of enigmatic little orbs drifting over Chicago on a winter evening."

There are many accomplished photographers among the ranks of Omni readers. Spectacular levels of imagination and craftsmanship reflect the care with which readers respond to our Photo Contests. We want to see more. In the June Omni, we announced the third in a series of photography invitations. Readers are asked to portray the year 2000 by using cameras as crystal balls to peer into the future. Travel through time, using your imagination and the appropriate technology to capture the world a generation from now. We're waiting to see what you'll show us next.
instruction manual. I am clearly identified as the president of that company and Mr Mendelssohn is not mentioned at all. I have filed suit against Mr Mendelssohn for misrepresentation, and my lawyers may subpoena you as a witness. But in any case, thank you for writing about my company and my Robot Eggs.

MAX THE ROBOT
President
Intergalactic Robot Eggs, Inc

More Atomic Vets
As a veteran of 22 nuclear tests conducted by the U.S. government at Eniwetok Atoll in 1958, I feel both compelled and qualified to refute Lieutenant General Harry A. Griffith's letter [Forum, April 1981]. When General Griffith said that Eleanor Smith's article about atomic veterans in the November 1980 Earth column contained errors of fact, he was practicing the big lie technique which the Defense Nuclear Agency (DNA) has perfected over the years. Griffith would have the reader believe that this agency is exhausting all resources to help the atomic veteran when just the opposite is true.

First, Griffith alleges that hundreds of documents have been declassified and made available to the public through the National Technical Information Service (NTIS). The key word in this statement is through NTIS: for it absolves the DNA of further responsibility. NTIS annually publishes the Government Report and Announcement Index which is required to identify a document and its NTIS catalog number. If you can't afford $275 for the report, certain colleges and hospitals subscribe to the index. You must have the NTIS catalog number to obtain a document and there is a substantial charge.

Second, Griffith states that more than 40,000 veterans have contacted the DNA and received information. The omitted part is the quantity and quality of information that the DNA provides. When a veteran contacts the DNA, he receives a form to fill out concerning his participation in nuclear testing. Under the health portion of this questionnaire, the DNA asks whether you have any health problems without giving any indication of what diseases or problems a veteran could expect from radiation exposure.

After this initial contact, a veteran will never hear from the DNA again unless he is aggressive. Those who receive a DNA response are sent statements that they received little or any radiation during the tests. This is followed by a statement that tells you that scientists will be studying the radiation problem for years.

Third, Griffith forgot to mention how the DNA unsuccessfully tried to influence the study of the Smoky test veterans. The DNA paid for a contract with the National Academy of Sciences—National Research Council to duplicate the Dr Caldwell study with the same group of Smoky veterans. The result? Confirmation of Dr Caldwell's findings that leukemias have been occurring excessively among Smoky veterans. All of these leukemia victims received less than the federal guideline of five REMs.

Fourth, Griffith asserts that more than 99 percent of atomic veterans received less than five REMs. He speaks in terms of average exposure as if he were dividing up Morn's apple pie! The omission in this statement is the 28 airmen who as part of Operation Castle in 1954 were exposed to very high levels of radiation through an accident with a 17-megaton bomb.

There were also 239 Marshallese natives and 23 Japanese involved in this accident. The Japanese received almost immediate lump sum payments from the U.S. government and the Marshallese are still receiving free medical treatment for numerous radiation-related diseases.

This is documented in a Brookhaven National Laboratory study entitled, "A Twenty Year Review of Medical Findings in a Marshallese Population Accidentally Exposed to Radiactive Fallout." Three of the 28 airmen with whom I correspond have documents from the U.S. government stating their individual exposures were 86 REMs! However, since their initial medical examinations in 1954, the government has made no follow-up inquiries concerning their health.

The big lie technique will no longer work for concerned veterans have formed the National Association of Atomic Veterans (NAAV). Our headquarters is at 1109 Franklin Street Burlington IA 52601 Telephone 319-753-6112. NAAV provides atomic veterans with facts and assistance including the names and addresses of fellow participants.

George E. Mace
Hagerstown MD

FOR FUTURE REFERENCE

Moving? We need 4-6 weeks notice of a change of address. Fill in the attached form.

New Subscription or Renewal? One year of Omni is $8.50 in the U.S. $12.50 in Canada and overseas. Please enclose a check or money order for the appropriate amount and allow 4-8 weeks for delivery.

Listing/Unlisting Service? Omni makes the names and addresses of its subscribers available to other publications and outside companies. The publications and companies selected are carefully screened for their acceptability and quality of their offers. If you would like your name removed from this mailing list please check the appropriate box on the coupon.
by the year 2000 Losses caused by ozone in this region are estimated to be 233 million bushels. Millions of cubic feet of valuable timber is lost each year to the invisible pollution that weakens trees and slows their growth. Those who want to use coal Loucke warns must follow that plume of pollutants from the smokestack to its ultimate effects and only then decide whether the tradeoff is worthwhile.

The regions hardest hit will seldom be the ones that benefit from use of the coal. Ecological fallout from the Midwest will be visited on neighbors in the Northeast, which may soon have air pollution rivaling that of southern California. "If industrial conversion to coal continues," Loucke predicts, "the United States will experience severe food shortages, decreased forest growth, and an acceleration of the greenhouse effect. Loucke expects increased political tensions with Canada over environmental issues.

The nation's renewed interest in coal has intensified this warming trend. Production levels are up in the United States, where more than half the electricity is coal generated. Mining rose last year by 10 percent. The coal industry is pushing for aggressive development of the 438 billion ton U.S. coal reserve. Utilities throughout the country are diverting coal power now that the government has relaxed clean-air restrictions. And several other coal-rich areas, like the Four Corners region of Arizona, Colorado, Utah and New Mexico, are producing more coal to meet demands from neighboring regions that require electricity. Soon these coal-rich regions will face problems similar to those of the Ohio River basin.

"I know there will be a change when we have poisoned enough people and starved ourselves," he says. "I am concerned about our capacity to make the necessary changes soon enough. It is possible to avert these catastrophes but only if we can persuade people that there is a need now to avert them."

Damage from coal use can be countered by building smaller power plants with effective emission-control devices. "More important," says Loucke, "is increased development of conservation as an alternative energy source. Along with increased utilization of solar and wind energy by utilities, I am encouraged by the fact that we now have an opportunity to have an advanced global society without the threat of wastes and toxic substances."

"There are no simple answers," he adds. "That's why we have to take a closer look at the whole answer—coal conversion and rain-farm carbon cycles. We already have ahead of us decades of hard work. We will need to adjust to energy efficient values and lifestyles. There is no silver lining in this cloud."

As part of an advertising program, we will give a solid sterling silver floating heart pendant charm to every reader of Omni Magazine who reads and responds to this printed notice before Midnight, Sept. 30, for the sum of $5 plus $1 shipping and handling. There is no further monetary obligation. [Each heart is composed entirely of solid sterling silver and will be accompanied by our Certificate of Authenticity to that effect.] This advertising notice is being placed simultaneously in other publications. If you see it in more than one publication, please let us know, as this information is helpful to us.

Should you wish to return your heart you may do so at any time to the address below and receive a full refund. There is a limit of one (1) heart per address, but if your request is made before Sept. 22, you may request a second heart by enclosing an additional $5 plus $1 shipping and handling. No request will be accepted past the dates noted above, your uncashed check will be returned if postmarked later than those dates. Please enclose this original notice with your request. Photographs will not be accepted. Note: If you would like a matching 18-inch chain of solid sterling silver to go with your heart, please indicate this when you make your request and it will be included at no additional cost. Send appropriate sum together with your name and address to:

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Psssst!
Have you heard…?

COMPETITION

By Scot Morris

Last November when we announced our Competition #17 for Unconfirmed Rumors, we had no idea of the mass-market appeal that a good rumor can have. At that time only one major rumor had “gone Hollywood”. The canard that no astronauts ever went into space and that all the “moonwalks” were secretly filmed in a Nevada desert became the inspiration for the 1978 film Capricorn One, starring James Brolin, Hal Holbrook and O. J. Simpson.

Almost immediately after we announced our contest, three other famous rumors made their screen debuts. Within weeks we saw the release of The Formula, which had George C. Scott vs. Marlon Brando and the secret of the cheap fuel that is being kept from the public by greedy oil companies, Hangar 18, about the crashed UFO and those alien bodies in deep freeze at Wright-Patterson Air Force Base in Ohio; and Alligator, the real truth underlying the manhole coverup in the New York City sewer system.

If the trend continues, other rumors mentioned when we announced this contest are soon to become motion pictures. First out will be Scallop! about a ruthless restaurateur who serves cut-out shark or skate to unsuspecting customers who have ordered shellfish. We are currently negotiating the screen rights to our rumor that reading Omni will make one multiorgasmic. (It’s probably because of the sex pheromones we add to our ink.)

THE RUMOR HALL OF FAME

What makes for a classic rumor? The best are paranoid, plausible, provocative, officially denied, and outrageous.

Solid paranoid thinking underlies the very best rumors. The truth is known only to a few because the powers-that-be are covering it up. Paranoia is the easiest mental aberration to slip into and the one that appeals to the most creative, intelligent minds. If you can’t find conspiracies all around you you’re not paying attention. A good rumor must be plausible, of course, but to the truly imaginative there are few situations that aren’t.

Plausibility then provokes investigation. It was a classically provocative rumor that Paul McCartney was dead. That rumor inspired diligent, creative people to investigate it and uncover new “evidence.” They were then able to say “If it isn’t true, explain this…” And then they would recompose a catalog of substantiations.

Investigation sometimes leads to an official denial which, for a rumor is the equivalent of being nominated for an Oscar. After all, those stories about rat parsnips found in a bucket of chicken, worm meat in hamburgers, and spiders’ eggs in bubble gum had only moderate word-of-mouth circulation. Most of us first heard of those outrages when the companies’ official denials were carried nationally by the news media.

Finally if any of the above qualities are lacking, an outrageous sense of humor is the saving grace.

For purposes of our contest, another quality was looked for: namely, originality. It didn’t matter whether the rumor was “real” or made up. If too many versions of a rumor came in, we discarded all of them.

RUMOR THEMAS

After sifting through thousands of rumors, we began to notice recurring themes. The most commonly overdone categories were:

1. They’re Still Alive! Hitler, the shah of Iran, Howard Hughes, Jim Morrison, Elvis Presley, Bruce Lee, even John Lennon are…

RUMORS GO HOLLYWOOD. Terror from the sewers (top) a phony astronaut landing (bottom)
all with us, in hiding. We saw so many
resurrections of J F Kennedy (always: a
vegetable) that we had to give a prize to the
second order rumor that finally lays him
to rest.

2. The Aliens Are Among Us! Known
extraterrestrials Einstein, Heinlein, Sagan,
and at least one Omni editor Recently
discovered Senator William Proxmire who
is trying to keep earthing's from learning
the real secrets of the universe.

3. They're All Impostors! None of them are
the real them. Ronald Reagan (he died in
1952) the man in the White House is a
fifty five year-old stand-in possibly his
own illegitimate son. Jimmy Carter (the
switcheroo came when he changed the
part in his hair). Ayatollah Khomeini (in
exile he had nine fingers: the impostor
in Iran has ten). and Isaac Asimov (who is
known to be at least triple.

4. They're Suppressing the Miracle
Patents! Everyone has heard about the
100 mpg carburetor that Standard Oil
bought for millions of dollars and then
burned. But what happened to the inven-
tor? Some say he was bumped off. Others
suspect that he became a specialist and
went on to produce other suppressible
inventions such as the 50 year-light
bulb, the permanent battery the
million-mile tire, the tooth-decay prevent-
tive and the runest nylon stocking.

5. The Secret Ingredient. Girl Scout
cookies are faced with hashish. Famous
Amos uses pure THC. Addictive drugs are
added to pizza, gum, and, of course cola.
"Why do you think they call it Coke?"

6. The Real Purpose of Omni and
Competition #17. Several sneaky entrants
hoped to win the money by mentioning
Omni or this contest. One succeeded
(Corne J Bergeron Jr below), but most
didn't. Some claimed that this contest was
a thinly disguised attempt by the
American government to find out who
knows what is really going on, any entran-
tee who divulged such government secrets
would be eliminated quietly.

Another invidious claim was that the
government paid Omni to run this contest
in order to convince people that stones
about the AMA's subsidy to the tobacco
industry and the alien bodies on ice at
Wright Patterson are "just rumors." Several
real conspiracies are planted in the results
as well, so that people will associate them
with crackpot ideas and dismiss all of
them as untrue.

Don't believe a word of it.

GRAND PRIZE WINNER $100

There is a strain of albino marijuana
growing in the New York City sewer
system. The nutrent-rich sludge has
germinated the seeds that were flushed
down the toilet during drug raids. Resulting
in extremely powerful plants. Known locally
as Manhattan white or subway silver. It is
hard to harvest, however, because it is
guarded by all those alligators.

— Daniel Cohen, Port Jefferson, N Y

RUNNERS UP $25

It is widely rumored that John F Kennedy
was not killed in Dallas. His brain was
destroyed but he is alive — as a human
vegetable — on the Greek island of
Skopos. Jackie married Aristotle
Onassis on the condition that he provide
a secret place where J F K's body could be
kept alive (or as long as possible) I have
heard that J F K 's body did die in 1978
although that is still unconfirmed.

— Kathy Hurley, New York, N Y

Someone found that the red M & M's can
be used as an aphrodisiac. So the FDA
ordered most of them taken out of the mix,
if you find any save them. You need at
least five.

— Kevin L Clark, Crown Point, N Y

Popular arcade games such as Asteroids,
Space Invaders, and Tail Gunner are
programmed to record the initials of the
highest scoring player. When you enter your
initials, a photograph is secretly
taken of you. The "games" are actually
mechanisms for selecting, sorting and
training slave labor for duty in military
spacecraft and on star bases. People who
get at these machines disappear
under suspicious circumstances. You won't
find my initials in one of those things
no matter how good I get.

— Larry Pike, Portland, Ore

The U S government secretly is trying to
increase inflation. Eighteen percent
inflation could double your income every
four years placing you in a higher tax
bracket without increasing your real
income at all.

— Dan J Hicks, Orlando, Fla

I have heard that a man in Kerry [Ireland],
on his deathbed expressed a desire to be
buried at sea and that three of his sons
drowned trying to comply with his wishes.

— William Anderson Calkey, Ireland

Seeking the reputation of a visionary — like
Heinlein. Wells and Verne — a certain
well known science fiction writer has paid
ever sums of money and has even put
innocent lives in danger, just to make
sure that a wild prediction he made in a
short story several years ago will come
true on schedule.

— P J. Yebor, Mount Pleasant, S C

David Berkowitz obtained his pseudonym
by listening to Jimi Hendrix whisper Son
of Sam, Son of Sam' halfway through
Purple Haze on the right channel.
— Robert Rucci, Danbury, Conn.

Killing turkeys causes winter
— Brian Sano, Cherry Hill, N J

The National Enquirer is paying Scoot
Morris $1 for each item he receives for
Omni Competition #17. They expect to get
at least two years' worth of cover stories
from this investment.

— Corrie J Bergeron, Jr
College Station, Tex

HONORABLE MENTION

Humpty Dumpy was pushed
— Michael Marini, Brisbane, Australia.

Lee Harvey Oswald shot John F Kennedy
— Kurt Friedman, Oxford Hill, Md

We Chinese believe that one's destiny is
determined by one's physical features. In
the case of a politician: the fate of a
country can be predicted. Take Sun
Yat-sen, for instance. China under Sun
Yat-sen was divided into the Nationalist
and Communist camps because he
parted his hair in the middle. Chiang
Ka-shhek lost the whole of mainland China
because he shaved off all his hair.

And the secret deep freeze at an Air Force base where alien corpses are being kept on ice.
Chairman Mao Zedong was able to sweep across China and unite the country because his hair was swept back without any parting. He had one problem, though: the island of Taiwan, as shown by the mole on his chin.

— T Quah, Singapore

The Antichrist prophesied in the Bible (Revelations 14:18) has arrived. He is Ronald Wilson Reagan. Count the letters in each name to get "the number of the beast"—666. I realized this on election night, 1980, when the winning number in the Maryland State Lottery was—you guessed it—666.

— David Chiarenza, Columbia, Md.

The SAT scores are low because educators who make the tests have added more difficult questions to get more federal funding for their projects.

— Bill Loercher, Manheim, Pa.

If nobody voted in a U.S. presidential election, a candidate would still win because big business and computers have the winners of each election taped 12 years in advance. This explains why no one admits he or she voted for Nixon. No one did.

— Jennifer R. Habersaat, San Jose, Calif.

In the background noise of the Ohio Players song 'Love Rollercoaster' one can hear a girl being stabbed to death. It was recorded in a thin-walled studio in New York City and the screams couldn't be edited out completely.

— Vaman Nelson, Springfield, Ill.

"Max," the eccentric millionaire who had himself cloned in David Horovitz's book In His Image, the Cloning of a Man was in reality Alex Comfort.

— Ken Stein, Baltimore, Md.

If you drink the water from the Charles River in Boston, it will cause you to be unable to pronounce your r's.

— Ben Edelhart, New York, N.Y.

Or Pepper is carbonated prune juice.

— Bryan McFadden, Hollywood, Fla.

Prehistoric man did not associate childbirth with intercourse because of the long delay between the two events. He did, however, understand the hair on his palms.

— Chris Doyle, Burke, Va.

NFL Commissioner Pete Rozelle's main job is to keep pro football honest so that people will continue to bet on it.

— Eugene B. Bailey, Savannah, Mo.

In the Tibetan Book of the Dead, there is a description of a technique whereby one can learn to tackle oneself.

— Stuart S. Dannich, Baltimore, Md.

Colonel Sanders's 'Extra Crispy' chicken is yesterday's Original Recipe chicken. If this isn't so, explain why 'Extra Crispy' usually costs less than 'Original Recipe.'

— Laurie M. Young, Decatur, Mich.

The movie The Invasion of the Body Snatchers was a documentary.

— Richard Green, Livermore, Calif.

The main ingredient in toothpaste is sugar.


The Peoples Temple cultists did not commit suicide in Guyana. They were murdered by the C.I.A. in order to create an anticommunist hysteria that would aid the F.B.I. in its war against the Church of Scientology.

— David Palter, Hollywood, Calif.

The reason why Anita Bryant hates homosexuals is that when she was in kindergarten three gay boys tied her up, naked after school and gang-rejected her.

— Mike Stasko, Columbus, Ohio.

The U.S. government is reluctant to fund the space program because it doesn't want to lose taxpayers to low-type colonies.

— Donald R. Gentry, Independence, Mo.

Isaac Asimov, Martin Gardner and James Randi are aliens with psi powers and are debunking flying saucers and paranormal phenomena.

CONTINUED ON PAGE 182

The Soligor 80-200mm Expand Your Horizons By Getting Close.

You've got a terrific 35mm SLR camera, but not all of your shots are terrific. Some suffer from too much unwanted scenery; some from tiny people in big frames; shots that didn't work because your creative IQ was more than your lens could handle.

That's right, lens. But, Soligor has a solution: the affordable, innovative Soligor 80-200mm One-Touch Zoom + Macro lens that lets you and your camera turn blah into beauty.

Zoom in to crop out extraneous details. Bring your subjects up to 4 times closer than a standard lens can. Frame your shots exactly as you want them, and Soligor's quality captures them faithfully. Create exciting portraits, instead of just pictures of people. Capture a still life or sports action as the kind of picture you bought your camera to get, experiment with amazing close-ups, thanks to macro ability. And it's all so easy with Soligor's single One-Touch control for zoom, focus and macro.

If some of the zip has gone out of your picture taking, zip down to your Soligor dealer and try our 80-200mm on your Canon, Minolta, Pentax, Olympus, Nikon or other fine camera. Or write for full information.

SOLIGOR MAKES THE DIFFERENCE

AI CORPORATION INC. CARLE PLACE, N.Y. 11514
The pilot's in the desert were celebrating. The Coors truck was passing out free beer. The Omni area had turned into a champagne party. The years of frustration and delay the budget cuts and engineering problems, the criticisms and threats to cancel the shuttle program altogether—they were forgotten. We had a spaceship sitting out there on the desert. A visitor from outer space, Columbia, and her sister craft being built by Rockwell were meant to work in orbital space. She was on the surface of our planet. The time between missions was only a few minutes. NASA people were talking to each other, planning scientific experiments. In March, scientists at the University of Maryland were listening to a call in radio show interview with a man who claimed to have been taken by a flying-saucer people to their home planet, Lanulos in the distant constellation Ganymede. One of the students, Tom Monteleone, an avid science-fiction buff, was asked to discuss the incident. Tom Monteleone suddenly thought. Just for the heck of it why not claim I've been to Lanulos, too? It will blow his mind.

And so he did, and it did. The dumb-founded 'contactee' Woodrow Derby quick regained his composure and corroborated Monteleone's description of the planet Lanulos, agreeing with details that contradicted things Derber had just disclosed on the show. A few minutes later Monteleone hung up and enjoyed a good laugh with his roommates—until the phone rang. The radio station had traced his call and now wanted further information.

For the next two years Monteleone went along with the reporting, cleverly providing UFO investigators with information gleaned from Derber's account and from the general UFO literature. Whatever he corroborated was given with enthusiasm by his credibility rose further (he had told investigators that he was unfamiliar with UFO literature and they believed him). UFO publicist Harold Salkin was interested in Monteleone's story. So tightly synchronized with Derber's UFO writer and editor Timothy Green Beckley taped an interview and wrote several magazine articles that presented the account as factual. Noted UFO author and theorist John Keel called the story 'one of the most puzzling stories in the field of UFOs'.

All that took place three months ago. Columbia is now back at Cape Canaveral. The launch was delayed for her second trip into space Challenger under construction in California will be ready for flight next year.

In Washington the new team heading NASA now has a powerful argument to convince our political leaders that a new era in space transportation has truly begun. Never again can the debate be over whether the space shuttle will fly or not. Now the question is: How much do we want to accomplish with the shuttle? How soon will we use her capabilities to help build a permanent American presence in near Earth orbit?

For the first time since its inception, Space Week will have an entirely new and different American achievement to celebrate. We are in space again. And this time we are there to stay. No longer the glamorous one-shot missions that grabbed headlines and then faded into oblivion. Space-flight is on its way to becoming as routine as commercial air travel.

Even the longest journey is started with a single step. Columbia has taken that first step for all of us.

Crippen said it best, the day after the landing, when he told a press conference in Houston that 'despite all the problems and setbacks that had beleagured the shuttle program. It was worth it.'

None of the pilots who ventured into the desert that morning to see the dawn of the Shuttle Era would disagree.

Salkin, Beckley, and Keel among others to be. This ironic complaint appeared to asbolish the gullible investigators of any responsibility for their careless and credulous acceptance of Monteleone's deliberately absurd fabrications. Fate magazine seemed to be saying that it was not their fault that they were hoaxed.

Some other reactions to Monteleone's confession are quite amusing. Salkin, who is descibed by long-time ufological observer James Moseley as a 'warm likeable but somewhat gullible sort' still refuses to believe Monteleone's confession. Keel is particularly upset and has issued a statement calling the Fate piece 'an attempt to discredit my entire body of work and my professional reputation as a journalist for over 35 years. Keel is preparing a lawsuit according to some accounts.

As for Beckley he has to worry about freshers wounds in his credibility as a competent UFO investigator. In a recent issue of his monthly tabloid UFO Review Beckley apparently became the victim of yet another UFO hoax.

In an article entitled 'Erotic Encounters of the Very Close Kind,' a report opened with the startling words: 'It is not uncommon for the occupants of UFOs to have sexual contact with humans.' He tried to lay the foundation for this far out story in an editorial on the facing page. 'Some readers undoubtedly will believe that we are getting a wee bit carried away when we turn to sex in order to sell a UFO newspaper. We really aren't trying to capture a larger audience by planting a sensationalistic headline on our cover. If we wanted to take this approach we'd simply fabricate the stories we print. But we don't cater to the gullible. All the items we mention in our story are fully documented. We need not substitute fiction for truth—for truth is far greater than fiction in the field of UFOlogy.'

The principal source of Beckley's saucer sex story was a newspaper account dated February 12. 1978 which carried the headline KIDNAPPED TO VENUS. Reporter Jerry Burger told of a thirty-one-year-old librarian found by police as she rambled around in a park wearing no clothes. She claimed she had been abducted by Venusians and taken to the 'back of the moon, where she was implanted with outer-space semen before being returned to Earth. Beckley reported the case as true and added that 'such reports are taking place on a global scale.' There can be little doubt from the documented evidence that some tremendous event is slated to happen that will guide us to a higher understanding of ourselves and the cosmos. The UFOnauts are trying to teach us a lesson—that love is universal and encompasses every living creature regardless of their planet or dimension of origin.' And for those readers who wanted more information, Beckley added that the saucer sex story is just one chapter in his new book, Strange Encounters—Bazars & Erie Contacts with Flying Saucers available...
able from the author for $6.95 plus postage and handling.

Unfortunately, Beckley's story is even more absurd than it first appears. Houston spaceflight expert Robert Nichols sent Omni the actual source of the "outer-space semen" story in the form of the newspaper clipping Beckley quoted. The article did not come from a newspaper at all, but from a 1978 satirical publication, the Sunday Newspaper Parody written by the National Lampoon. Beckley (or someone on his staff) evidently made some editorial changes by adding realistic touches to the article and changing the original spelling of the saucer-rape victim from the highly suspicious "Penelope Kunz" to the acceptably ethnic "Penelope Cuntz." Beckley also altered the name of the newspaper from the utopian Dacron Ohio Republican-Democrat to the Toronto Sunday Sun. The entire account then is a fictional spoof, but the extent of Beckley's role in promoting and altering it (or merely passing it along credulously) is still undetermined.

Photographs are even more subject to hoaxes. In fact, while only a very small percentage of UFO reports are hoaxes, it is generally acknowledged even by UFO believers that the overwhelming majority of published UFO photographs are hoaxes—either forgeries, models, or misrepresentations of ordinary phenomena.

A classic UFO photographic hoax involved the "Fogl flying saucer" pictures taken in December 1957 and first published in 1959. As chronicled by skeptical ufologist David A. Schroth, the photographs were embraced by magazines in Great Britain and the United States. UFO experts argued that some features on the bottom of the flying saucer were identical to features seen in other photographs testifying to the authenticity of Fogli's photographs. American UFO publicist Ray Palmer declared, "We are forced to admit this is not a fake." In 1966 one of the photographs was presented as authentic in Life.

That may have been the last straw for Fogli, who finally revealed the UFOs were faked—made with a small model hung on a wire. When asked why he did what he did, Fogli replied that he wanted to show 'that certain people make utter fools of themselves. Far too many people make a racket of the UFO business,' writing phony books supported by faked pictures.

As if in fulfillment of Fogli's point, UFO writers continued to use the hoax pictures. Palmer (who is credited by UFO historian Daniel Cohen with having invented the concept of flying saucers) wrote that it was impossible for the photos to be fakes and that Fogli's confession must be a hoax. And in 1979 McGraw Hill published David C. Knight's UFOs: A Pictorial History with page 86 proudly presenting one of Fogli's pictures as still authentic.

Another famous UFO hoax provides eloquent warning against well-meaning UFO stories that originate at a great distance in space or time. They are thus immune from any real investigation. If they are hoaxes, it is next to impossible to prove.

As part of a "UFO flap" in 1897, the story of Alexander Hamilton of Yates Center, Kansas, stands out. The farmer reported that a cigar-shaped airship flown by jabbering humanoids hovered over his farm and caught hold of a calf with a rope. Hamilton's account was published in the local newspaper along with a statement vouching for his honesty signed by five leading citizens of the town. The story rapidly spread around the world, and for decades UFO writers considered it one of the best-documented "close encounters of the third kind ever.

Hamilton and the five leading citizens actually had organized a local Liars Club and Hamilton's "calfnapping airship" passed through with little comment. The newspaper story was all a joke, as it turned out, but rather the editor nor the town citizens realized how seriously the outside world had taken the account. It was not until early 1977 that the full story appeared in Fate magazine. Associate editor Jerry Clark, a diligent and highly principled pro-UFO investigator revealed what he called the biggest hoax ever known in UFO history when he published hitherto-unknown documentation that established beyond a shadow of a doubt that the Kansas farmer's story was phony.

But the same old ufonic patterns continued. New writers based their books and articles on older UFO books and articles, not relying on original sources or their own independent verification. Among the subsequent UFO literature that continued to use the Hamilton story as if it were authentic were Knight's UFOs: A Pictorial History and Reilly & Belsham's The Real U.F.O. Story.

The January 1980 issue of UFO Journal (issued by MUFON the Mutual UFO Network a well-organized private research group with a good reputation) provided some very interesting insights into the minds of a UFO hoaxer and of the UFO investigator who worked on the case. The witness was a twenty-six-year-old security guard who claimed to have encountered aliens in the San Joaquin Valley on February 27, 1977. A year and a half later after trying to dig up supporting evidence he contacted MUFON.

The investigator (who, along with the witness was kept anonymous in the article) reported: "I was impressed with this young man's sincerity and apparent honesty and his concern that he was unable to locate any other witnesses. I am by nature a cautious and suspicious person, having run into enough hoaxes and fraudulent cases in my 22 years of investigation, to give me adequate insight and recognition for such incidents. I was quite satisfied as to his honesty. The UFO incident filled nearly four pages in the magazine.
But at the end of the article the entire tone changed. "The important message for all of us" wrote editor Richard Hall, "is that this case is a hoax—a confessed hoax."

The investigators didn't find this out for sure until the article had been typed but they decided to publish it anyway as a lesson in human vulnerability to hoaxes. The story content fit so well with other cases, and the reporter seemed so sincere and in a responsible position that we were nearly taken in. Even without the confession, MUFON investigators had become suspicious of glaring discrepancies in the story as bold to different investigators, but even those considerations might not have been enough to prove the case a hoax if the witness himself had not confessed when confronted with the inconsistencies and contradictions in his story.

In a letter to MUFON, the hoaxer (code named Carl to preserve his anonymity) explained his motives. All my life I had been a nobody important, I wanted to be important. I am not psychologically deranged but just wanted some attention. But he had not apparently acted as if he sought attention. He certainly had not sought publicity. Indeed the investigator had originally reported that "fearing ridicule and harassment from friends and coworkers, Carl kept this story to himself until he simply had to tell someone who would help ease his frustration and anxiety." Evidently the adequate insight into hoaxes that the MUFON investigator claimed to possess involved something other than factual evidence.

MUFON's decision to publish the San Joaquin hoax story with the confession was a courageous one, since it did make its investigator sound rather foolish. But the UFO group demonstrated commendable maturity in choosing to try to have all its investigators learn from the experience, lest it be repeated on a wide scale. It still may not help.

The other famous hoaxes were not universally swallowed, either Monteleone's space trip to Lanusos was never believed by most of the "nuts and bolts" UFO buffs who have for so long despised the crackpot contactees and the bad publicity they have brought to the subject. James Mooney, editor of Flying Saucers News, wrote that Monteleone clearly was not a "classic contactee" and evidently never believed his own story. A perceptive conclusion! However the Fogl photographs and Simpson's experiment in England would probably not have survived the sophisticated photanalytical techniques now used by some UFO groups not least of which is William Spaulding's high technology Ground Saucer Watch in Phoenix and the GEPAN laboratories in Paris.

The extent to which serious UFO groups seem determined to detect and reject hoaxes was demonstrated last year when virtually without exception all major groups and leading investigators publicly denounced Genesis III Productions' photograph UFOs, Contact from the Plaidres. While the strikingly handsome collection of flying-saucer photographs was being billed by its publishers as the greatest UFO breakthrough in human history a number of pro-UFO researchers circulated reports that claimed that the whole business was a money-making fraud. For once UFO skeptics agreed with their traditionally antagonistic pro-UFO counterparts, though a Genesis III spokesman continues to deny that his company is involved in any hoax.

UFO skeptics, however, go even further in their allegations that there have been hoaxes, and they find themselves in bitter disagreement with pro-UFO forces. Some of the highly publicized classic UFO encounters (such as the 1973 Francisco Fisherman's account and the 1975 Snow flake Arizona, woodcutters account) and some of the classic UFO photographs (such as the 1950 McInnivale photos and the 1957 Trinidad Island photos) are considered by skeptics to be hoaxes. Half of the "best UFO cases of the 1970s—as judged by a blue ribbon panel of UFO experts sponsored by the National Enquirer—are considered hoaxes, according to independent research by skeptics. Here the battle lines are clearly drawn.

Suggesting that a UFO case is a hoax poses delicate problems. First of all the UFO witness (whether a hoaxer or not) may not have grounds for a libel lawsuit. Although many threats along these lines have been made so far no suit has been filed. Second, without a confession it is extremely difficult to prove an accusation of "hoax" however spurious the story may sound. Last UFO skeptics (in particular the world's undisputed leading skeptical aviation journalist Philip J. Klass) open them selves up to countercharges of "character assassination" and "vicious ad hominem attacks" when they point out usually quite correctly, that the reliability of many famous UFO witnesses is highly questionable because of their past and subsequent histories of exaggeration, fantasy and outright deception (pro-UFO groups generally downplay or even cover up such behavior on the part of people whose credibility they wish to emphasize).

Despite the problems caused by UFO hoaxes (mainly, that they can be far more difficult to solve or even recognize than are "ordinary honest UFO reports") these patterns in deception can be made useful. Successful hoaxes can help calibrate the reliability of UFO research as in the case of Monteleone's and Simpson's hoaxes, hoaxes can also instruct serious investigators and by humanity as with the San Joaquin hoax reported in UFO Journal. The claim of the superskeptics that unsolved UFO cases can all easily be dismissed as unrecognized hoaxes is unsubstantiated, the claim of UFO eager believers that the hoax problem is under control is equally unsubstantiated if not refuted. And since no one wants to look foolish, the disagreement continues.

But what we claim to offer is a really functional music in worker areas. We arrange and record all our own music, and we see it a stimulus factor. Then we play in fifteen-minute segments, on and off, programmed sequentially so that the last composition in the fifteen-minute segment has the maximum amount of stimulus value. Although it is not entertainment we still use music from the Top Hundred, and we even compose some of our own.

Muzik is made in the studios of the company's world headquarters at 100 Park Avenue in New York City by musicians like Dick Hyman, Warren Covington, Lionel Hampton, Tony Motolla, Al Caiola, and many others. Pizzariello. After the compositions are properly mixed they are put in the library where they become part of the daily schedule of programming.

All the programming is done by computer. There is a computer printout for each day the program is never repeated. The programmers produce 24 hours worth of music every day.

The printout for this day's program, tomorrow's program, and so on, goes out to Westbury, Long Island, where there's an automated studio. Until very recently the program was broadcast onto tapes that went on a 15-city circuit about every three days. First the tapes were played at 100 Park Avenue and then by lease line went to the antenna atop the Empire State Building. There the tapes were transmitted on the sub-channel of an FM station before being sent to Philadelphia and then to the next city on the circuit. Ultimately they returned to Westbury where the process began all over again.

Now Muzik is going satellite. Instead of producing tapes, copying them, and sending them out to the satellite, Muzik is beamed directly from the satellite to the subscriber.

The price of a subscription depends upon the number of speakers a restaurant office, or elevator has. The greater the number of speakers the greater the distribution on the subscriber's premises. A simple little restaurant with two or three speakers may pay $40 a month. And then there are installations that pay $10,000 a month plus per franchise.

We have four programs to choose from: Office, Travel, Public Area, and Industrial, which has lots of brass. Most of the heavy industry that we play is at night because the workers on the third shift require the greatest amount of stimulation. That's why we get a lot of brass.

A whorehouse in Stuttgart requested a "Light Industrial Program," although it's not clear to Bing Musco whether it was to increase the workers' productivity or to relax the customers. }
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Thank you for the way in which you handled the article that told about my accident with Washoe the first chimpanzee to learn human sign language [People, February 1981]. I worried that a report of this kind might damage the possibilities for future work with apes, but Mr. Rob's treatment of the incident was such that there couldn't be any adverse effect.

Let me take this opportunity to tell you how much my family and my coworkers appreciate the good job Omni is doing.

Karl H. Prinbam
Stanford, CA

COMMUNICATIONS
CONTINUED FROM PAGE 10

The Stealth Brouhaha

As a writer who specializes in aviation I was interested in "The Stealth Affair" [Continuum, April 1981]. Paul Nahin is correct in disclaiming former President Carter's statement that the Stealth aircraft was a technological breakthrough but it is certainly far more than a "rubber-coated airplane.

Stealth is a combination of technologies: structural materials, airframe and engine design, and electronics—all of which exploit the physical properties of radar and infrared detection.

Radar absorbing coatings are only one small element of the Stealth program. Another type of coating uses a phenomenon of physics known as destructive interference. Graphite fibers, epoxy resins, and high-strength ceramics reflect radar more effectively than conventional metals do. An aircraft design with a small cross section, curved surfaces, and no sharp angles intersecting edges, engine pods, or vertical control surfaces will produce a much weaker echo. Finally there are electronic systems that can deceive and baffle radar.

Dr. Nahin got the politics right on the Stealth brouhaha, but the technologies and electronic countermeasures involved are equally important.

John-Allen Price
Lewiston, N.Y.

Moon Rocks Revisited

I was fascinated by the more serious side of David Saltman's Last Word [November 1980], concerning lunar rocks.

In the science-fiction novel Inherit the Stars, by James P. Hogan, a 50,000-year-old human skeleton in a spacesuit was found on the moon. At that time, Homo sapiens could not have evolved to this human form much less to the level of intelligence required for space travel. This man could not have existed. The evidence of rock samples piled randomly only on the far side indicates that a major cosmic blast occurred in our galaxy 50,000 years ago.

I thought Hogan's book was pure science fiction. Imagine my surprise and excitement on reading Saltman's article. There really is a difference between the two sides of the moon! Imagine my anger and dismay that most of the rocks retrieved by Apollo 11 are still lying panned in silence, begging to blurt their knowledge of the time place and cause of Earth's birth.

As demonstrated by Hogan's book, an open mind and a unique line of thought and a willingness to challenge the obvious and the widely accepted are necessary for man to succeed. Fear of the unknown should not hinder our healthy curiosity.

Julie Palmer
Toronto, Ont., Canada
of exploring Russian spacecraft. In the highest orbit, stoically presiding over the hall is a great bronze head of Lenin.

As you wander around these museums and monuments, a great many impressions begin to crystallize. The first few are obvious. The sheer number of these memorials and their giant size is one of the most striking things about Russia. The vast size of these monuments, though not so much from size as from design. The Social Realism school of sculpture uses every device to convey dynamic movement. Figures never stand, they stride. The air is never still around them, the wind whips their coats. The Monument to Space Conquerors is a rocket that shoots heavenward, riding a bronze trail of exhaust. These sculptures may seem melodramatic to Westerners, but there is something about them that evokes an emotional response. Compare the 15-story-high Monument to Space Conquerors with a two-story-high memorial in the United States; the Saturn V moon rocket lying on its side at the John F. Kennedy Space Center. The cigar-shaped rocket rising above Moscow may look like a science-fiction caricature, but which monument communicates more of a feeling of progress?

In the Kaluga museum there is a working model of the Cosmodrome at Baikonur. It is not sophisticated as models go. The operator is in full view of the audience and the rocket never quite launches, but it has a magnetic appeal for Russian visitors. Children, adults and important looking figures in military dress crowd around and hang over the balconies on the upper levels, intent on watching the tiny Vostok rocket as it swings slowly into launch position.

Somewhere a patriotic theme begins to play softly. Over that a tinny sound two men talking the original recording of Korolev addressing Gagarin moments before liftoff on April 12, 1961.

Korolev: How are you feeling? Gagarin: I'm not worried. I feel fine. How are you feeling?

Suddenly the music swells to a crescendo and the museum shakes as the rockets burst into life. From atop the thunder Gagarin shouts, "Peahyekale!"

Now freeze the action; a split second after lift-off, a split second before the visitors to the museum break into an ovation on that one word, "peahyekale!"

It was the spontaneous exclamation of a young man about to do something no one had ever done. It was the speech that inaugurated the Space Age. A simple Russian colloquialism. It sums up a cultural experience. It's been translated as "We reoff!" But it carries with it a whole universe of meaning, adventure, expectation and the love of a son for his steed.

And it's that one exhibit, that one word played over and over and over the electronic hiss and noise and rumble of rockets that perhaps best defines the relationship of Soviet citizens to the awesome technology of the Space Age.
ATTORNEY TO THE STARS—Ali Dula takes on the big questions. Who should mine the moon? Who pays if a rocket crashes? Who owns the stars? He finds the answers in the laws of the Roman Empire. Working out of a computerized house in downtown Houston, Dula is the first lawyer in private practice to devote himself to space and technical law. At thirty-three, he is already odds on to be the first federal judge on the moon. To find out why, see this exclusive profile in the August Omni.

THE RIGHT TO DIE—One spring morning in 1975 Derek Humphreys handed his wife a cup of coffee containing a lethal mix of sleeping pills and painkillers. With his emotional support Jean Humphreys had decided to end her long and painful struggle against cancer. Derek has gone on to lead the grass-roots suicide movement, promoting the right of the aged or the terminally ill to end lives they find intolerable. The society he founded, Hemlock, has 15,000 members and is growing rapidly. A more radical group, Exit, is bent on bringing out a detailed how-to suicide manual. Battling fierce opposition, the right to die movement has gained startling momentum on both sides of the Atlantic. Read about these groups next month.

VISIONS OF EDEN—The interpenetration of ocean, mountain and sky is the subject of "Green World," next month's pictoral. The art of Friedrich Hachelmann, with text by Robert Shickley, explores a strange yet familiar world of the imagination. The primal garden that calls to us from our genetic memories. A leading painter from Vienna's school of Fantastic Realism, Hachelmann has displayed his distinctive style in many exhibitions and films. He recently illustrated a book of gothic tales. Next month in Omni, the artist celebrates the illusive paradise of our mind's eye.

INNOVATIONS—Many breakthroughs in personal technology are transforming the ways we enjoy our leisure time. Next month Omni selects the best of innovative products that facilitate outdoor summer explorations. An underwater telephone, a jet surfboard, and a parafol kite are to be found among the fantastic machines and gadgets composing a portfolio of items that fuse nature with technology. Look for our rundown on what's up in electronics, sports machines, and ingenious devices.

SCIENCE FICTION—Included in the August issue is an excerpt from Ben Bova's new novel "Wayseekers," speculating on humankind's first contact with an alien in space, a lighthearted story of the unexpected havoc wreaked by Ian Stewart's miniature robots in "The Microbotic Revolution," and Melissa Michaels' tale of a sentient spaceship determined to reach the stars, "I Am Large, I Contain Multitudes."
LIFE
CONTINUED FROM PAGE 16

spun away from it. Each testicle should be examined separately with both hands, holding it between the thumb and index finger and rolling the organ to sense its smoothness and firmness.

"Any lump in the testicle can be presumed to be cancerous unless proved otherwise," Dr. Garnick warns. "Many men with testicular cancer have made the mistake that an enlarged testicle is a sign of greater virility and have postponed a visit to the physician until it was too late."

Any enlargement, hardening, or lump not associated with infection should be checked immediately by a physician, preferably a urologist.

While all of this may astound or frighten most men, Garnick says, "Keep in mind that just ten years ago the chances of surviving testicular cancer would have been as low as ten to forty percent. Death often came within two years of discovery. But today there's a ninety-five to one hundred percent chance of survival if we catch it early enough. While the cancer is still confined to the testicle."

To promote wider awareness of the disease, the Farber Institute and the Massachusetts chapter of the American Cancer Society have designed a project to educate teen-agers and their parents. The Massachusetts ACS has published pamphlets and lends out a ten-minute film depicting a case history. The American Cancer Society in New York is preparing similar publications which will be distributed later this year.

"Obviously," Garnick concudes, "there's a long way to go before the men and boys of America come out of the Dark Ages and realistically confront the threat of testicular cancer. But I believe that before this decade is out we shall all be changed by this knowledge. Already the Army and the Navy are using our procedure in a film for their recruits. I see the day not too far from now when young men will be completely comfortable in their knowledge of sexual health, just as they are today with tooth decay prevention."

For more information on testicular cancer, send for the brochure "TSE," available at no charge from the American Cancer Society, 247 Commonwealth Avenue, Boston MA 02115.

Schools, civic associations and other appropriate organizations can also borrow, or buy for $200, the ten-minute film about testicular cancer suitable for general audiences. Write to Norwich-Eaton Pharmaceticals Film Library, Norwich, NY 13815.

The American Cancer Society headquarters in New York distributes its local chapters throughout the country a brochure entitled "Facts on Testicular Cancer." To obtain more information write to the American Cancer Society, 777 Third Avenue, New York, NY 10017.

NAME Michael J. Lavelle
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HOBBIES Racquetball, basketball, auto mechanics, hiking, philosophy

AS A ROSICRUCIAN, I HAVE LEARNED TO CONTROL MY LIFE

Several years ago as a college student in search of truth, I found myself collecting many useless facts that did not apply to my life. On hearing about the Rosicrucian Order, I was skeptical and spent time investigating its claims. Eventually, I became a member—and that was the most rewarding step I have ever taken.

As a Rosicrucian, I have learned to develop the psychic, subconscious and intellectual levels of my mind. With this new awareness, I can deal with people on a deep and positive level, attaining harmonious conditions to my personal relationships. I have also learned to maintain an excellent state of health.

In short, the Rosicrucians have taught me to control my life. Today I look within myself to understand and control life situations and rely on my intuition to guide me in decision making and problem solving. And since there is no limit to what I can learn, I will be a Rosicrucian for as long as I can.

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Rethinking Hubble

By David K. Lynch

It's not every day the universe shrinks much less, in half. It happened, though. On November 8, 1979. And, unlike the rest of us, it got younger by between 6 billion and 9 billion years.

If you didn't notice, don't worry about it. It was nothing dramatic. The stars didn't suddenly leap closer. It was only a quiet announcement at a meeting of astronomers. All the same, the universe was suddenly a lot smaller and younger than most of them thought.

What happened is that three American scientists—John Huchra, of Harvard; Marc Aaronson, of the University of Arizona; and Jeremy Mould, of Kitt Peak National Observatory, southwest of Tucson—reported a new estimate of the Hubble constant, H. Along with a number called the deceleration parameter, D, H determines the size and age of the universe. Much of today's cosmological research hinges on the magnitude of the Hubble constant.

Edwin Hubble was a tall, chily Missourian who spoke with an Oxford accent and spent most of his career at California's Mount Wilson Observatory. It was Hubble who proved that the long-mysterious nebulae were galaxies like our own. He had measured the distance to many of them.

Then, in 1927, Hubble compared his work with that of Vesto Slipher of the Lowell Observatory in Flagstaff, Arizona. Slipher had spent several years studying the nebulae and, much to his surprise, had discovered that nearly all were moving away from Earth, at speeds up to 1,000 miles per second. What Hubble found was that the farther the galaxies were from Earth, the faster they were receding. He had found the expanding universe predicted by Einstein's theory of general relativity in 1916.

What is more, he had found a clear relationship between the velocity of a receding galaxy and its distance from Earth. A galaxy leaves our neighborhood at roughly 625 kilometers per second per megaparsec (about 3.26 million light-years) or 360,000 miles per hour per million light-years. And that is the Hubble constant. Once it is known, we can calculate the size and age of the universe, the lower the constant, the larger and older the universe.

Hubble's estimate turned out to be too high. It has fallen—and the universe has grown—since 1927. For the past two decades the leaders in refining the Hubble constant have been Allen Sandage of the Hale Observatory, Gustav Tammann of the University of Texas, and Gerard de Vaucouleurs of the University of Arizona. According to Sandage and Tammann, the Hubble constant is roughly 50 kilometers per second per megaparsec, which puts the age of the universe at about 18 billion years. De Vaucouleurs, however, believes the constant is about 100 and the age only 9 billion years.

There are several reasons for this conflict, but one is crucial. De Vaucouleurs has found that the Milky Way is being pulled toward a congregation of galaxies located in the constellation Virgo. Our speed, 450 kilometers per second or about 1 million miles per hour makes the Virgo supercluster appear to be receding more slowly than it really is. De Vaucouleurs compensates for this by measuring the distance of galaxies outside the supercluster. Sandage and Tammann do not. But their estimate has been almost universally accepted for the last decade. All of this brings us back to November 8, 1979.

Huchra, Aaronson, and Mould have found what they believe to be a reliable new way to measure the distances to far galaxies. They start by examining the frequency and shape of radio waves emitted by hydrogen in a galaxy. The signal's frequency depends on the speed at which the galaxy is moving away from the earth, and its shape depends on the galaxy's speed of rotation.

The astronomers already knew that a galaxy's rotation and intrinsic brightness are governed by its mass. So they could string all these functions together with a little complicated arithmetic and calculate the galaxy's distance by measuring how bright it appears. Compare with other galaxies, and you have a new estimate of the Hubble constant.

When Huchra, Aaronson, and Mould looked at galaxies outside the Virgo supercluster, they found a Hubble constant of 75 kilometers per second per megaparsec—almost exactly what De Vaucouleurs had been claiming for years. That makes the universe roughly 9 billion years old, half the commonly accepted age. And if the universe is half as old as we thought, it must be half as large.

Like many scientific debates, the controversy over the Hubble constant hinges less on the accuracy of the measurements than on the assumptions that go into interpreting them. Each team can cite flaws in the arguments of the other and for the moment neither side of the debate is clearly stronger than the other. Most astronomers are waiting to see more and better observations before they take sides.

Meanwhile, the universe, quite unconcerned with our struggle to discover its size and age, continues to expand—as it has for 10 billion or 20 billion years.  

Edwin Hubble. His constant is still changing.

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A scar from welding steel to glass tears a path across a sculpture that abstractly portrays the scope of the universe. In the city of Kristiansand, in southern Norway, the sculpture bears the welding mark of its sculptor, Marius Heyerdahl, to signify the riveting effect of a marriage between two elements in our cosmos. Photographer Karoly Buday focused on this aspect of the glass and steel sculpture to magnify and enhance the symbolic scar. Thus, the camera converts sculpture into a new visual expression—a metamorphosis created and controlled by the artist-photographer. "Through photography we can see things we would not be able to see in any other way. We cut through the visible to see the invisible," Buday says. He closed in on the scar with a Canon 50mm lens, attached to a Canon T-1 set for a 1/250-second exposure. The blue and gold fusion of metal to glass was captured on Ektachrome X film.
Soapy Sam strikes again, and
a baby step for man

By Scot Morris

Samuel Wilberforce, bishop of Oxford
nicknamed Soapy Sam by his contempo-
rarines because of his slippery debating
tactics, is best remembered for his con-
frontation in 1860 with Thomas Henry
Huxley before the British Association
for the Advancement of Science in
a debate over the new theory of evolution.

Wilberforce was also a puzzle maker.
Last December we printed four unsolved
riddles attributed to him that had been
sent to us by Dr. Richard Wrangham, a
distant relative of Wilberforce’s and a
biologist and research fellow at King’s
College, Cambridge, England. The riddles
were discovered in the bishop’s personal
papers Wrangham said, and as far as he
or other Wilberforce descendants knew
none had yet been adequately solved.

We challenged our readers to solve the
Wilberforce riddles and offered $50 for
the best solution to each riddle. As always,
we underestimated readers’ ingenuity.
Thousands of cards came in analyzing
these enigmas from every conceivable
angle. Some riddles attracted hundreds of
different answers, others arrived with long
explanations, often in rhyme. We picked
out the most pleasing, most clever and
most outrageous of these and sent a
summary to three guest judges for their
opinions. Willard R. Espy, author of nu-
merous wordplay books, most recently
the delightful Another Almanac of Words
at Play (Grown, 1980), A Ross Eckler, edi-
tor of Word Ways: the journal for logo-
ographies, and Will Shortz, puzzle editor of
Games magazine.

These eminent wordsmiths indicated
their preferred “best” solutions and we
made a final judgment in the case of
disagreements. All cards containing the
chosen “best” solution for each riddle
were placed in a pile, and the money
winner was chosen randomly from them
(using the last digits of numbers in the
Manhattan telephone directory).

Here then, the results of our quest to
crack the bishop’s century-old enigmas.

RIDDLE #1
I’m a bird of gay plumage, but look like a bird.
Nothing in Nature ever has been.
Touching earth I expire, in water I live,
To earth I go, but then I can swim.
I can fly.
Darkest destroys me and light is my death.
I am not. I keep alive without stopping my breath.
If my name isn’t guessed by a boy or a man.
By a girl or a woman & certainly can.

RIDDLE #2
I’m a bird of gay plumage, but look like a bird.
Nothing in Nature ever has been.
Touching earth I expire, in water I live,
To earth I go, but then I can swim.
I can fly.
Darkest destroys me and light is my death.
I am not. I keep alive without stopping my breath.
If my name isn’t guessed by a boy or a man.
By a girl or a woman & certainly can.

This one proved the toughest, with the
widest variety of entries and the smallest
consensus. The commonest solution was
orchid, allowing a stretch of the imagina-
tion to make the lines fit (in water I die??).

RIDDLE #3

Soapy Sam remains as slippery as ever
with this one. Whale was judged the best
solution, albeit imperfect, and from
whale/bestforce entries our randomly
chosen winner was Mike Grocly of St.
Louis.

RIDDLE #4

Both dry and night abused.
MyWhois never such by day.
And never was called straight.

Tis most dusted when far away.
And head when in sight.

Dudeny discussed the above riddle in
300 Best Word Puzzles (Scribner’s 1972)
calling it an unsolved enigma that is
widely known. attributed to Bishop
Wilberforce. His own suggested answer
was heartache. Probably it is not correct,”
said, “but all other attempts seem in-
ferior. Dudeny quotes the last three lines
a bit differently. ‘And never by night/Tis
dear to friends when far away/And
delay when in sight.

Many readers agreed with Dudeny, but
we saw too many problems with heart-
ache. An ache isn’t abused. A heartache
was never doomed and never in sight.

We judged the most reasonable answer
to be airy. This fits most of the riddle’s
tones though the last two still seem to be
questionable. ‘If the answer is correct in
sight’ must mean something like ‘in your
eye.’ From 49 airy’s submitted the
winning entrant was Marshall B. Mills
of Tucson.

The first/my second format is
called a charade and suggests that the
answer is a compound word. Some ingen-
ious arguments were made for these
desolate answers: lifetime willpower
earthworm, homework, and cockroach

RIDDLE #5

Not newly formed yet made to-day.
And most in use while others sleep.
What few would wish to give away.
And none would wish to keep.

At last we have a riddle with a clear
solution. Of nearly 1,000 entrants 265
agreed on a bed the last line refers to the
obscenest phrase to keep abed “it’a
to be sick. What isn’t clear is whether
Wilberforce actually wrote this riddle.
Other sources attribute it to Charles J. Fox
an eighteenth century statesman and
orator. It is possible that Soapy Sam
penetrated the riddle into his personal papers
without realizing that it wasn’t his own and
that his descendants only assumed it was
original. (A similar fate may have befallen
RIDDLE #4 which one source attributes to William Cowper.

Some clever arguments were made for a secret, a snoring mate, VD, a mistress "made today the latter an and a New York City sanitation truck. The money went to Mike Moore, of Springfield, Ohio

RIDDLE #4

I'm just two and two, I am not, I am cold
I'm the parental numbers that cannot be told
I am truthful, unlawful is duty a fault
And often told dear god for nothing when bought
An extraordinary boon — a matter of course —
And yielded with pleasure when taken by force.

Love, passion, sex, and a kiss were the commonest answers. The last line proved troublesome for all. We finally had to write it off to the different attitudes of another era. Although Espy and Eckler preferred love, we agreed with Shortz that a kiss better satisfies the first line, "I'm just two and two", (Incidentally, two readers independently argued for heart by placing a pair of 2's face to face.)

The winning kiss from a stack of 39 came from Giff Mauser of Jacksonville Texas.

We acknowledge the following readers who made solid explanations for "right" answers or valiant attempts at wrong ones, who sent the cleverest rhymed replies, or who otherwise honored themselves in this contest. David Bennett, Graeme Bennett, Theodore L. Brown, Anna Davidson, Dan D'Mase, Chris Doyle, Mark Farrell, Ben Gottlick, C.E. Jackson, Carl Lippitt, Samuel G. McLellan, Wally Nickel, D.S. & R. "Tucky" William J. Velteck, and Neil White III.

READER ORIGINAL

$25: Sam Bassett of Palo Alto, Calif., writes that while he was driving behind a late model Volkswagen, he noticed that its license plate read "MLB 698", when he caught on he "nearly ran off the road laughing."

Question: What color was the car?

OLD BUSINESS

In February's "How Observant Are You?" Quiz, we offered "DOC", a mnemonic to tell whether the moon is waxing or waning by observing whether its curve is "D"- or "C"-shaped. This was appallingly northern-hemispherian of us. Australians of course, use "COD" Problem #14 in Quick Quiz [April] had an obvious misprint. It referred at one point to toothpicks and at another to matches. This wasn't meant as an extra April Fool's joke on readers, but it turned out to be one on us.

READER ORIGINAL. Here's the answer to the MLB 698 license plate problem, above.

The car was a white Rabbit of course. (TM, Bassett is a lawyer, C.A.)

COMPETITION #21 SMALL STEPS

"That's one small step for man, one giant leap for mankind!"

We commemorate the moment — 12 years ago, on the twentieth of this month — when one of the strangest sentences of all time was uttered. What did it mean? What was the distinction between 'man' and 'mankind'? There was none of course. Neil Armstrong mispoke. What he meant to say was, "That's one small step for a man, 'by a man' meaning himself! The line, fluffed through over-rehearsal or the momentousness of the occasion, was a small step away in wording a giant leap away in effect. Here are some 'small steps', just off the mark.

• E = mc²
• World War Jr.
• "Lightning never strikes twice at the same time"
• Fiddler on the Porch
• Lawrence of the United Arab Republic
• The United States of Vespucce
• "One if by land, two otherwise"
• "Beware March fifteenth!"
• "'Twas brilliant and the slimy toads did gyrate and gambol in the waves."
• Godel Escher Brahm
• The joy of victory the doomer's losing
• Zerox B-Up Bob Dilson
• "Give me liberty or give me death"

These are the idea names and phrases that might have been. Mary Ann Madden in her New York magazine competitions column (which we acknowledge for the idea and some of the examples) calls them near-misses. To us they are "small steps" — close, but not quite on target.

We're looking for more. We'll pay $100 for the best of the genre. $25 each for runners-up (2-10). Postcards only. please, with no more than two entries per card. Entries become the property of Omni and cannot be returned. Send your Small Steps, postmarked by August 15, 1981, to Omni Competition #21, 909 Third Avenue, New York, NY 10022.
On a historic night in 1953 a wizened figure eased cautiously from retirement to present a firsthand account of the crucifixion of Jesus. Since that historic interview, the Two Thousand Year Old Man — also known by the less imposing name of Mel Brooks — has enthralled audiences the world over with his insightful recollections.

Omn: I'm pleased to present the following exclusive interview with the ancient sage, a man whose opinions about the future of mankind are as compelling as his vision of the past.

Omn: We'd like to thank you for taking time from your busy schedule to join us.

2000: Wait just a minute. Hold on. This little thing is a tape recorder. Why isn't there a light to tell you whether it's working? What kind of technology is this? I have to check with my eyes to see whether it's turning. By the way I gave that line to Galletto.

Omn: What line?

2000: It's a line I wrote during lunch one day. I told him to turn and get some sun. He thought I said the earth turned around the sun. HeBlédéed it all over and they threw him in jail.

Omn: Who else did you know?

2000: Well, I knew H. G. Wells who had eugaphobia. He started writing science fiction because he couldn't get served in restaurants. Don't you see the dynamics? He hated this world. So he destroyed it and created a new one.

Omn: That's a very interesting. Have you ever tried to write science fiction?

2000: As a matter of fact, no.

Omn: What is the earliest science-fiction story you recall having heard?

2000: That would have to be in the cave days. They spoke of fires that came from the sky and there was evidence of them. I remember that spaceships once left a giant tictactoe board on an enormous plateau in Peru. We used it to play games, but it was really an incredible code. It has to do with genetics. If you get three nino roses in a row, you win a godlike prize.

Omn: Does the idea of gene splicing appeal to you?

2000: Only if we can make a nice good looking Jew by giving him a gentle nose. One you can blow with one Kleenex. In return, we can teach the Gentiles how to add odes on the back of a brown paper bag with a short stubby pencil.

Omn: You once remarked that transplantation was made imperative by fear. Do you still believe that?

2000: Absolutely. A loud sound: a big dog, a clash of steel, a thirty-eight barrel. These have a tendency to move us along more quickly than polite conversation.

Omn: Have you flown on the Concorde?

2000: Only as a passenger.

Omn: Did you like it?

2000: It's just sex. You get it over with fast.

Omn: We take it then, that you wouldn't like to fly in the space shuttle.

2000: I would, but only if I could ride the local, take a look around, get off and come back. Anyway it's gonna be the same as we got now. They're gonna go overboard and then they're going to give us little white plastic spoons and forks and make us eat little white plastic sandwiches.

Omn: Is there anything that would persuade you to travel to Mars?

2000: Yes, I'd go there if I could get a light as a feather mail box. You haven't been able to get it on Earth anymore since the old Jews from Odessa and Kiev started to die.

Omn: Let's discuss the energy crisis.

2000: There is no energy crisis. That's a lot of baloney. There's a lazzy crisis. They made energy for us and we used it all up. We don't understand moderation. We don't even understand energy. If we did, we'd have more than enough to go around. What is nuclear energy? It's a super excitement of atomic particles, that's all. It's not like you took a rock and shook the clay out of it. You could create your own nuclear energy.

Omn: You'd have to stick it a long time.

2000: Yes, or else whisper. The Germans are coming. That's strange. The hell out of rocks. But we're so lazy. We don't even put little lights in tape recorders anymore to tell us that they're working.

Omn: So you've indicated how would you solve the energy crisis?

2000: Very simple. We won't use another drop of oil, not another drop.

Omn: How will we run the economy?

2000: We won't. We'll pull up a chair. The Arabs can wait and we'll wait. We won't give them a nickel and we won't give them a can of carrots and peas. We'll eat what we've got and we'll starve them until what they've got is all out. Let's do that and see who wins.

Omn: Do you think that automation can help us sort out some of our problems?

2000: No, it's too complicated. If your hand can't make it, it's a joke. That's why they say it's handmade to show that something is good.

Omn: But hands make machines.

2000: That's a lie. They're made by other machines. It's a ghost world, nonliving things making more nonliving things. Take video games. They're not for us. They're here to entertain the television.

Omn: How did you get so smart?

2000: By paying attention every day of my life and by reading a lot of science fiction. It takes me out of the normal, everyday stupid, pedestrian world into something wonderful and prophetic. About fourteen hundred years ago, when I was a kid, I was a cab in the woods. I started reading science fiction. You know, books about great mechanical monsters swallowing defenseless creatures. And all of this has come true. Gulf and Western eating up Paramount. Transamericans swallowing up United Artists. Who would have dreamed it would turn out to be science fact?