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OMNI

JULY 1982 $2.50

GETTING HIGH AT HARVARD
THE JOSEPHSON JUNCTION: LINK BETWEEN COMPUTERS AND THE PARANORMAL
FRANK "DUNE" HERBERT'S NEWEST NOVEL
BUILDING THE SOVIET OEATH STAR
WIN A HOME COMPUTER

JOHN MARTIN

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JULY 1982

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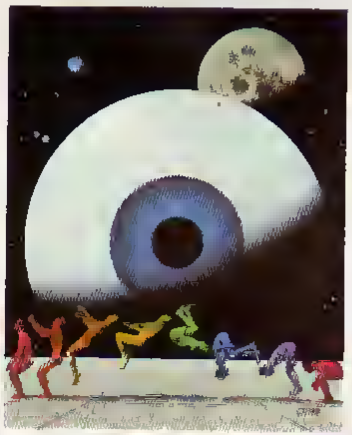

John Martin originally created this painting as a poster for an international film festival. He portrays a multidimensional universe in which an iridescent man and his shadow backflip through flat space under the gaze of a giant eye, resembling the rising moon

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FIRST WORD

By Arnold R Deutsch

"Machinery can do only so much It has not created robot engineers, and we have little prospect of acquiring human ones"

C P Snow divided modern society into people who know the Second Law of Thermodynamics and people who do not Paradoxically as high technology expands the numerical gap between those two groups is widening as well There is a chronic shortage of engineers and an equally chronic oversupply of nontechnical college graduates A recent cartoon strip summed the situation up nicely As two characters walk along, one reading a paper worries why the United States is producing fewer and fewer engineers "Don t worry" his companion reassures him "There are a million psychologists and sociologists studying the problem"

Meanwhile a cover story in *Chemical Week* is headlined "A Scramble for Talent" And an issue of the monthly magazine *Engineering News-Record* headlines one story "Engineering Crunch Seen Tightening" which provides a list of schools that have begun limiting the number of engineering students they will accept *Spectrum* the official publication of the prestigious Institute of Electrical and Electronic Engineers sees "A Crisis in Electrical Engineering Manpower" and *Computerworld* reports that AEA [American Electronics Association] Launches Study on Engineer Shortages"

Because there are so few technical people despite the obvious demand for them, competition for their services has encouraged a considerable number of technical students to opt for the currently glamorous and highly paid fields such as microelectronics and petroleum and computer sciences Relatively few are studying such traditional areas of engineering as HVAC (heating ventilating and air conditioning) Like MBAs, engineers are moving away from basic production

What has kept the economy on a relatively even keel in the face of these shortages is today s technology which can "clone" existing technical people without benefit of genetic-engineering breakthroughs Today s engineer, equipped with a computer terminal, can handle assignments that would have required a dozen or more slide-rule equipped types B C (before computers)

But machines can do only so much They have not created robot engineers yet and we have little prospect of acquiring adequate supplies of human ones.

Most students now in school for example, couldn't switch to an engineering major in college even if they wanted to And that is not because they lack mechanical aptitude—as the lines between hardware and software blur this isn't essential any longer—but because they have insufficient background in mathematics A 1980 survey of high-school seniors disclosed that only 33 4 percent had completed at least three years of math Only 22 4 percent had taken science courses for three or more years At least three years of math (excluding business math), together with intensive concentration in physical sciences, is the *minimum* preparation for engineering school

Furthermore, engineering education itself is in trouble

Increasingly desperate for technical talent, industry is outbidding academia not only for new graduates but for the engineering faculty members themselves When companies can lure faculty members from the classrooms with salaries, on the average more than $10,000 above academic scale engineering schools are freezing or cutting back on enrollments In 1982 with some 76,000 students graduating bachelor's degrees in engineering will peak out Then because of the end of the baby boom generation, numbers will fall off

Those students who do win admission to technical schools will find themselves working with equipment that is, on the average 14 years old "In a time when knowledge is doubling every five years engineering students might as well be working with stone tools," one critic says.

If we are to remain an economically viable society, Snow s two cultures must be integrated A major part of the economic and military competition we face comes from countries that have been successful in narrowing the gap between the two Japan, for instance, is reportedly producing about five times as many engineers annually as we are

The process of integration must begin with education and must start much earlier and more intensively than is now the situation The media both in subject matter and in their own rapidly developing technologies, offer the prospect of revolutionizing the whole educational process while contributing to the growing acceptance of a high technology world. The increasing popularity of science fiction, and the proliferation of new magazines and television shows devoted to science support this argument

Training for technological literacy will help develop a climate that is pro rather than antitechnology The concept of "user friendly" machines now becoming an integral part of information systems is an indication of this trend Upcoming generations must be made more aware of and prepared for living in an increasingly sophisticated high tech environment and working in it

Granted not everyone has the desire or talent to be an engineer But we do need to end the polarization between the technically trained and the often hostile technologically illiterate Technology is too important to our lives, our careers and our future to be left to technologists alone

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Arnold R Deutsch is the chairman of Deutsch, Shea, & Evans a human resources consulting firm and the author of The Human Resources Revolution Communicate or Litigate

OMNIBUS


GIBSON


BOVA


HERBERT

Somewhere in the shadowy recesses of human consciousness lurks psi—the holy grail of parapsychologists. They believe this elusive force lies at the root of telepathy, clairvoyance, psychokinesis and other psychic phenomena. *Les Ericson*, who describes himself as a "curious skeptic," volunteered as a psychonaut in the quest to track psi down. In "Butterflies in the Dark," he takes us inside the most advanced institutes of paranormal research, where highly sensitive equipment can detect the mind's scantest influence. Though Ericson failed the psychic-talent test, he notes that recent studies hint at the existence of ESP. "It just may be that psi is an art, not a science," he speculates. "A psychic may not be able to perform on demand any more than an artist can be expected to produce a masterpiece at each attempt." His journey through the corridors of consciousness begins on page 46.

Dr. Richard Evans Schultes, a quiet, Harvard-educated botanist, hardly fits the mold of a drug fiend. Yet Schultes's experiences with mind-altering substances make Timothy Leary look naive by comparison. Schultes can personally take credit for having discovered hundreds of psychoactive drugs in the pharmacopoeia of the Amazon Jungle. Surprisingly, the world's foremost connoisseur of hallucinogens says he never once had the kind of lucid psychedelic trip popularized in the Sixties. "Blurred vision and headaches seem to be his strongest reactions," says *Leah Wallach*, whose revealing profile of the "Gardener of Eden" begins on page 68. Wallach, a New York-based freelance writer, is a frequent visitor to local botanicas—Puerto Rican shops that sell plants that possess magical healing powers. "Ever since I met Schultes," she confides, "I've been as obsessed with herbal remedies as any witch doctor."

The battle for the stars is already being fought on Earth. And before the first laser shot is fired, the United States is losing. *Omni* editorial director *Ben Bova* takes a behind-the-scenes look at Unispace 82, a United Nations conference that threatens to close private enterprise out of orbit, hand the enormous resources of space to the Third World, and curtail operations of NASA's shuttle—all the while permitting the Soviet Union to set up the ultimate military base 300 miles overhead. This cautionary tale starts on page 62.

This month's pictorial is a celebration of *Tron*, the new movie from Walt Disney studios. *Tron* is the story of a young computer genius blasted into another world—the inside of a computer. Called the first film of the Eighties, *Tron* has almost 20 minutes of computer-generated art. The photos in the pictorial (pages 78–85) are copyright 1982, Walt Disney Productions.

Do science and mysticism mix? Nobel Prize-winning physicist Brian Josephson thinks they do. A self-proclaimed half-mystic, Josephson is a follower of the Maharishi Mahesh Yogi and believes that meditation can reveal new facts about the physical universe. *Omni* contributor *John Gliedman* explores Josephson's unconventional blend of rigorous accomplishment and controversial speculation in an interview with him beginning on page 86. Gliedman teaches the philosophy of science and psychology at Empire State College/SUNY. A Texan by birth and a New Yorker by choice, he prefers running to meditation and is working on a book about the new visions of reality suggested by modern physics.

This month's fiction includes the first of a two-part excerpt from *Frank Herbert*'s latest novel, *The White Plague* (see page 52). The award-winning author of *Dune* and *God Emperor of Dune* makes a stunning departure from those best sellers in his rendering of a chilling and all-too-plausible scientific horror story. And *William Gibson* returns with "Burning Chrome" (page 72), a tale of two small-time hoods who attempt the heist of their lives. Gibson's first published story, "Johnny Mnemonic," appeared in *Omni* (May 1981) and went on to be nominated for a Nebula.

First came the Italian-language edition of *Omni* magazine. Now we are pleased to announce that our readership extends all the way to Japan, which has emerged as an eager audience for our futuristic, high-tech format. Indeed, *Omni*'s debut in the Far East last April can only be described as a smash hit. The Japanese-language edition sold out in just three days.

OMNI

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JULY

LETTERS

COMMUNICATIONS

Dairy Beef

The brief article that appeared in the February 1982 issue [Continuum] about bovine leukemia virus (BLV) was misleading. Whether BLV has any effect on human health has been explored for more than 20 years

There have been many epidemiological studies that can demonstrate no relationship between the bovine disease and human illness There is no evidence that leukemia or other cancers found in one animal species can be transmitted to other species

BLV is a weak virus which dies quickly outside the cow Furthermore, it is destroyed by pasteurization

Dale Kemery
National Dairy Council
Rosemont, Ill

Sensational News

Omni s March 1982 issue s coverline "How Homosexuals Are Created implies that homosexuals are in fact created But the causes of homosexuality are still unknown indeed it hasn t even been proved that there are any causes

Ned Flaherty
Washington, D.C

With Malice Toward None

I enjoyed *Omni* s January 1982 issue except for the news of Senator William Proxmire s malevolence toward SETI [Continuum] You should bestow first prize for Competition #22 (caption-writing contest) on yourselves, for the caption beneath Senator Proxmire s picture "He has no interest in searching for intelligence It fits him perfectly

Tim Lewis
Great Bend, Kan

Greasy Kid Stuff

I enjoyed your informative article Spare Genes," by Yvonne Baskin [March 1982] Not all the biochemists have grease on their fingers under laboratory conditions I hope (picture on page 52) If so please leave my kid s genes unaltered

Mark Whipple
Arlington, Tex

Omni Squared

You may find this word-cube [Games, June 1982] of interest in view of its leading word—the name of a certain meritorious magazine of the future

O M N I	M A I D	N I L L	I D L E
M A I D	A I D E	I D E A	D E A L
N I L L	I D E A	L E N S	L A S S
I D L E	D E A L	L A S S	E L S E

Peter Graham
Papakura, New Zealand

Circus Cheers

I have been a circus performer for eight years I was thoroughly captivated when "Elephant Song by Barry Longyear appeared in *Omni* [January 1982]

"Elephant Song" made me laugh and cry and helped me recover my perspective after having to leave my show Thank you for running it

Kathleen Herb
San Diego Calif.

Chauvinistic Stylizing

I would like to point out a subtle yet irritating note in your recent story "Computerized M D" [Continuum February 1982]

I quote, The nurse having just completed *her* training, is inexperienced in this kind of emergency *She* repeatedly pages for the doctor, but by the time *he* arrives the patient has suffered a heart attack " (Italics mine)

I will leave it to someone else to ask why a hospital has the ICU under the solitary control of a novice, and I will concentrate on a different point Now I don't believe for a minute that your staff thinks that all doctors are males and all nurses are females So why write the item that way?

I think it is important that you are careful about your assumptions and implications in stories such as this one

S L Shea
Bloomington, Ind

DIALOGUE

FORUM

In which the readers, editors and correspondents discuss theories and speculation arising out of Omni. *Readers are encouraged to debate views and pose questions to* Omni, *the scientific community, and the science-fiction establishment. The opinions published are not necessarily those of the editors.*

On Thin Ice

I was extremely disappointed in the article "Cool Immortality" by Roy Walford, Jr. [March 1982]. The author's credentials led me to expect a report on significant progress in the study of senescence in human beings. Instead, what we were provided with were some cursory observations about fence lizards, some partial results from an interesting study of South American fish, and a largely worthless travelogue of India.

Dr. Walford seems to have the wrong impression of his audience. I think the problem arises from a characteristic that he shares with some of the yogis he met in his wanderings. He accused them of being "on quite resplendent ego trips." I think he is on an ego trip no less resplendent.

I am rather disturbed by a scientist who doesn't seem to plan his work, but continually "finds" himself in unexpected places doing unexpected things. This sort of laid-back, hip presentation may be acceptable in Lotusland (L.A.), but it leaves me cold.

Melvin Carter
Pleasanton, Calif.

Dr. Roy Walford notes that "Swami Rama boasted that he could boil water in his naked hand. He held out his cupped hand, but he poured no water into it."

Of course not. Yoga psychology forbids the display of Siddhic powers. A Himalayan master might place himself at the service of Western sciences, as the Swami Rajneesh did, but he would not dictate the details of tests to assess the effects of different systems of psychospiritual development.

Selene MacKeanzie
Pasadena, Calif.

Yellow Rain

The excellent article by Douglas Starr entitled "Yellow Rain" [Earth, March 1982] provoked my imagination to examine the "if we didn't do it, you must have" name-calling syndrome that typifies the only current public communications we have with the Soviet Union.

What if a wealthy, powerful, but secret organization exists today whose sole purpose is to create disharmony between the two great superpowers by causing havoc and destruction all over the world?

This organization would then sit back and watch the United States and the USSR stab each other in the back, each blaming the other for inhuman events like those described in Mr. Starr's article. The end result would be that the two powers would go to war and destroy each other, leaving the secret organization in power.

Robert Levi
San Luis Obispo, Calif.

Douglas Starr says that the State Department destroyed its own credibility when it admitted that one of the samples of trichothecenes it had tested had been obtained through *Soldier of Fortune*, which Mr. Starr labeled "a magazine for mercenaries."

I do not consider myself a mercenary, and neither do any of my friends who read *Soldier of Fortune*. Besides, if "mercenaries" did obtain the samples, it seems to me they would probably be the most objective of any samplers, since, by definition, a mercenary is a soldier without any political or patriotic ties.

Timothy David
Alexandria, Va.

Douglas Starr's article "Yellow Rain" seems to have been written for the Russian propaganda department. I doubt whether any evidence could be found that would convince Mr. Starr of Soviet complicity in the use of poison gas.

Fred Greene
Tulsa, Okla.

Space Race

Ben Bova tells us [First Word, March 1982] that the USSR already has a weapons system in space. This is only one more surprise in a long dynasty that began with *Sputnik*. If the United States does not start putting money into the space program, we will find ourselves at the bottom of a pit so deep we will never get out of it.

We saw that the scientists working at the ESA [European Space Agency] are assembling their new transport rocket, Ariane, and the Spacelab. Even the shuttle's pallets are clearly marked "Made in England."

Will we be outsmarted at our own game? Remember how the Japanese and the Europeans took over our automotive industry?

Perhaps some of the people who represent us are waiting to see the space shuttle stamped "Made in Japan." Just so long as it is economical. Our government must invest in the space program.

Rui Proenca
Woodside, N.Y.

Big Mouths

In the article "Future Faces" [Continuum, February 1982] orthodontist Dr. David Marshall presents his conclusions that "human jaws are actually becoming smaller, the brain cage is increasing in size, teeth are losing cusps, and the roots are shrinking," and this has occurred because man no longer uses his teeth as weapons or to chew unprocessed food.

This line of reasoning bears absolutely no resemblance to modern evolutionary theory. To think that a decrease in the use of the jaw will make it smaller and that this acquired characteristic will then be transmitted to future generations is ridiculous and a classic example of the theory of Lamarck, popular long before Darwin.

Dr. Marshall based his sweeping conclusions on a "trend" discovered from barely one generation of observation. Furthermore, no member of the genus *Homo* ever used his teeth as a weapon unless he had some physical disability or had his hands tied.

Robert Noland
Frederick, Md.

FIGHTING FIRE WITH FIRE

EARTH

By Mark Teich

As the helicopter swooped over the trees, the man beside the pilot scanned the ridges. Finally he found what he wanted: a wide, denuded ridgetop, stark as human skin. "Now!" he barked. The pilot hit his torch button, and the nozzle of a 50-pound canister of alumino gel and gas opened wide. Globules of flame spewed down onto the trees at the edge of the clearing. "Bull's-eye," said the passenger. "Straight ahead." The copter moved on, shearing long strips of fire through the forest.

The men were neither soldiers in Vietnam nor crazed arsonists trying to level the wilderness. They were firefighters protecting a southern California chaparral forest. The year was 1982.

After nearly 100 years of "crushing that butt dead out," the U.S. Forest Service has recently concluded that Smokey the Bear may have missed the mark. Saving forests many firefighters now believe, does not mean killing every forest fire as soon as it springs to life. Rather, the secret to fighting fire is setting more fires.

From its inception in 1892, the Forest Service always operated with "suppression" as its catchword. Fire was man's enemy, the code went, and when it broke out, you were to attack it with all the weapons and manpower at your disposal. At the hint of a flame, sundry fire retardants, herbicides, tractors, aerial bombers, and smoke paratroopers chased it back to oblivion, preserving the forest and the burgeoning civilization along its borders.

But in a sense the technology was too good. Fire, especially in the thick coniferous forests and chaparral of the southwestern United States, had once been a natural part of the ecological balance, burning away old vegetation to make room for new. But by the late 1950s the flames had been kept at bay so long and so completely that vast stretches of dry, dead timber lay primed to detonate the wilderness at the flick of a match or the random spark of a tractor. During the hot season, some asserted, there were only four realistic ways to fight a wildfire: pray for rain, pray for the wind to die, pray that the fire headed for the ocean, or wait until there was absolutely nothing left to burn.

Alert to the problem, a California forestry professor named Harold Biswell and a few others began calling for the Forest Service to take a new tack diametrically opposed to fire suppression. Fire, Biswell said, was not man's enemy but his natural friend, and instead of being fought, it should be exploited. By setting controlled, periodic burns, he maintained, you could create a mosaic pattern of charred stretches blended into younger, greener stretches, eliminating the decades of massive brush buildup that gave wildfires their inexorable momentum.

Suppression, Biswell said, only upset the natural cycle, creating a fire-breathing monster. Not only did it leave the forest ready to incinerate, but it guaranteed that wildfires would start in the worst possible conditions. Blazes could be contained in the spring and winter months, but in the hot season the hills would turn to matchsticks, and the Santa Ana winds would fling the burning embers throughout the forest. Prescribed burning, on the contrary, would allow firefighters to choose the time, place, and weather conditions they wanted.

To Biswell, all of this made perfect sense. He'd just returned from Georgia, where prescribed burning had recently been tried. But Western foresters weren't ready to hear it. After decades of Smokey, the thought of *setting* fires turned their stomachs. What worked in the Southeast, they said, could not safely be used in the West, where the slopes were steeper and harder to maneuver, the vegetation denser, and the weather more treacherous. When Biswell could not be silenced, the consensus was to let him rave. Foresters started calling him "Professor Burnwell," "The Friendly Flame," and "Harry the Torch."

But then came the major wildfires of the Sixties. The Bel Air fire snuffed so many movie stars' homes that when the smoke finally cleared, firefighters looked around in dumb confusion. "The freeway!" they had stridently promised. "The fire will never jump the freeway!" The fire did jump the freeway, and when the Malibu fire a few years later made similar graceful leaps,

CONTINUED ON PAGE 119

Helicopters spewing flame throughout the forest can prevent the ravages of wildfire

LIFE

By Dr Bernard Dixon

Can animals think? Two people who think they now know the answer to that venerable riddle are Professor Herbert Terrace from Columbia University in New York City and Dr Guy Woodruff at Temple University in Philadelphia. Their experiments should convince the most hard-nosed skeptics that animals really do think.

The claim is especially interesting in the case of Herbert Terrace—one of the first and recently most disillusioned students of communication among apes. After spending four years of research time and $250,000, Terrace believed he had helped his chimp Nim to converse by employing Ameslan sign language. But when he looked again at his videotapes, he realized that he had been a victim of the Clever Hans syndrome. Nim had learned to please, just like Hans the mathematical horse, which astounded spectators earlier in this century by tapping out the answers to simple problems in addition and subtraction. Both had subconsciously picked up promptings from their trainers.

Terrace's book *Nim: A Chimpanzee Who Learned Sign Language* tells the story of that exciting but eventually disappointing project.

So what has made Terrace believe that animals can indeed think? The answer lies in some ingeniously designed tests that, unlike earlier efforts, cannot be criticized for yielding results open to more than one explanation. For many decades now, psychologists have been tackling the same question by putting rats into mazes and inducing pigeons to peck keys for food. But all these tests merely suggest that learning can be reduced to particular combinations of stimuli and responses. Whether predicated on crude Pavlovian conditioning or the more sophisticated ideas of B. F. Skinner, explanations could always be advanced to suggest that the animals were not *really* thinking. The crucial missing evidence concerned whether they could do as we do: form concepts and reflect on their experiences.

Terrace cites experiments that should silence such argument once and for all. Researchers worked with rats placed at the center of a maze, with eight identical arms radiating outwards, each loaded with a food pellet. After several runs, a rat quickly learned to collect each of the pellets. Very soon it was emptying the maze with just one visit to each arm. And not only that. The rat wouldn't always enter the arms in the same order. It might choose a 5,2,3,8,7,1,4,6 sequence on one occasion and an 8,1,6,4,3,2,5,7 sequence the next time. Further tests eliminated the possibility that the animal was laying a scented trail or relying on other external cues. It was remembering and thinking.

Investigations reported by Terrace recently in *New Society* reveal an even more fascinating dimension. He has now trained pigeons to peck four colored discs in a particular sequence—say blue, green, yellow, red—before being rewarded with food. But the discs were not always laid out in the same order. Nonetheless, his pigeons chose the correct sequence the first time when presented with any new configuration. Even more impressive was their ability to peck just two colors of the four in the right order, whether blue and green, blue and yellow or blue and red.

Terrace's birds were performing like a child who recites the second and fourth lines of a nursery rhyme in the correct order, or plays nonadjacent notes on a musical scale. This is possible only because the child produces a mental representation of those sequences.

Likewise, new studies by Dr. Woodruff and his colleagues in Philadelphia demonstrate primitive but unambiguous mathematical reasoning in a chimp named Sarah. Results reported in the *Journal of Experimental Psychology* show that Sarah is capable of analogical thinking. She can judge whether one pair of objects is related in the same way as another.

After three centuries of wrangling, Descartes's view of dumb beasts as mechanical automata can finally be discounted. But, Terrace points out, the answer to one longstanding riddle raises an even more baffling question. Thought and language have always been seen as intimately conjoined. How then do animals think *without* language?

Pensive primate. Descartes's "dumb beasts" demonstrate analogical and mathematical reasoning

THE POLITICS OF PLANETARY SCIENCE

SPACE

By Earl Lane

Under the Reagan Administration the exploration of the planets appears to depend far more on earthly concerns than on scientific interest or philosophical wonder The space shuttle and other high-priority items have bled much-needed money from America s planetary-science program since the mid-1970s But in the last 18 months endurable wounds have turned into near-fatal hemorrhaging

Planetary science barely survived a tough round of negotiations late last year between top-level officials in the National Aeronautics and Space Administration and the Reagan Budget Office Why some space projects survived while others were killed may give a gloomy warning of what is to come for American planetary exploration and for science in general

The debate involved the 1983 budget, which was presented to Congress in January and is supposed to take effect October 1, though Congress has missed budget deadlines regularly of late It is the first budget to bear the sole stamp of President Reagan's administration

Scientific merit may not quite have been tossed out the window during the budget bargaining but insiders make it clear that science largely took a backseat to such mundane matters as the complexities of the budgetary process itself and the increasingly cozy relationship between NASA and the Department of Defense

The big winner in the bargaining was *Galileo* a craft that will voyage to Jupiter The mission was first approved in 1977 and is now scheduled for launch in 1985 Plans include placing an automated spacecraft in orbit around Jupiter and sending a probe into the planet s swirling atmosphere Galileo had already survived the frantic budget revisions in February 1981 when the Reagan folks chopped away at the lame-duck 1982 budget drawn up by the Carter Administration It is the only new U S deep space probe now on the books If it had gone down the tube, it likely would have taken the American planetary program with it

Galileo which eventually may cost as much as $1 billion has had a bumpy history It has faced several challenges in Congress partly because there is still no booster rocket to kick it off from shuttle orbit into deep space and no one is sure how much it will cost to develop one

And Galileo faced the same threats as other planetary ventures White House Science Adviser George Keyworth was quoted several times as saying that further exploration of the solar system might not be the best use of our research dollars

Hans Mark NASAs deputy administrator was saying much the same thing In an internal NASA planning memorandum of October 7 1981 just before the budget battle was joined in earnest, Mark and a colleague suggested that deep-space missions might best be "deemphasized until "we have a space station that can serve as a base for the launching of a new generation of planetary-exploration spacecraft

The threats were more than idle talk The Carter budget had included money for Galileo and two other deep-space missions. an ambitious project to map Venus using an orbiting radar craft and a joint effort with the European Space Agency to send two spacecraft to explore the sun s polar regions

Galileo stayed alive in 1981 through the efforts of a small cadre of NASA officials who were holdovers from the Carter days or about to leave the agency They did not seek outside suggestions The decisions had to be made extremely swiftly ' says one NASA program planner ' It was done strictly within the agency It was *verboten* to go out there and ask people what they thought " In view of the White House attitude toward leaks on budget figures he notes It would have been out of the question to consult the scientific community " Even without outside allies the Carter holdovers pushed Galileo through But Reagan revisions put off the Venus mission and canceled the U S spacecraft in the solar-polar mission

There was little chance that the polar spacecraft would be given a second life last summer when NASA began to put together its 1983 budget The same proved to be true for the Venus mapping mission, even though it is highest on

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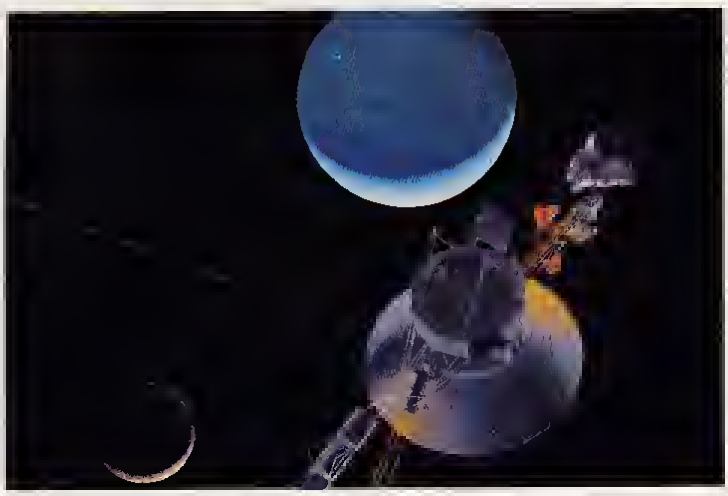

Sometimes deep-space probes fly on fiscal inertia boosted by down-to earth politics

IMAGINARY FRIENDS

MIND

By Patrick Huyghe

Stephen King, the modern master of the macabre (author of *The Shining, Cujo, Firestarter* and *Carrie*), remembers his vividly. "I had one when I was six or seven," he says. "I was the younger of two boys. My brother was always off on his own. My mother worked, and I often hung around by myself. So I invented this kid to play with that nobody could see but me. I was very aware that he was not real and that I must be very careful not to address him when other people were around, or they might think I was off my gourd.

"His name was Jerry, and he hung around with me for two or three years. He was great. He did anything I wanted. If I had a deck of cards, Jerry would play war with me. If Jerry won, he would always be big-hearted and magnanimous about it and never rub it in the way some of the other kids would."

Young children spend a good deal of their time in the world of make-believe, and certainly the most common inhabitants of that realm are the extraordinary creations known as imaginary companions. These invisible characters, unlike other products of make-believe, often occupy a physical space in the real world of the child. "They have a reality that is striking," says Dr. Humberto Nagera, a child analyst and professor of psychiatry at the University of Michigan's Medical Center in Ann Arbor, who has spent more than a decade studying these creations in England and in the United States. "For the child, the imaginary companion has a presence that would not be possible at any other age."

A surprisingly large number of children, it turns out, have imaginary companions. They are very common, according to Dr. Jerome Singer, professor of psychology and the director of the graduate program in clinical psychology at Yale University. He has spent much of his professional life studying fantasy in children. At some point in the first five or six years of life, from a third to half of all children have imaginary playmates, he estimates.

Imaginary friends and other fantasies play an important role in the development of the growing child, the experts say. These imaginary creations are constructive devices that allow young children to rehearse various roles and prepare for adult life. "Imaginary companions help children learn, experiment, deal with stress, and master problems," Dr. Nagera explains.

Children who have imaginary companions are clearly different from their more literal-minded peers. A recent study by Dr. Singer and two other Connecticut psychologists found children with imaginary companions to be less aggressive and less fearful than other children, and they seemed happier, too. They smiled more than their less imaginative peers. Their language was also richer. They showed greater concentration and cooperation, and, despite the fact that they watched less television than other children, they were seldom bored and generally more imaginative than their peers.

The consensus of the experts is that make-believe friends are more likely to appear to very intelligent children as early as the second year of life. While the first imaginary friends usually take the form of animals, the great majority of them are human characters about the same age and of the same sex as their creators. Some children may also prefer to ally themselves with exotic creatures or supernatural beings, such as fairies, little people, or even extraterrestrials.

Children usually become quite attached to their make-believe playmates. There are recorded cases of imaginary companions lasting a decade or more. Even older children, says Nagera, will sometimes have such friends, but for the most part children abandon their imaginary companions about the time they enter kindergarten or nursery school.

The same phenomenon in adults usually implies some psychopathological condition. Probably the most famous recent example can be found in the strange case of Mark David Chapman, John Lennon's assassin. During proceedings that led to Chapman's sentencing, forensic psychiatrist Dr. Daniel Schwartz testified that from the age of about nine years Chapman had trouble

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Invisible playmate. For a child, a sign of a healthy imagination; for an adult, a troubled mind.

THE ARTS

By Jonathan Rosenbaum

We all know what the Klondike is: a remote frontier raging with blizzards, where W. C. Fields can look out the door of his log cabin, dryly remark, "Ain't a fit night out for man nor beast," and then get a fistful of snow dutifully thrown at his kisser. Such at any rate was the image conjured up in my own mind when I discovered that I was flying all the way up to Hyder, Alaska, last December, to watch one of the final days of exterior location shooting on John Carpenter's *The Thing*—a remake of a 1951 science-fiction chiller—set somewhere in the vicinity of the Arctic Circle and budgeted at $11.5 million.

Simply in order to get to this spot, I had to fly from New York City to Seattle for a night's stopover, continue on Alaskan Airlines up to Ketchikan, and then proceed in a private, amphibian, four-seater plane—6,000 feet over narrow, forbidding valleys edged with snowy peaks, for an hour of spectacular vertigo—which eventually docked in Hyder. From there it was another hour up a twisting, one-way mountain road to the ultrascenic location—an Air Force compound where Carpenter, his all-male cast, and his crew had set up camp.

For all those familiar with the scary, low-budget original—produced and supervised by the late Howard Hawks and directed by his sometime editor Christian Nyby—the movie is a model of talky, fast-paced, macho group interaction, bearing all the earmarks of Hawks's own films as a director, such as *Only Angels Have Wings* and *His Girl Friday*. Critic Manny Farber described it at the time as a "well-cast story, as raw and ferocious as Hawks's *Scarface*, about a battle of wits near the North Pole between a screaming banshee of a vegetable and an air-force crew that jabbers away as sharply and sporadically as Jimmy Cagney moves."

Add to this that John Carpenter is a devoted Hawks fan in his own right. He included clips of the original film version of *The Thing* (shown on a TV screen) in his hit *Halloween*, and he was already featuring lengthy tributes to Hawks's *Rio Bravo* in his earlier *Assault on Precinct 13*. It would seem you'd have a faithful adaptation on your hands. (The script is by Bill Lancaster, son of Burt, whose principal credit is *The Bad News Bears*.) Yet the funny thing about Carpenter's remake is that it *is* faithful, but not to Hawks. Carpenter's object of fidelity is the 1938 story that the Hawks movie was loosely based on—"Who Goes There?," by John W. Campbell, Jr.—which Hawks, Nyby, and veteran scriptwriter Charles Lederer overhauled without any compunction.

"The original movie has always been one of my favorites," Carpenter confessed to me at one point. "For a lot of reasons, like its mood and style. And at the time it came out, it was very powerful—at least for me, as a young kid—and very frightening. In *Halloween*, I felt that the way the shape was portrayed was somewhat like the way the monster from outer space in *The Thing* was portrayed. You don't really see it too clearly."

"In terms of remaking the film, that's a different issue," Carpenter continued. "In addition, I've always admired the story that *The Thing* came from. It's an entirely different animal, and I've always wanted to remake—or actually *make*—that short story, basically the way it was written. Unlike the Frankenstein monsterlike, self-regenerating, eight-foot-tall vegetable in the 1951 movie, played by James Arness, the monster in Campbell's version sports three red eyes, four tentaclelike arms (each of which has a 'seven-tentacled hand") blazing blue hair, crawling like worms, and rubbery flesh, and it's only four feet tall. Its true horror, though, is less its appearance than its endless capacity to consume and duplicate living matter of all kinds, thereby threatening to conquer the whole planet.

A problem story of the sort that John Campbell was famous for developing. "Who Goes There?" shares with the Hawks film a strong sense of human interaction. According to another celebrated science-fiction writer, the late C. M. Kornbluth, it isn't a "monster story" at all, but "a story about maintaining integrity, working together, using brains and courage to solve the problems of survival in an indifferent world."

Carpenter's remake of an SF classic. "One or all of these people could be taken over by the Thing."

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THE ARTS

By M. S. Kaplan

Satellite communication is changing the ways we make telephone calls, watch TV, read a newspaper, and keep an eye on the stock market. It is also changing the way we hear radio.

Since FM signals reach no farther than the line of sight, many national radio networks are now delivering their programs by using satellite technology. Like a sky-high switchboard, Local stations with receivers (called dishes) pick up a main network signal bounced off a satellite. These stations then pass the signal over their local FM transmitters and transmit the news, sports, or other bill of fare to regional listeners. UPI, AP, Westinghouse (Group W), and other commercial radio networks send their shows to affiliates in this way. But only National Public Radio (NPR) has made the trafficking of network programming into a two-way street. Local radio stations equipped with earth stations called uplinks bounce a signal to the main network transmitter. From there the signal is put back on the satellite and over the nationwide system. NPR has as many as 17 uplinks that allow stations to originate as well as receive national programming.

"Satellite uplinks enable us to be 'Live from Everywhere,'" says David Ossman, one of the creators of the Firesign Theater whose records of high farce were Sixties standard issue. Last April Ossman anchored NPR's acoustic experiment *The Sunday Show*, a weekly five-hour arts and performance program. "We'll be able to go live from the foghorns in San Francisco Bay to a concert in Minneapolis, to an interview in New York. And in July, when our uplink is completed in Alaska, we'll be 'Live from Fairbanks,' too."

The Sunday Show will bring people into the foreground of listening," says Ossman. "People's lives change over the course of an afternoon, and the program will be constantly changing in order to interact with listeners." Programming will range from environmental sounds to Beethoven piano sonatas. "It's really audio art," says Ossman, "using radio as a canvas on which to paint sounds."

Executives at NPR, headquartered in Washington, D.C., like to say that the future of television is radio. No other broadcasting network has developed satellite-uplink capability like NPR's, and nowhere does it pay off better than at gathering the news. The popularity of NPR's two news programs, *All Things Considered* and *Morning Edition*, has spearheaded an astonishing 37 percent rise in NPR listenership.

"Satellite uplinks allow us to broaden our sources, respond quickly to a news situation, and update the story as it unfolds," says Barbara Cohen, NPR's director of news and information programming. "Radio is more portable and less intrusive than television, and it more faithfully conveys the sense of the event. TV news reports are taped for the six o'clock broadcast, but in radio the listener is involved in such a way that he becomes a participant."

NPR is the only radio network that distributes its programming entirely by satellite to some 250 member stations. Up until May 1980, NPR delivered its shows by using the same two expensive and elaborate methods still used by many radio networks. Programs were duplicated on disc, reel-to-reel, or cassette tape and then "bicycled" to NPR's member stations through the postal service. Besides being an arduous process, the time delay undermined any immediacy that the news content might originally have had.

The other alternative is to rent telephone lines and send the program through the wires. But landlines, leased by the mile from AT&T, are costly and of notoriously poor quality. With a bandwidth of only 5 kilohertz, phonelines might be satisfactory for voice transmission, but they reproduce music only as well as a colander holds water. Each time the signal is boosted by relay stations in its cross-country journey, it becomes increasingly degraded with cross talk and other interference. But with satellite transmission only one relay station is involved. Because you can send your signal to all your member stations simultaneously, you drive down the comparative cost of leasing a space on the satellite. One radio network that now pays

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Satellite communications are allowing radio to transform the world into an enormous room

THE ARTS

By Vicki Lindner

With erosion-control mesh and rope he transformed a mile and a half of rocky Australian coastline into a blinding white package in 1969. Three years later he suspended a 2,500-ton orange curtain between two cliffs in Rifle, Colorado. In 1976, after three years of stormy negotiation, 18 public hearings, and three court battles, he constructed a sinuous white nylon fence which ran gracefully through 24.5 miles of rolling fields in Sonoma County, California, down into the ocean, emphasizing changes in the light and wind. In the name of art, he erected an oblong, 5,600 cubic-meter package of air in Kassel, West Germany, blanketed the waters of a Newport, Rhode Island, cove with polypropylene, carpeted the walkways of a Kansas City, Missouri, park with a shimmering saffron fabric, and wrapped and tied a Roman wall.

Despite their tons of fabric and steel, Christo's projects are monumental mirages. None have remained in place nor were they meant to, for more than 75 days. (The nylon polyamide of *Valley Curtain* succumbed to a freak storm and had to be disassembled after 28 hours.) Yet even after their physical manifestations disappear, the Bulgarian-born artist's audacious visions remain superimposed on their sites, documented by films, books, photographs, and his own drawings and photo montages. The Christo version of modern art, moreover, has a social impact equivalent to its aesthetic clout and represents a complex political struggle won by the artist.

When Christo applies for permission to create a project, endless presentations of the work are made to commissions, influential individuals, and bureaucrats. Sometimes public hearings are held, rallying staunch supporters and embattled detractors. Government officials compile voluminous critiques, countered by in-depth studies supplied by Christo. Even before permission is granted, the services of environmental specialists, sociologists, and engineers are engaged, and teams of art students and construction workers are mobilized to assemble the mammoth art. (For *Wrapped Coast*, professional rock climbers were called in to sew and fasten immense panels of synthetic fabric to the treacherous cliffs of Little Bay.) The final result amazes and dismays. Christo thrives on the headaches that accompany his "Public Art," and he selects sites where he's bound to meet conflict. He believes opposition brings forth positive reactions, new interpretations, and opposition energizes his work. "It would be very unsettling if I arrive someplace, propose to do a project, and nobody care," he says.

Yet the political opposition that inevitably greets a Christo proposal has kept many of his projects in the embryonic stage. Though his completed visions are well known to art aficionados, those he hasn't been able to realize reveal much about the scope of his imagination and the political processes inherent in his work.

Take *Wrapped Trees*. Long fascinated with organic textures, Christo wrapped a lone tree here and there and suggested more extensive "tree sculptures" in Missouri, which was part of a larger plan to package New York's Museum of Modern Art. In 1969 he proposed to wrap the 360 platane trees that line the Champs Elysées. Christo felt the stately Parisian avenue provided the perfect uphill perspective for the project. "It was to happen in the wintertime, when the trees lose their leaves," he recalls. He intended to fill out the volume that leaves usually give to the thick-branched trees with a translucent fabric, "a silvery milkish cloth, not opaque, with a light-passing-through quality. We would still see some of the branch appearing and disappearing, like diluting," Christo suggests, "because the fabric became less visible as you moved far away. And you would have seen the trees in two very different perspectives—up to the Arc de Triomphe and down to the Place de la Concorde." But *Wrapped Trees* was not to be. Though the artist had lived in Paris and had many Parisian friends and an acute interest in the city, "and the way it was affecting me in my younger years," he did not bargain for the Parisian brand of politics that squelched his inspiration. Christo and his French wife, Jeanne-Claude, who is administrator for the projects and dealer for Christo's drawings, persuaded the influential stores and restaurants lining the Champs Elysées, the Park Department, and the police to support *Wrapped Trees*. But they could not convince the prefet of Paris, an appointee of the President and much at the mercy of political maneuvering, that the rest of the city would not be scandalized by the shrouded platanes. At that time, before Paris instituted an elected mayor, the préfet's word was law. Would he now offer to wrap trees for another city? No, says Christo, who felt Paris was, aesthetically and emotionally, the ideal site. "I have other interests now, other directions. I am not anymore excited about that." Christo and Jeanne-Claude believe a project happens when a mysterious "chemical" fusion of elements makes local politics work in their favor.

So far New York City, Christo's adopted home and art capital of the world, has not had the chemistry to host one of his

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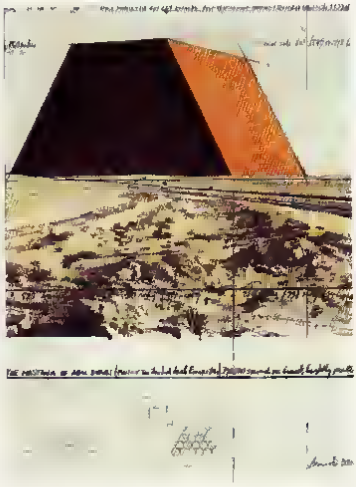

Christo's plan for a giant mastaba at Abu Dhabi

AQUATIC GRAVEYARD

EXPLORATIONS

By Cleo Hanlon Buchanan

It was the second watch on a chilly spring afternoon in 1945 when a small freighter the *Black Point* steamed up the coastline just off Rhode Island with her cargo of coal. A German U-boat was on watch, too, waiting for her next victim. As the *Black Point* approached, the U-boat fired off two torpedoes and sank the little freighter just four miles off the coast of the United States.

The *Black Point* went down quickly, taking 12 sailors with her. But before they died, the crew was able to send out an SOS. The Navy and Coast Guard quickly picked up the trail of the U-boat as she fled toward the open sea. Throughout the night of May 5 and into the early hours of the next day, a Navy destroyer escort and a Coast Guard frigate dropped depth charges until an oil slick was spotted. The U-boat, Number 853, died in 110 feet of water just east of Long Island. Only a few days later, on May 8, 1945, Germany surrendered, and the 44 crew members of *U 853* became some of the last casualties of World War II.

Today you can board this U-boat exactly where she finished her last vigil nearly 40 years ago—on the ocean's bottom more than 100 feet below the surface. Or if U-boats don't interest you, there are more than 1,500 other sunken vessels to choose from in the area surrounding New York Harbor. Wooden Colonial sailing ships, passenger liners, Prohibition Era rum runners, even modern oil tankers lie buried in these waters, possibly the largest ship cemetery in the world.

The U.S.S. *San Diego* has been lying upside down off Fire Island, to the south of Long Island, for nearly 70 years. There is a large, gaping hole amidships—the handiwork of another German submarine during World War I. Hordes of fish and a handful of divers have ventured through this fatal puncture to the officers' quarters and the captain's cabin, where his brass bed now rests on the ceiling.

Anyone seeking adventure will find plenty of it in these aquatic graveyards where numerous wrecks attest to the vicissitudes of history. The *Lizy D* is a reminder of one of the sorriest periods of the recent past. She sank off Brooklyn in 1921, at the outset of the Prohibition Era, taking down with her cases of whiskey, scotch, rum, and bourbon packed in the ship's hold. Needless to say, her sinking was never reported to the "proper authorities." Bill Reddan, a diver and charter-boat skipper, found the *Lizy D* two years ago. "The scotch, rum, and whiskey were all spoiled, but the bourbon had been corked and lead-sealed—sixty-five-year-old bourbon!" And a warm smile broke across his face.

For these divers, both professional and amateur alike, the main interest in sunken ships is the excitement of exploring the stilled world beneath the ocean's surface. Yet they often aid fishermen with tips about uncharted wrecks. As every deep-sea angler knows, fish congregate around the ruins of lost ships. For the past 20 years, fishing-boat skippers have allowed scuba and skin divers aboard for a ride to their favorite fishing grounds for a firsthand look at what's below. Usually this arrangement works well, and the diver rewards the skipper with details on the marine life that inhabits the wreck and with the best depth to drop his lines.

The wreck of the *Black Warrior*, just off Rockaway Point, in 35 feet of water, has been well fished for more than 100 years. When she ran aground in 1859, her passengers and the mail aboard were immediately transferred to a pilot boat, but the skipper and the crew remained on board to guard her precious cargo, $208,000 in gold. But the ship could not be navigated into deeper waters because the rising tide was pounding her against the rocks. When her hull began to break up, the rest of the crew and cargo were off-loaded, and she was left to sink in the shallows.

Now the *Black Warrior* is a summer resort for blackfish. The young fill the nooks and crannies by the thousands. And the largest inhabitants, for some unknown reason, have taken up residence in the boiler room. More than three pounds of fish per cubic foot reside among the rusting boilers.

Where there are fish, lobsters inevitably lurk nearby. Captain Reddan takes his

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U.S.S. San Diego, shortly before it was sunk by a German sub off Fire Island during World War I

CONTINUUM

Edited by Dick Teresi

GOOD NEWS FOR LAB ANIMALS

The eye of an albino rabbit is a remarkable organ. It resembles the human eye in sensitivity, yet it doesn't tear as a human eye does. Therefore chemicals that are placed in a rabbit's eye tend not to wash out. Unlike most human eyes, the albino rabbit's eye lacks pigment and so any inflammation shows clearly and angrily red.

All this makes the albino rabbit ideal for screening consumer products such as detergents, eye makeup, and shampoos before putting them on the market—a standard use for the animal since 1944. But increasing numbers of scientists are objecting to this procedure, known as the Draize test. And paid well by both industry and animal welfare groups, they're opening a whole new field in research devoted exclusively to finding alternatives to using animals in the laboratory.

At Tufts University in Medford, Massachusetts, Dr. William H. J. Douglas is growing human cornea cells to replace rabbits as indicators of chemical irritation. His goal is a more accurate and less costly product-screening test. Scientists at Rockefeller University in New York City, are studying whether lab tests commonly used for other purposes can realistically be substituted for the Draize test.

At Johns Hopkins University, in Baltimore, the cosmetics industry has funded the most extensive "alternatives to animals" program in the United States. That program will probe the very nature of chemical irritation. Scientists have long wished for cheaper, quicker, and more reliable prooduct tests, says Dr. Alan Goldberg, director of the program. "The animal welfare movement has really raised consciousness," he adds, in getting that research started.

The weight behind this gathering snowball is money, of course—pried loose by the most sophisticated animal-rights push in years. It began a few years ago when a New York high-school teacher, Henry Spira, banded nearly 400 groups together into an anti-Draize coalition. Spira opposed to almost all animal testing, focused his campaign on the Draize test as a realistic target. After all, who could defend killing animals to test eye shadow and rouge? Surely, he reasoned, the cosmetics industry would donate sufficient research money to save perhaps half a million rabbits a year.

Actually, Spira's charges were not really fair. For many years drug and cosmetics firms had researched alternatives to the use of animals for experiments, with occasional success. With rabbits costing from $15 to $30 each and housing costs inflating wildly, companies were only too happy to find an alternative test. Rabbit use in test labs, in fact, fell 13 percent in the ten-year period ending in 1978, according to reliable records.

But that wasn't enough for the anti-Draize coalition. And when industry was slow to provide money, they pulled out all the stops. They started demonstrations and letter-writing campaigns. They took out newspaper ads in Washington and New York. "How many rabbits did Revlon blind for beauty?" reads a recent *New York Times* full-pager.

Just looking at today's research will reveal the effects of that campaign. Late in 1980 Revlon gave Rockefeller University a $750,000 grant to find alternatives to Draize. Later the Cosmetics, Toiletries, and Fragrances Association gave Johns Hopkins $1 million. Animal-welfare groups, including the American Federation for Alternatives to Animal Research and the New England Anti-Vivisection Society, gave hundreds of thousands of their own. Meanwhile the government—chastened by a recent judicial decision in an animal-abuse case at a government sponsored lab—started work on a battery of regulations to ensure the humane treatment of lab animals.

Already the research has produced some exciting results. Dr. Douglas, for example, is impregnating lab-grown human cornea cells with a radioactive tracer called chromium 51. He exposes the cells to a specific chemical, then measures how much of the isotope has leaked from the damaged cell. He gets a very precise readout of the degree of irritation. "The information suggests our system will serve as a predictor," he says, much as a Draize test does. Animal lovers are so impressed by his work that more than 40 have offered to will him their corneas so that testing can proceed.

Dr. Joseph Leighton of Pennsylvania Medical College is testing chemicals on the membranes of chick embryos—a painless technique developed for virology more than 70 years ago. Dr. Leighton warns that lab tests will never wholly replace animals which are simply too important for biomedical research. But those that are tested will be treated a lot more humanely than many test animals apparently are today. —*DOUGLAS STARR*

CONTINUUM

BALDNESS CURE

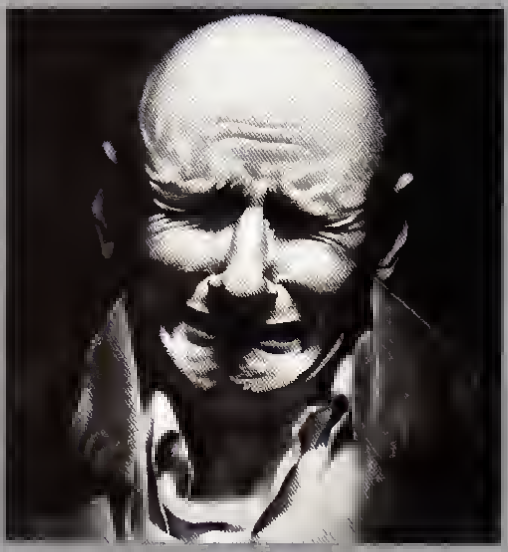
There is no cure for baldness. Or so doctors thought until recently when Philadelphia physician Anthony Zappacosta discovered that several of his very bald patients were growing mysterious patches of hair. The patients, all suffering from high blood pressure, were part of a study to test a new hypertension drug called minoxidil.

Zappacosta quickly realized that the minoxidil somehow was spurring his patient's unexpected hair growth, and he reported his findings in the *New England Journal of Medicine*.

It didn't take long for University of Illinois dermatologist Virginia Weiss to get wind of Zappacosta's report. Fascinated by it, she applied a minoxidil solution to the scalps of 29 patients suffering from alopecia areata, a form of baldness affecting about 2 million Americans and characterized by a rapid loss of hair in clumps. Seventeen of the patients, some of them completely bald, grew hair within four months after they began using the lotion. The response varied, Weiss adds, from a few wisps to cosmetically very desirable regrowth.

Today the Upjohn Company, which manufactures minoxidil, is trying to develop a special lotion for baldness. The company now has several studies under way, but exactly how minoxidil stimulates hair growth is not yet fully understood.

—Eric Mishara



The heartbreak of baldness may be eased by a new hypertension drug called minoxidil. Work is under way to create a special lotion.

There is no cure for birth and death save to enjoy the interval.

—George Santayana

CHANGING BLOOD TYPES

Using an enzyme obtained from green coffee beans, scientists at a New York City blood center have succeeded in changing type B blood into type O.

The enzyme, alpha-galactosidase, removes one sugar from type B's large molecule, rendering its structure identical to type O, says Dr. Jack Goldstein of the Lindsey F. Kimball Research Center.

Recently a different enzyme performed the same function, cleaving off a sugar to change type A blood into type O. Since type O blood is the universal donor (it can be transfused into most patients regardless of blood type), the process may eventually help reduce or eliminate blood shortages and stretch blood storage time.

The process does not affect the Rh factor, and it works equally well on Rh-positive or -negative blood. It may also prove a boon to people allergic to other antigens in blood. If blood of their type—type O, say—has the antigens, but supplies of type A or B do not, it could be converted to help them, Goldstein says.

The converted blood has been tested on volunteers. Labeled with radioactive tracers, tiny amounts of the converted type B blood were introduced into both the original donors and recipients of types A and O. Normally the type B cells would have been destroyed rapidly by the A and O recipients, Goldstein notes, or you might expect to have a transfusion reaction. With the converted blood, we did not see any of that.

It may be several years before the process is fully tested. We have to be sure there is no way for recipients to become immunized and have an allergic reaction. We'll proceed by administering increasingly larger doses.

—Allan Maurer

The real problem is not whether machines think but whether men do.

—B. F. Skinner

An enzyme from coffee beans changes blood type B to O.

Quake destruction Geophysicists are afraid to warn us

KEEPING QUIET ABOUT EARTHQUAKES

Geophysicists monitoring California s San Andreas Fault are aware that forecasting earthquakes can be a thankless job Because adverse public reaction to a false alarm might damage their reputation some of these scientists have resolved to keep quiet about warning signals in the future As a result lives might unnecessarily be lost

While there is no way to predict earthquakes for sure scientific instruments can detect the earth crust movement that often precedes a tremor But scientists who once conveyed such facts to the public now point to the unfortunate experience of California Institute of Technology researcher James Whitcomb In 1976 Whitcomb predicted that a major earthquake would rock the heavily populated San Fernando Valley that year Basing his prediction on a slowdown in the velocity of sound waves in the earth s crust he testified before TV cameras for the California Earthquake Prediction Evaluation Council in what he terms a circus atmosphere Later when the much-ballyhooed quake failed to occur an irate real estate developer threatened to sue him

Now at the University of Colorado in Boulder Whitcomb claims that several scientists have told him they intend to avoid notoriety by maintaining silence Believing they are not the only ones he says If an earthquake happens you will see publication of a successful test after the fact "

Geologist Clarence Allen of the California Institute of Technology ends Anyone who makes a prediction had damn well better be prepared to be in the limelight —Eric Mishara

You can tell the ideals of a nation by its advertisements
— Norman Douglas

The past is a work of art free of irrelevancies and loose ends
— Sir Max Beerbohm

AIR ROOTING

If you ve ever placed a cutting from a friend s wandering Jew in a glass of water only to see it wilt you know just how difficult it is to root a plant But now a small black box that helps plant cuttings sprout roots in thin air and darkness might make the task a bit easier

The new rooting technique was invented by Clemson University horticulturist D C Coston as a quicker cheaper way of propagating commercial shrubs and fruit trees Usually Coston explains these plants are started from cuttings rooted in an expensive, nutrient filled solution Many of the cuttings never take root and the procedure adds dearly to the cost of planting a new orchard or nursery

To solve the problem Coston spent part of last summer drilling holes through the top and bottom of a small black Plexiglas box He placed a peach-tree cutting that had been treated with the rooting hormone indole butyric acid in the top hole And in the bottom hole he placed a spray nozzle that misted the cutting with water for five seconds every 2 5 minutes Lo and behold roots sprouted

This past winter Coston used a 40 foot-long black box to root cuttings from peach trees wild azaleas junipers and rabbit-eye blueberry bushes So far 95 percent of the peach cuttings and 65 to 90 percent of the others have rooted—a success rate that will keep Coston busy for months to come —Carol A Johmann

This black Plexiglas box has holes drilled through the top and bottom A spray nozzle in the bottom mists the cuttings sporadically

Nothing, not all the armies of the world can stop an idea whose time has come
— Victor Hugo

What is mind? No matter What is matter? Never mind '
— Thomas H Key

CONTINUUM

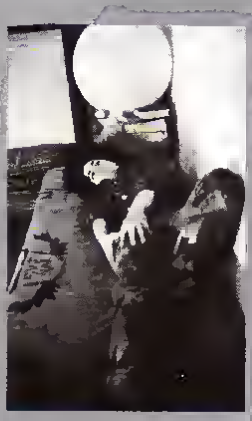
BOGUS LSD

A dead ringer for the medieval scourge known as St Anthony s fire is showing up in emergency rooms across the country The modern villain is a new hallucinogen being sold to unsuspecting LSD users It is called DOB, for 2 5-dimethoxy-4-bromoamphetamine

At high doses DOB causes veins and arteries in the extremities to constrict, blocking blood flow to the arms or legs Victims experience a tingling sensation as their limbs ' go to sleep ', the numb limbs soon become cold then start to ache Unless medical treatment is prompt gangrene may set in leaving unwitting users with the dismal prospect of limb amputation

At the University of California at San Diego (UCSD) Medical Center, physicians were recently able to save a DOB victim s limbs by injecting drugs to expand his constricted blood vessels But a victim in San Francisco was not so fortunate She lost both legs to gangrene

"DOB has absolutely no medical use ' says UCSD clinical toxicologist Thomas Kearney "But from a chemist s point of view it s relatively cheap and easy to make That's probably why sellers are beginning to substitute it for more expensive street drugs The brown liquid mimics the hallucinogenic effects of LSD Kearney says, and on the street it masquerades as LSD or psychodrine The only tipoff a user has is that DOB must



Bad trips from phony acid can result in gangrene

be taken in increasingly larger amounts to produce the same effect as the genuine drug

Chronic use of DOB for at least a week is probably necessary for overdose he adds No one yet knows the effect of an occasional use of DOB over extended periods —Yvonne Baskin

MOOD ROOM

When you sprained your ankle you were one of the best running backs in the National Football League Now the ankle is fine, but you keep holding back terrified of playing with your old intensity So the trainer sends you into the "mood room

Inside the carpeted and soundproof cubicle you lean back cozily in a leather reclining chair You push a button and a series of actions are ordered electronically by the mood room s computer brain The chair heats up massages your entire body as colored lights flick on and brighten drawing your attention to a molten sunset on the wall Then softly tinkling music starts followed by a mellifluous tape-recorded voice Make yourself comfortable relax you are going on a journey When the journey ends 15 to 20 minutes later, you feel totally refreshed and you can t wait to charge up and down the field shedding tacklers

The mood room an automated stress-relieving and motivational resource ' installed last year by the Philadelphia Eagles pro football team uses a variety of relaxation techniques and hypnotherapeutic tapes to ease players aches and anxieties and increase their self-confidence

The standard tapes with such titles as Goals' and Enthusiasm," furnish the listener with words of encouragement and such soothing imagery as sunsets and beaches The Eagles and the Philadelphia Phillies baseball team who recently became the second professional sports organization to install a mood room, are also developing tapes geared to individual players problems, such as how to hit a curve ball properly

How much the mood room can actually enhance an athlete s performance remains to be seen The Eagles trainer Otho Davis, who worked with a company called Mood Rooms Ltd to develop the system, admits, "It didn t take us to the Super Bowl last year Nonetheless he feels it will be a fixture with the team I went in there myself at seven o'clock one night to spend fifteen minutes with the Self-Confidence tape he says I sat down and pushed the button and the next thing I knew it was midnight I felt great I worked the rest of the night '—Mark Teich

Philadelphia Eagle down with injury When he s recovered, a computerized room can help him shed psychological inhibitions

DISSOLVING GALLSTONES

Instead of surgically removing gallstones—those crystallized globs of cholesterol that kill up to 8 000 Americans a year—doctors can now dissolve them with a new drug called Chenodiol Physicians think the drug might prevent half a million gallstone operations annually

According to Dr Jay Marks, deputy director of the National Cooperative Gallstone Study Chenodiol's active ingredient is an acid normally present in human bile, the digestive fluid secreted by the liver and stored in the gall bladder When this essential acid is missing bile becomes saturated with cholesterol, which crystallizes into sharp-edged 'stones The condition can prove fatal if the stones lodge in the ducts that connect the liver with the gall bladder or if their sharp edges cut through tissue walls

Restoring the acid with Chenodiol, which can be taken orally, is a "simple and clean-cut solution," Marks says Marks and his colleagues have spent the past two years testing the drug on nearly 1 000 patients and he found that stones were substantially or completely dissolved in more than half the cases Most patients experienced no noticeable side effects But Marks notes that the drug sometimes raises the blood cholesterol level slightly—no one yet knows why—and physicians suspect that it might also cause mild liver damage

Chenodiol was just recently approved for U S use by the Food and Drug Administration

—Sy Montgomery

Micrograph of cholesterol crystals that cause gallstones A half-million operations a year could be prevented by a new drug

Christianity is screwed up, our representative religion in Western culture is physics '
— William Hurt

God give me strength to face a fact, though it slay me
— Thomas Henry Huxley

RINGS IN THEIR EARS

You can tell the age of a tree by counting the concentric rings inside it Fish also have telltale age rings—in their ears

Now scientists have found that, unlike tree rings which form at the rate of one a year a fish s rings form every day Called otoliths these calcium carbonate (limestone) structures are turning out to be useful in helping to maximize fishing harvests

Researchers at the Belle Baruch Institute for Marine Biology in South Carolina who proved that otoliths form daily are scanning the tiny rings (a millionth of a meter in size) with an electron microscope The precision with which they can now determine fish age will affect both commercial and recreational fishing practices

It s a critical component in managing this resource" says Dr John Dean of the Institute Chuck Wilson one of his graduate students involved with the project, points out that "it can tell us when a certain species of fish should be left alone to reproduce, and it could affect both commercial and recreational size limits Sturgeon, for instance reproduce late in life and so it is actually better to take in-between-sized fish [100 pounds] and let the large, old [300-pound] fish go I don t know that you ll convince commercial caviar fishermen of this As the findings become more generally accepted, however, they will probably affect commercial fisheries' management policies '— Allan Maurer

There are no facts, only interpretations '
— Friedrich Nietzsche

Closeup photo of otoliths These telltale age rings in fishes ears are made of limestone and form at the rate of one a day

CONTINUUM

YESTERYEAR'S MENU

Nutritionists maintain that people are what they eat But anthropologists go one step further arguing that the act of getting food determines the structure of primitive societies and may have spurred some magnificent leaps in cultural evolution such as the use of tools and the development of spoken language

Meat eating for example is of particular interest because hunting could have been the start of important group dynamics among humans So when did humans first eat meat?

At least 1 5 million to 2 million years ago according to a recent finding made by Glynn Isaac and Henry Bunn of the University of California at Berkeley along with Richard Potts of Yale University They were able to discern cut marks on the bones of large animals—elephants hippopotamuses and buffaloes—found in the Rift Valley of East Africa and to show that the marks apparently were made by stone tools used for scraping meat from bones

'Until now' Isaac says we only *assumed* that early humans ate meat because we found their bones together with the bones of these animals The cut marks however are proof of slaughter and butchery

Our finding doesn't tell us the amount of meat in the diet Isaac adds, but it does indicate a way of life that involved plant *and* animal foods—a way of life that may have helped to induce the first cooperation in food gathering

Most other adult animals forage for themselves alone according to Isaac making the sharing of food a distinctively

If a chimpanzee could tell you his observations of characteristic human behavior Isaac speculates the first thing he would mention is that when humans get food they give it to another human

The discovery of the bone-cut marks which was made with both conventional microscopes and the electron-scanning microscope is exciting because of its social implications Collective acquisition of food Isaac concludes may in turn have stimulated the development of language ability and of intricate social patterns

—Dava Sobel

Early meat eaters If a chimpanzee could talk the first thing he'd tell you is that when humans get food they give it to another human

ARTHRITIS CURE

For years researchers have puzzled over why women with rheumatoid arthritis get better during pregnancy Now a Texas scientist has an explanation and perhaps the key to curing this common and crippling disease

Dr Robert Persellin of the University of Texas Health Science Center in San Antonio has isolated a protein that soars to 400 times its normal level in the blood of pregnant women The protein called alpha-glycoprotein blunts the immune system's natural tendency to reject the fetus and placenta as foreign tissue In fact high concentrations of alpha-glycoprotein might explain why pregnant women come down with an uncharacteristic number of colds and other infections

Most doctors now agree that the pain of rheumatoid arthritis is caused by genetically immune cells attacking the joints It makes sense then to conclude that if you can slow down the immune system you'll ease arthritis pain Six weeks after a pregnancy ends arthritis returns as troublesome as ever, because alpha-glycoprotein levels quickly return to normal

Women with rheumatoid arthritis improve when they're pregnant

Experiments with laboratory rats in which arthritis has been induced indicate that injections of alpha-glycoprotein might help human arthritis sufferers But as Persellin told *Omni* receiving someone else's live protein could cause a dangerous reaction

The goal is to find out how to turn on the body's spigot for alpha-glycoprotein ' he says which lies somewhere within estrogen's biochemical makeup

—Caroline Rob

It is characteristic of wisdom not to do desperate things

—Henry David Thoreau

MYSTERY LAKE

The ship tore through miles of ice to a position close to Antarctica. Then 26 American and Soviet scientists scanned the ice-locked sea for Polynya, a body of water detected by satellites in 1974, 1975 and 1976.

The possibility of a lake in the more or less ice-packed region surrounding Antarctica has long sparked scientific curiosity. So last October a group of scientists from the United States and the Soviet Union decided to investigate it. They traveled thousands of miles to the frigid southern continent, where satellite photographs indicated the mysterious lake might be located. But they found absolutely nothing.

Despite Polynya's absence, new data announced by the American expedition leader, Arnold Gordon, may explain the occasional appearance of unfrozen water at the South Pole. Gordon discovered unexpected pockets of warm salt water near the ocean's surface. Every so often these pockets may lose their heat, he suggests, condensing and then sinking to the bottom. As this cold water drops down, warmer water may be pushed toward the surface, melting the ice and forming the Polynya.

The expedition spent its two-month journey learning as much as possible about Antarctic ice, atmosphere and microorganisms. Samples and data are now being analyzed.

—Madeleine Lebwohl

The heart of a wise man lies quiet like limpid water
—Cameroonian proverb

At least once a year everybody is a genius
—G. C. Lichtenburg

Unfrozen water near the South Pole? Satellites have detected the ice-locked Lake Polynya, but human explorers have yet to find it.

WHOLE-MIND PREDICTIONS

Forget your tabloid seers and your computer-whiz economic forecasters. The best predictions come from people who use *both* halves of their brains, more or less equally, according to social psychologist David Loye.

At the Institute for Futures Forecasting in Carmel, California, Loye devised a Hemispheric Consensus Prediction (HCP) test to gauge which brain hemisphere dominates a person's mental processes. Then he asked 135 people to predict future events.

Who would win the 1980 presidential election? Would the inflation rate go up or down in the next six months? Would troubles in the Middle East lead to war? Balanced-brain people, in whom neither the logical left hemisphere nor the imagistic right hemisphere stole the show, turned out to be the best visionaries, Loye says. Yet the people to whom we look most for predictions are one-hemisphere individuals.

Most economists are mathematical, left-brained types who hover over their computers and publish predictions, Loye says. "Psychics and astrologers, however, are right hemisphere-dominant.

"What this tells us is that we need both sides of the brain to forecast the future. We can do that either by employing mixed-brain forecasters or by comparing the predictions of left-hemisphere and right-hemisphere people.

Loye's volunteer seers included management students from the Naval Postgraduate School, in Monterey, California; liberal arts majors from the University of California at Berkeley; and subjects for extrasensory perception (ESP) experiments at the University of California at Los Angeles. The ESP recruits performed best. —Judith Hooper

Astrologers may be poor [illegible] on only one side of the brain. The same [illegible]s

CONTINUUM

Miniature missiles and chaos in space? A trade magazine says yes but a high-ranking government official tells us not to worry

SPACE WARS?

The weapons race in space may be escalating at a dangerous pace, at least according to the magazine *Aviation Week*. A recent issue of the publication reported that the Soviet Union has launched the world's first antisatellite battle station into low-Earth orbit. The killer satellite, called A-sat, is supposedly studded with multiple miniature missiles guided by infrared or radar sensors.

Earlier Soviet A-sats were one-shot devices that operated like hand grenades, self-destructing in a shower of shrapnel. *Aviation Week* notes. But the new system is designed to remain in orbit and to attack satellites on command. Even more ominous is the report that the station, *Cosmos 1267*, has been docked to the Soviet manned spaceship *Salyut 6*, which might function as its control console.

If A-sat exists, the Russians have an advantage in the space arms race, for the United States probably won't be ready to launch a comparable vehicle before 1984. But Washington officials are skeptical about the alleged Soviet station. From what we know about the Soviet space program, the Defense Intelligence Agency says, "we cannot conclude that the Russians have the system described in the recent article." A high-ranking government official adds, "[the article] is bullshit."

But Ronald Reagan doesn't necessarily agree with these assessments. According to *Aviation Week*, last year he gave the Defense Department the official go-ahead—and an extra $12 million over 1980's budget—to develop comparable technologies for space-based missile defense. —Phoebe Hoban

CONTINUUM CONTEST 2000

Omni is sponsoring a reader contest to celebrate the publication of its new book *Omni's Continuum*.

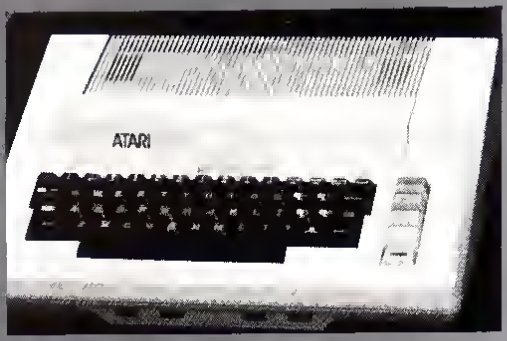
Released just this May by Little, Brown & Company, *Omni's Continuum* contains 270 individual scientific entries that report on everything from NASA's $3 million Space Age toilet to the fate of Albert Einstein's brain. The book is composed half of new items and half of significant Continuum stories that were reported over the last four years.

Here's how the contest is run. Readers are asked to select the *one* Continuum item in the book that will have the most significant impact on life in the year 2000. In 50 words or less, explain how this one discovery will revolutionize our world at the turn of the century. Entries will be judged on logic of reasoning, cleverness of the reply and clarity of expression.

Send us postcards please. Write the title of the Continuum book item you've selected at the top of your entry with your 50-word-or-less explanation of its importance underneath. The judges' decision is final, and all entries become the property of *Omni* and cannot be returned. The grand prize-winner will receive an Atari 800 home computer; runners-up (2–3) will each receive a Vespa moped; runners-up (4–5) will each receive an Astro Arcade video game. Ten honorable-mention responses will receive a one-year subscription to *Omni* or a one-year renewal of their present subscription, and the winning answer will be printed in *Omni*.

Send entries postmarked by September 15, 1982, to Omni Continuum Quiz, Omni Magazine, 909 Third Avenue, New York, NY 10022.

Omni's Continuum is available in bookstores or through an advertisement in this magazine.



The Atari 800 home computer. The grand prize in our contest, which requires you to pick the most significant story in our new book

Searching for proof of psychic phenomena is like chasing

BUTTERFLIES IN THE DARK

BY LES ERICSON

I sit in a soundproof bathroom-sized room and sink into the folds of a leather chair. As in a spy-movie interrogation scene, a bright light shines directly at my face. But my senses are muted. My eyes are veiled

with the cloven halves of a Ping-Pong ball; my ears are encased in earphones. Obeying a tape-recorded female voice, I tighten—then relax—the muscles of my toes, thighs, stomach, and head. Still under the influence of the calm, disembodied voice, I breathe out slowly and begin counting backwards.

I am neither a prisoner of war nor a high-tech guru's mild disciple, but a guinea pig in an ESP experiment. As I drift into the desired altered state, the laboratory's director, Charles ("Chuck") Honorton (at right), tries to send me a telepathic message—the image of a video picture that he's studying—from the room right next door.

Soon I'm completely disoriented. The

PHOTOGRAPHS BY
DAN McCOY/RAINBOW

"We need to examine our rituals," says Marilyn Schlitz (below). "Does a white lab coat block psi?"

voice in my ears is gone replaced by crackling radio static and the crash-crash of waves breaking over a jetty I float like a feather in an abyss, and I can't tell whether my eyes are open or shut But I *do* have visions 'Corn on the cob,' I say into a microphone clipped to my shirt collar 'Grille on a fancy car ice cream man in a sailor's or chef's white hat! little mouse or rat' Half an hour later a staff member reads my transcribed comments back to me and asks me to choose which of four color slides most resembles my inner landscapes I pick a photo of an outdoor cookout teeming with fish and corn on the cob As it turns out it's the one Honorton was gazing at it's a direct hit

The experiment I'm in at the Psychophysical Research Laboratories in Princeton, New Jersey makes use of the Ganzfeld technique pioneered in the 1930s *Ganzfeld* is the German word for 'homogenized field', and as the name suggests, the German psychologists who first employed this technique immersed their subjects in a uniform foglike environment Deprived of virtually all stimulation, these subjects helped researchers test the oddities of perception in a sensory vacuum

It was an awareness of sensory deprivation that propelled Chuck Honorton to investigate ESP (extrasensory perception) in the first place When he was still a child, before he'd even heard of Ganzfeld, a deaf uncle set him to thinking about how the intact senses of the deaf and blind grow extraordinarily acute Years later as a grown-up researcher he wondered whether sensory deprivation might unlock a person's psychic perceptions

But can researchers like Honorton ever prove that such perceptions exist? More than 5 000 studies have been published in parapsychology journals since 1930 yet even parapsychologists admit that evidence of psychic phenomena or psi is flimsy at best

The reason they say is rooted in the nature of psi itself Subject to the vagaries of human consciousness, telepathy (reading another person's thoughts) or clairvoyance (perceiving a distant scene) might seem to be evident in one experiment but absent from the next And since the parapsychologists don't know exactly what psi is or even where it comes from they're still fumbling for what they call the 'psi recipe' the formula of experimental conditions that would allow any careful researcher to cook a batch of psi in his own lab time and again Relegated to the limbo of the never-proved never-disproved psi seems as nebulous as the dreamy spaces of Ganzfeld

So why did I sit in a booth trying to pick another man's thoughts out of ether? More to the point, what impels parapsychologists to persist day after day in sifting through painfully subtle successes mapping tiny particles of the unknown? The fact is I am told current research and precise new technology may soon lead parapsychologists to their Rosetta Stone—the psi recipe—after all Armed with equal amounts of incredulity and curiosity I've set out to taste some psi cuisine for myself

My quest takes me back to scientific parapsychology's grandfather a biologist named Joseph B Rhine Rhine who was to become director of Duke University's parapsychology department in the Fifties started out investigating mediums But the ladies of the seance proved problematic Say the turbaned Madame Rosa delivers a 'message' from the deceased Mr X Even if his widow can verify its accuracy—perhaps the communiqué refers to Mrs X's secret hoard of gauzy lingerie—it would still be impossible to tell whether Madame Rosa had actually talked to the dear departed Mr X on the Other Shore or to one of Mrs X's new earthbound beaux It on the other hand the message contains unverifiable information about harp lessons near the Pearly Gates how can it be investigated? Reincarnation poses similar dilemmas If I recall my former life as Humphrey Farquar my account must be compared with records somewhere If details exist, either in documents or in some living person's memory how can anyone prove I haven't learned the information telepathically?

Rhine therefore declared some chambers of the paranormal off limits to scientific investigation and tried his hand at the sort of controlled experimentation that is the goal of psi research today Honorton who began reading Rhine's books as a boy, is a direct spiritual descendant 'Impressed but confused' at age fourteen he wrote a letter to Rhine and found himself that summer in a parapsychology course with old J B himself 'I got involved in parapsychology you see, before I learned it was 'impossible'' Honorton confides over wisps of Captain Black pipe smoke

THE ALTERED STATE

Soon after leaving Rhine's tutelage in 1967 Honorton got himself a job in the dream lab at Brooklyn's Maimonides Hospital He'd long known that almost all spontaneous ESP recounted in the literature occurred when the body was deeply relaxed and the mind immune to sensory input—during meditation hypnosis and dreaming So he jumped at the chance to send telepathic images to dreamers locked away in the lab's isolation chambers These efforts he says, seemed to work impressively in 9 out of 13 studies When a distant 'sender' contemplated a photo of the Firpo-Dempsey boxing match for in-

stance, one person dreamed of watching a fight at Madison Square Garden. Other dream messages were hazier, fragmentary and symbolic. After studying the data, Honorton and his colleagues came to believe that information had somehow gotten through to the dreamer.

It eventually became clear, however, that the dream work was too time-consuming—an average session took ten hours—and too costly. So Honorton set his sights on detecting ESP that occurred during waking hours. To tree his subjects from the messages that were constantly assaulting their eyes, ears, skin, and taste buds—messages that could be filtering out psi—he placed them in the Ganzfeld chamber.

To date, nearly 1,000 men and women have bathed in the dreamlike fog of Ganzfeld rooms at 14 different labs. Honorton contends that evidence of ESP has shown up in half the studies. A single psi experiment is considered successful if the subject hits upon the right answer 20 times more frequently than he would by pure chance, Honorton explains. And Ganzfeld experimenters have achieved such success 50 percent of the time.

Impressed despite my skeptical bent, I follow the High Pasha of Altered States into his central monitoring room. High above the Apple computers hangs a tapestry reproduction of Salvador Dali's *Persistence of Memory*, its melted timepieces mirroring the eerie timelessness of Ganzfeld. But all around us are machines that form the basis of a *new* type of psi test—video games, which Honorton calls "mind candy."

A game called Psi-Trek, whose screen glitters with space guns and stars, works like any other arcade fantasy with one difference: It helps if the player has ESP. To annihilate a Klingon warship hidden in one of four quadrants of the screen, you must guess where the ship will come up next. If you're a video visionary and manage to zap an invisible enemy, a tiny screen explosion acknowledges your success. If you score well above the one-in-four odds expected by chance, your psychic ego is stroked by a jackpot display of pinball-type lights and buzzers.

Honorton believes that video games may induce an altered state, much as dreams do. And his hope is that easy-to-control video technology will allow him to monitor his subjects with far more precision than he can in Ganzfeld. Automated video games stored in lab computers across the country would create the same experimental conditions every time, reducing human error to a minimum. And sensitive biofeedback equipment would measure the physiological parameters of every hit.

Honorton says he's already found the possibility of a link between alpha brain-wave activity and psi. He suspects that forehead muscle tension (measured by electrodes) impedes psychic perception. If there's an internal state corresponding to psi, Honorton adds, it ought to ripple through heart rate, fingertip temperature, even stomach acidity. What else might seep into a test prophet's ability (or lack of it) to see a distant or future scene? "We just don't know," says Honorton, "and the truth is that obtrusive monitoring equipment might inhibit psi altogether."

DISTANT VIEW

In search of more conclusive information, I soon find myself in the soft, somnolent North Carolina landscape. In yet another soundproof cubicle, this one at the Foundation for Research on the Nature of Man in Durham, I try to focus on a researcher at a geographic target somewhere near the foundation. Visions of David Stockman and Brooke Shields tapdance in my cerebrum until I'm able to exorcise them and focus on the still-empty center of myself. My performance this time wouldn't dazzle even the most credulous *National Enquirer* reader. At test's end, I make a drawing and feed my thoughts into a tape recorder. A few details match the target scene. My perception of knotty pine echoes the pine pole at the location; my gridlike drawing looks something like the sewer grid next to the pole; a small brown dog turns up in both the geographical target and my mental meanderings. Otherwise, I'm way off.

> *"I pick a photo of an outdoor cookout teeming with fish and corn on the cob. As it turns out, it's the one Chuck Honorton was gazing at. Apparently, it's a direct hit."*

Marilyn Schlitz, the twenty-four-year-old parapsychologist overseeing my telepathy trials, looks like a scaled-down Helen Reddy. She brings a philosophy degree to her work, and a dose of the philosophical may be required. As we pass fading photographs of Freud, Jung, Rhine and other luminaries lining the walls, Schlitz confides that she barely earns enough money to get by on.

Though she'd be the last to proclaim it from the rooftops, Schlitz may be a bit of a seer herself. In the summer of 1977, while still a junior at Wayne State University in Detroit, she closed her eyes and tried to "see" where her professor was hiding. Brushing all workaday thoughts from her mind, she sketched an omegalike symbol with a horizontal line through it. The professor was, as a matter of fact, in front of a building surrounded by a fence made of omegalike symbols. Etched on the side of the building in concrete was a huge omega sign.

Charged with enthusiasm, Schlitz and the professor psychologist Charles Solley conducted several more remote viewing experiments like the one described above. Although these informal tests lacked tight controls, Schlitz felt that the team had come up with some *very* direct hits. By 1980, after three years of intense psi research, she had gotten herself a fellowship at the foundation in Durham.

A middle-sized city like many others with a campus in its belly, Durham is a confluence of redneck/Klan types and pockets of anachronistic hippies. Long hairs and macrobiotic food joints coexist with pickup trucks and gun racks. In this setting if nowhere else, parapsychologists are likely to seem like mystics or weirdos.

Fielding phone calls twice a week at the foundation's switchboard, the young researcher often finds herself engaged in senseless colloquies with UFO cultists and prophets who insist the End of the World is being hastened by people talking too much. Like some of the townspeople, these fanatics think Schlitz shares some of the same views.

But as far as she's concerned, nothing could be further from the truth. Working long hours in her small laboratory, Schlitz has tried to bring statistical rigor to the extraordinary notion that people possess psychic skills. In the past few years she's conducted four formal remote-viewing experiments. In the latest, she asked a friend in Cocoa Beach, Florida, to visit ten arbitrarily selected sites at specified times on ten consecutive days. Schlitz, who had never been to Cocoa Beach, sat alone during the specified periods and doodled random outtakes of her thoughts on a pad. Days later, two judges took the drawings and compared them with the actual target locations. Schlitz, they agreed, had had four direct hits, a success rate of 25 to 1 against chance. Two of her three other experiments, Schlitz tells me, were at least as successful.

As any researcher knows, three positive experiments done by the same person may be suggestive, but they hardly prove a point. Similar remote-viewing studies have produced less than positive results in other labs time and again. So today Schlitz colleague George Hanson and altered-states pioneer Charles Tart of the University of California at Davis are reviewing all the remote-viewing studies ever published. Their hope? To deduce the elusive *recipe* of ingredients shared by all the successful ones. Once they have come up with a formula, they'll try to brew the optimum remote-viewing experiment, one that works every time.

I ask Schlitz what *she* thinks those ingredients might be. "Well, I suspect the group interaction, plus the time of day, the weather and so on, all enter in," she says in a Midwestern slouch of a voice adulterated

with Southern inflections. Shrugging off my request for white sugar, not brown, for my tepid coffee, she says she's interested in "the interpersonal dimension, the ritual. We have a lot to learn from other cultures," like the folk healers of Mexico," she continues. "Ceremony may ease the influence of the ego, and it may be that psi is repressed when the ego takes control."

"We need to examine our own rituals," she continues. "Does having a person in a white lab coat with lots of monitors around facilitate or block psi? How about electrodes attached to a scrubbed patch of scalp? I'm hoping that our remote-viewing survey will help us eliminate the extraneous stuff, the distracting elements that work to push psi out of the picture."

ESP BOOT CAMP

Most parapsychologists agree that the complete psi recipe, one that will produce successful laboratory results again and again, will likely include a cadre of good performers—people who somehow have the knack of psiing. To turn out an army of trained psychonauts, a potpourri of experts from Syracuse University's communications studies laboratory labor in a two-story frame house a couple of blocks from the main campus. In charge of the psi boot camp is psychologist Robert Morris, who might be a clone of New York City Mayor Ed Koch from his bald pate to his Eastern European–style nose.

Morris tells me that the idea of psi training goes back to ancient Buddhist texts, where the practice was considered part of the natural progression toward a more enlightened state. Yet his modern-day trainees, Syracuse undergraduates and ordinary burghers from town, couldn't look less like Buddhist monks. And their techniques smack less of esoteric rites than of the garden-variety Esalen workshops. In fact, the students have gleaned most of their ESP tips from a survey of some 70 pop-psi books that have titles like *ESP Power* and *Psychic Self-Improvement for the Millions*.

In one procedure, Morris's psychonauts study an everyday object—a ballpoint pen, say—for a few minutes. Then they close their eyes and try to envision it. This simple visualization exercise, Morris says, aims at training them to "see" objects that are no longer physically present.

In another exercise, they imagine themselves shrinking down to flea size and crawling over the face of a coin. "One guy crawled all over a penny and got lost in the hairs of Lincoln's nose," Morris chuckles. "Then he turned it over and found that inside the Lincoln Memorial there was a teeny-tiny Lincoln statue." The goal of this technique is to enhance concentration, a crucial skill, Morris says, if you want to psi with the best of them.

The trainees test their skills on games like Horizon, a dead ringer for a Coney Island arcade road test. Random dots generated by a machine simulate a car weav-

CONTINUED ON PAGE 96

FICTION

THE WHITE PLAGUE

BY FRANK HERBERT

Every tyrant in history is marked by indifference to misery. That is a clear way to identify tyranny. Now I am the tyrant. You must deal with me. You must answer to me. And I am indifferent to your misery. Out of this indifference, I ask you to consider the consequences of your own violent actions and inactions."

It was an ordinary gray British Ford, the spartan economy model and with right-hand drive, customary in Ireland. John Roe O'Neill would remember the driver's brown-sweatered right arm resting on the car's windowsill in the cloud-filtered light of that Dublin afternoon. A nightmare capsule of memory, it excluded everything else; just the car and that arm.

Several witnesses commented on a crumpled break in the Ford's left front wing. The break had begun to rust.

Speaking from her hospital bed, one witness said, "The break was a jagged thing, and I was afraid someone would be cut if they brushed against it."

Two of those who recalled seeing the car come out of Lower Leeson Street

Part One of a Two-Part Excerpt

PAINTING BY CHARLES PFAHL

knew the driver casually but only from his days in postal uniform. He was Francis Bley, a retired postman working part time as a watchman at a building site in Dun Laoghaire. Bley left for work early every Wednesday giving himself time to run a few errands and then pick up his wife, Tessie. On that one day each week, Tessie spent the morning doing "light secretarial" for a betting shop in King Street. It was Tessie's habit to spend the rest of the day with her widowed sister who lived in a remodeled gatehouse off the Dun Laoghaire bypass "just a few minutes out of his way."

This was a Wednesday, June twentieth. Bley was on his way to pick up Tessie.

The Ford's left front door, although appearing undamaged by the accident which had crumpled the wing, still required a twist of wire around the doorpost to keep it closed. The door rattled every time the car hit a bump.

"I heard it rattling when it turned onto St. Stephen's Green South," one witness said. "It's God's own mercy I wasn't at the Grafton corner when it happened."

Bley turned right off St. Stephen's Green South, which put him on St. Stephen's Green West, hugging the left lane as he headed for Grafton Street. There were better routes for him to make his connection with Tessie, but this was "his way."

"He liked to see all the people," Tessie said. "God rest him, that's what he said he missed most when he quit the postal—all the people."

Bley, slight and wrinkled, had that skin-stretched cadaverous look that is common among certain aged Celts from the south of Ireland. He wore a soiled brown hat almost the exact shade of his patched sweater, and he drove with the patient detachment of someone who came this way often. And if the truth were known, he rather liked being slowed by the heavy traffic.

It had been cold and wet through most of June, and, while it was still cloudy, the cloud cover had thinned and there was a feeling that there might be a break in the weather. Only a few of the pedestrians carried umbrellas. The trees of St. Stephen's Green, on Bley's right, were in full leaf.

As the Ford inched along in the congested traffic, the man watching for it from a fourth-floor window of the Irish Film Society building nodded once in satisfaction.

Right on time

Bley's Ford had been selected because of his Wednesday punctuality. There was also the fact that Bley did not garage his car on Davitt Road, where he and Tessie lived. The Ford was parked outside next to a thick yew hedge, which could be approached from the street along a path shielded by a parked van. There had been a van parked in this covering position the previous night. Neighbors had seen it, but no one had thought to comment at the time.

"There were often vans and other vehicles parked in that place," one said. "How were we to know it oughtn't to be there?"

The watcher at the Film Society building had many names, but he had been born Joseph Leo Herity. He was a small, solidly fleshy man with a long, thin face and pale, almost translucent skin. Herity wore his blond hair combed straight back and hanging almost to the collar. His light brown eyes were deeply set, and he had a pug nose with prominent nostrils from which some hairs protruded.

From his fourth-floor vantage, Herity commanded an overview of the entire setting for the drama he was about to ignite. Directly across from him, the tall trees of the Green formed a verdant wall enclosing the flow of vehicles and pedestrians. The Robert Emmet statue stood opposite his window, and to the left of it there was a black-on-white sign pointing to the public toilets. Bley's Ford had stopped with the traffic just to the left of Herity's window. A white tour bus with blue and red stripes down its side loomed over the small Ford.

"Herity, at the open window above and behind Bley, nodded once to himself. He stepped back away from the window and toggled the second switch on his transmitter."

Traffic fumes were thick even up at the fourth-floor level.

Herity checked Bley's license number to be certain. *Yes—JIA 5028.* There was the crumpled left front wing.

The traffic began to inch forward, then stopped once more.

Herity glanced left at the Grafton Street corner. He could see the signs of the Toy World shop and the Irish Permanent Society on the ground floor of the red brick building soon to be taken over by the Ulster Bank. There had been some protest about that—one ragged march with a few signs—but it had died out quickly. The Ulster Bank had powerful friends in the government.

Barney and his lot. Herity thought. *They think we're ignorant of their scheme to make a peace with the Ulster boys!*

Again Bley's Ford inched toward the corner, but once more it was stopped. There was heavy foot traffic where Grafton took off from St. Stephen's Green.

A bald-headed man in a dark blue suit had stopped almost directly beneath Herity's window and was examining the cinema marquee. Two young men pushing bicycles threaded their way past the bald-headed man.

The traffic remained stopped.

Herity looked down at the top of Bley's car. So innocent-looking, that car. Herity had been one of the two-man team to emerge from the night-shrouded van near Bley's parking spot the previous night. In Herity's hands there had been a molded plastic package which they had attached like a deformed limpet under Bley's car. At the core of that package lay a tiny radio receiver. The transmitter sat on the windowsill in front of Herity. A small black metal rectangle, it had a thin wire antenna and two recessed toggle switches, one painted yellow, the other red. Yellow armed it, red transmitted.

A glance at his wristwatch told Herity that they were already five minutes past Zero Time. It was not Bley's fault. It was all the blasted traffic.

"You can set your bloody watch by Bley," the leader of their selection team had said. "The old bastard should be running a tram or something."

"What're his politics?" Greaves had asked.

"Who cares about his politics?" Herity had countered. "He's perfect, and he'll be dying for a grand cause."

"The street'll be full of people," Greaves had said. "And there'll be tourists—sure as hell is full of Brits."

"We warned 'em to stop the Ulster boys," Herity had said. *"Greaves could be an old woman sometimes!"* They know what to expect when they don't listen to us."

It was settled then. And now Bley's car was inching once more toward the Grafton Street corner, toward the mass of pedestrians, including the possible tourists.

John Roe O'Neill, his wife, Mary, and their five-year-old twins, Kevin and Mairead, could have been classified as tourists, although John expected to be living in Ireland for six months while he was completing the research called for under his grant from the Pastermorn Foundation of New Haven, Connecticut.

An Overview of Irish Genetic Research.

He thought the title pompous, but it was only a cover. The real research was into the acceptance of the new genetics by a Roman Catholic society, whether such a society had taken a position to cope with the explosive potentials and implications of molecular biology.

The project was much on his mind that Wednesday morning, but necessary preparations required his attention. High on his list was the need to transfer funds from America to the Allied Irish Bank. Mary wanted to go shopping for sweaters "to keep our darlings warm of an evening."

"There y' go," John teased as they left the Sherbourne Hotel, stepping into the rush of tourists and businessmen. "Only four days in Ireland, and already you're beginning to sound like a local."

"And why not?" she demanded. "And both my grandmothers from Limerick."

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Come explore a comet.

Halley's Comet returns in 1985. The Europeans, the Soviets, and the Japanese are readying spacecraft to meet it. Of the technological powers,

only our nation plans to watch from afar. Why? Our space program is dying.

Over the last decade, NASA's purchasing power was slashed again and again while the rest of the federal budget mushroomed. Twice NASA tried to get funding for missions to Halley's, and twice the budget cutters looked at the dollars and not at what they'd buy. Now the only U.S. representatives at this comet will be the few American scientists associated with the European mission. And it doesn't appear that our government will even fund them properly.

Our space program has strong supporters in the government who could add a Halley Intercept Mission (HIM) to NASA funding. For them to do so in this budget cutting year, however, they need proof to show their colleagues that the public supports space exploration.

Last year 10,000 people used the Viking Fund to begin giving that proof. They dug into their pockets and gave an average of $10 apiece to support one starving project: the Viking lander on Mars. Today, their money is helping pay the costs of collecting and analyzing Viking's data.

Now the organizers of the Viking Fund announce the Halley Fund. Its goal: Show popular support for HIM by actually helping pay for it. By sending a few dollars to the Halley Fund, you can let the politicians know that you want an American mission to Halley's comet. We'll see that your money helps pay for

HIM. And if the mission doesn't make it into the budget, your money will support American scientists associated with the European probe.

At stake is more than America's prestige. Even with other nations sending probes, the scientific value of a sophisticated American probe is unquestioned. The real question is whether the U.S. has the resolve to explore the solar system.

So come explore a comet.

Send your tax deductible contribution to the Halley Fund ($1 minimum), and you'll receive regular updates on the plans of all nations to explore Halley's comet. Don't delay. If Congress doesn't add money to NASA's budget for HIM this summer, your next chance to explore Halley's will come in 76 years.

And save our space program.

THE HALLEY FUND

3033 Moorpark Avenue, Suite 27
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They laughed drawing a few curious stares The children tugged at Mary anxious to be off shopping

Ireland suits Mary John thought She had pale, clear skin and dark blue eyes Jet-black hair— Spanish hair her family called it—framed her rather round face A sweet face Irish skin and Irish features He bent and kissed her before leaving It brought a blush to her face but she was pleased at his show of affection, and she gave him a warm smile as they parted

John walked away briskly humming to himself amused when he recognized the tune "Oh What a Beautiful Morning!"

John s Wednesday appointment for "transfer of foreign funds was at 2 P M at the Allied Irish Bank on Grafton and Chatham streets There was a sign just inside the bank s entrance, white letters on black NON BRANCH CUSTOMERS UPSTAIRS A uniformed guard led him up the stairs to the office of the bank manager Charles Mulrain a small nervous man with tow-colored hair and pale blue eyes behind gold framed glasses Mulrain had a habit of touching the corners of his mouth with a forefinger first left side then right followed by a quick downward brush of his dark tie He made a joke about having his office on the first floor what you Americans call the second floor

"It is confusing until you catch on," John agreed congenially

Well!" A quick touching of lips and tie "You understand that we'd normally do this at our main office but

When I called they assured me it was

"As a convenience to the customer" Mulrain said He lifted a folder from his desk glanced inside it nodded "Yes this amount if you ll make yourself comfortable here I ll just get the proper forms and be right back

Mulrain left giving John a tight smile at the door

John went to the window and pulled back a heavy lace curtain to look down on Grafton Streef The sidewalks were thick with people all the way up to the arched gateway into St Stephen s Green, two short blocks up Grafton The motor tratfic was two abreast filling the street and crawling along toward him There was a workman cleaning the parapet on the roof of the shopping center across the street—a white-coated figure with a long-handled brush He stood outlined against a row of five chimney stacks

Glancing at the closed door of the manager's office John wondered how long Mulrain would be Everything was so damned formal here He looked at his watch Mary would arrive with the children in a few minutes They planned to have tea and then John would walk down Grafton to Trinity College and begin work at the library there—the real start of his research project

Much later John would look back on those few minutes at the bank manager s "first-floor" window and think how another sequence of events had been set in motion without his knowledge, an inescapable thing like a movie in which one frame follows another without ever the chance to deviate It all centered upon Francis Bley s old car and a small VHF transmitter in the hands of a determined man watching intently from an open window that looked down on that corner where Grafton met St Stephen s Green

Bley patient as always eased along at the traffic s pace Herity in his window vantage point toggled the arming switch of his transmitter making sure that fhe antenna wire dangled out over the sill

As Bley neared the Grafton corner the crush of pedestrians forced him to stop and he missed the change of the traffic light He heard the tour bus gain clear of traffic to his right trundling off in a rumble ot its heavy diesel Barricades were being erected on the building to his left and a big white on red sign had been raised over the rough construction "This Building to Be

He allowed himself to be carried along by the crowd rushing toward the area of the blast. There was a smell of burned iron in the air and the sound of cries and screams.

Remodelled by G Tottenham Sons Ltd" Bley looked to his right and noted the tall blue-and-white Prestige Cafeteria sign feeling a small pang of hunger The pedestrian isthmus beside him was jammed with people waiting to cross over to St Stephen s Green and others struggling to make a way through the cars stopped on Grafton and blocking Bley s way The crush of pedestrians was particularly heavy around Bley s car people passing both front and back A woman in a brown tweed coat, a white parcel clutched under her right elbow and each hand grasping the hand of her two small children hesitated at the right front corner of Bley s car while she sought an opening through the press of people

John Roe O Neill standing at the bank manager s window, recognized Mary He saw her first because of her familiar tweed coat and the way she carried her head, that sleek cap of jet hair He smiled The twins were screened from him by the hurrying adults but he knew from Mary s stance that she held the children s hands A brief break in the throng allowed John a glimpse of the top of Kevin's head and the old Ford with the driver s brown-sweatered elbow protruding slightly

Where is that damned bank manager? John wondered *She ll be here any minute*

He dropped the heavy lace curtain and looked again at his wristwatch

Herity at the open window above and behind Bley nodded once more to himself He stepped away from the window and proceeded to toggle the second switch on his transmitter

Bley s car exploded ripped apart from the bottom The bomb, exploding almost under Bley s feet drove him upward with a large piece of the car s roof, his body crushed dismembered and scattered The large section of roof sailed upward in a slow arc to come crashing onto the Irish Permanent Society building demolishing chimneys and slates

It was not a large bomb as such things went but it had been experfly placed The old car was transformed into jagged bits of metal and glass an orange ball of fire peppered the deadly shrapnel A section of the car s hood decapitated Mary O Neill The twins became part of a bloody puddle blown against the iron fencing across the street at St Stephen s Green Their bodies were more easily identified later because they had been the only children of that age among the throng

Herity did not pause to glance out at his work the sound told it all He tucked the transmitter into a small and worn military green pack stuffed an old yellow sweater onto it strapped the cover and slung the pack over his shoulder He left the building by the back way elated and satisfied Barney and his group would get this message!

John O Neill had looked up from his wristwatch just in time to see the orange blast envelop Mary He was saved from the window s shattered glass by the heavy curtains which deflected all but one of the shards away from him One small section of glass creased his scalp The shock wave staggered him driving him backward against a desk He fell sideways momentarily unconscious but getting quickly to his knees as the bank manager rushed into the room shouting "Good God! What in the world was that?

John stumbled to his feet rejecting the question and the answer both of which rumbled through his head like an aftershock of the blast He brushed past the bank manager and out the door His mind remained in shock but his body found its way down the stairs He shouldered a woman aside at the toot ot the stairs and lurched out to the street where he allowed himself to be carried along by the crowd rushing toward the site of the blast There was a smell of burned iron in the air and he could hear cries and screams

Within only a tew seconds he was part of the crush being held back by police and uninjured civilians pressed into service to keep the area around the explosion clear John elbowed and clawed his way forward

"My wife!" he shouted "I saw her She

was there My wife and our children!"

A policeman pinned his arms and swung him around blocking John's view of the tangled fabric and bloody flesh strewn across the street

The groans of the injured, cries for help and shouts of horror drove John into insensate rage *Mary needs me!* He struggled against the policeman

Mary! She was right in front of

The ambulances are coming, sir! There's help at hand You must be still You cannot go through now."

A woman off to John's left said Let me through I'm a nurse

This more than anything else stopped John's struggles with the policeman

People were helping There was a nurse

"It'll be cleared up in a bit sir the policeman said His voice was maddeningly calm "That's a bad cut on your head I'll just help you across to where the ambulances are coming."

John allowed himself to be led through a lane in the crowd seeing the curious stares, hearing the voices on his right *cooing* and calling upon God to 'look over there' Awed voices telling John about things he did not want to see He knew though And there were glimpses past the policeman who had helped him to a cleared place against a building across from the Green

"There now sir the policeman said You'll be taken care of here Then to someone else I think he was hit by a flying bit, the bleeding seems to've stopped

John stood with his back against a scarred brick wall from which the dust of the explosion still sifted There was broken glass underfoot Through an opening in the crowd to his right he could see part of the bloody mess at the corner the people moving and bending over torn flesh He thought he recognized Mary's coat behind a kneeling priest Somewhere within him there existed an understanding of that scene His mind, though remained frozen frigidly locked into limited thought If he allowed himself to think freely then events would flow time would continue a time without Mary and the children It was as if a tiny jewel of awareness held itself intact inside him understanding *knowing* but nothing else could be allowed to move

A hand touched his arm

It was electric A scream erupted from him—agonized echoing down the street bringing people whirling around to stare at him A photographer's flash temporarily blinded him shutting off the scream but he could still hear it in his head It was more than a primal scream This came from deeper from some place he had not suspected and against which he had no protection Two white-coated ambulance attendants grabbed him He felt his coat pulled down, his shirt ripped There came the prick of a needle in his arm They hustled him into an ambulance while an enveloping drowsiness overwhelmed his mind, sweeping away his memory

For a long time afterward memory would

How to change a forecast.

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not reproduce those shocked minutes. He could recall the small car, the brown-sweatered elbow on the windowsill, but nothing afterward. He knew he had seen what he had seen: the explosion, the death. Intellectual awareness argued the facts: *I was standing at that window. I must have seen the blast.* But the particulars lay behind a screen that he could not penetrate. The recollection of the blast lay frozen within him, demanding action lest the frozen thing thaw and obliterate him.

Without any particular pride, John Roe O'Neill thought his basement lab in Ballard, a suburb of Seattle, Washington, a marvel of ingenuity. The centrifuge that he had improvised out of tire-balancing equipment had cost less than a thousand dollars. His freezer was stock home bar equipment turned on its back and with a calibrated thermostat added. It was accurate to within one degree centigrade. He had improvised peristaltic pumps from scuba equipment. His cell disrupter was adapted from a used yachting sonar. The electron microscope, a dual-stage, thirty-angstrom-resolution ISI model, cost him the most time and considerable money. It was provided as a consignment theft item by the San Francisco underworld at a cost of twenty-five thousand dollars.

And so it went with the entire lab. He fashioned the negative-pressure research rooms out of plywood and plastic film. The air lock was sealed with two small boat hatches, which forced him to crawl into and out of the rooms. It was the only significant inconvenience.

Before the lab was completed, John was at work with his computer, setting up the full-color graphics of the molecular models upon which he would center his attention. In parallel computer storage circuits, he filed away everything he could ferret out about the ways existing drugs functioned in the body. He paid particular attention to known data on enzymes and specific DNA receptors.

It gratified him to discover that many of the most important requirements for his molecular maps were available in 'canned' form—on computer discs or in storage programs that could be bought or stolen. By the time the lab was completed, he had his computer loaded with the elemental building blocks of his project.

There was a hypnotic fascination in sitting before the cathode display, watching the double spirals of the primal helix turn and twist at his command. The red, green, purple, and yellow lines took on a life of their own. His mind and the display fell into a kind of unified space within which it was difficult to separate which was in his mind and which was in the screen. It seemed at times as if his hands on the computer controls created the images in his head, or the image would be in his head and then appear as if miraculously on the screen. There were moments when he thought he was actually speaking in the language of the genetic code, *talking* to specific sites on DNA molecules.

During these periods the actual flow of time vanished from his consciousness. On one occasion he crawled from the air-lock hatch, staggered to his feet, and found it just dawn outside. Investigation revealed that he had been working steadily for thirty-seven hours with only an occasional sip of water. He was achingly hungry and his trembling hands could not even deal with solid food until he drank almost a full quart of milk.

The structure he needed to see and understand was slowly revealing itself, though both on the screen and in the computer-monitored outputs of his lab. He knew it was only a matter of time until he would fit the proper molecular key into the biological lock. The answers were here in the lab and in his head. The nucleotide sequences of the DNA encoded all of the genetic information for every biological function. It was a code-breaking problem.

> *"It seemed at times as if his hands on the computer controls created the images in his head, or the image would be in his head and then appear miraculously on the screen."*

Without the computer he would have been lost. At any given moment he might be working with four thousand to twenty thousand genes. The mapped arrangements of these genes and the DNA codes within them could project into more than a million genes. He did not need all of those genes, though. The only ones he needed were the key ones whose coding lay in the particular nucleotide sequences.

By disruption, by enzyme fractionating, and by temperature-controlled separation with colimators and centrifuge, he sought out the bits and pieces that his mind/computer images told him were there.

Before long, he was fashioning ribosomal RNAs and messenger RNAs from his own DNA templates, selecting and discarding, seeking out the control sites in the genomes. These and the regulatory proteins were his first targets.

Some two months into the project, John realized he would need a special supply of natural DNA for the polymerization cycle. The DNA had to be biologically active, and it had to carry the templates he required. There was no escaping the fact that the DNA material transferred in pairs, one of each pair being an exact mirror of its opposite number.

His head ached with thinking about the problem. He could not avoid the necessity. It would risk exposure. It was dangerous, but he could see no alternative.

A session with his forging kit gave him a passable identification as a John Vicenti, M.D., Public Health Service. He had bought a small hand press early in fitting out the equipment for his project. This now produced some quite adequate letterheads. On these he typed letters of authorization, scrawling big signatures of officials at the bottoms. He bought a dark wig, toned his skin olive, and all the while kept watch through the newspapers for a school immunization date. It came within the week: an immunization program in West Seattle Junior High for the following Monday.

Wearing a white jacket with stethoscope protruding from a side pocket and a name tag on his lapel identifying him as John Vicenti, M.D., he showed up early at the school. It was a cold winter morning, and the halls were crowded with students bundled into heavy jackets. He moved through the shouting, jabbering throng without attracting more than casual notice. In his left hand he carried a carefully arranged wooden kit box containing racks of sterile slides and covers and all the tools for blood sampling. In his left hand was the briefcase with his *authorizations*.

He bustled officiously into the school nurse's office, noting her name on the door: Jeanette Blanquie. He cleared his throat.

"Hi," he said, all innocence. "I'm Doctor Vicenti. Where do I set up?"

Set up? Nurse Blanquie was a slender, blonde young woman with a permanently harried expression. She stood behind a long table upon which the immunization kits were set out in orderly rows. There was an empty chair at the far end of the table with two stacks of forms in front of it. The wall behind her displayed a calendar and two bowdlerized anatomical charts, one labeled MALE, the other FEMALE.

"For the blood samples," he said. He put his wooden box and briefcase on the table and showed her his identification and *authorizations*. Nurse Blanquie merely glanced at them, and her expression became even more harried.

"Blood samples," she muttered.

"We're supposed to get them right along with your immunization program to minimize the upset of school routine," he said.

"I was supposed to have two clinical technicians here this morning to help me. One of them just called in sick, and the other one has some kind of emergency at Good Samaritan. Now you. This is all I need. What are your samples for?"

"We're doing a genetic typing nationally to see whether we can identify correlations with certain diseases and immunities. I'm supposed to use your ID numbers, no names. All I need is to know whether the sample is from a male or a female."

Her voice sounded tired. "Doctor Vicenti

CONTINUED ON PAGE 99

The shuttle down in flames?
Private enterprise banned from orbit?
It could happen, thanks to a new

SOVIET SPACE OFFENSIVE

BY BEN BOVA

The year is 1983. The U.S. space shuttle *Challenger* is in orbit on its first test flight. Its sister ship, *Columbia*, is being checked out at Kennedy Space Flight Center in preparation for its sixth mission.

Disaster strikes without warning. A pair of explosions rip through *Challenger*, destroying the rocket engines at its tail and blowing off the barn-door hatches of the payload bay. The ship tumbles wildly until its two-man crew grimly brings it back under control. The astronauts are alive and unharmed except for some bruises. But *Challenger* is crippled and unable to return safely to Earth.

Suddenly Moscow broadcasts an electrifying message. In keeping with the terms of the 1972 Convention on Rescue of Cosmonauts, the Soviet Union has dispatched a rescue mission to the damaged American pirate spacecraft *Challenger*.

The world watches worriedly as cosmonauts in two *Soyuz-T* spacecraft reach *Challenger* and return the Americans safely to Earth. Inside the Soviet Union.

The media are already buzzing with stories leaked from Washington that *Challenger* was destroyed not by an accident but by Soviet missiles fired from a satellite.

Then Moscow makes a new announcement. The American astronauts are safe, but they will not be returned to the United States until some comprehensive agreements about outer space are signed. After all, Moscow asserts, everyone knows that these astronauts are military officers whose mission in space was to spy on the USSR and steal Soviet reconnaissance satellites.

The military calls it "taking the high ground." Diplomats refer to it as "seizing the initiative." Whichever you prefer, the Soviet Union has launched a major diplomatic and military offensive against the American space program, and particularly against the space shuttles. The foregoing scenario could soon come true. Two critical elements of such a crisis are already falling into place.

The more obvious is a dramatic advance in Soviet space weaponry. The U.S. government has not officially confirmed reports that the Soviet satellite *Cosmos 1267* carries missiles capable of destroying other satellites. But privately some Reagan Administration sources concede that stories leaked in *Aviation Week* magazine last autumn are true. *Cosmos 1267* is an orbital battle station that might well down an American shuttle.

The other element, no less dangerous, is diplomatic. Next month (August 9–22) the United Nations will convene its Unispace 82 conference in Vienna. It promises to turn the city of political intrigue into the site of a propaganda circus.

The Russians, it seems, hope to con-

PAINTING BY ROBERT McCALL

vince the Third World and as much of Europe and the Western Hemisphere as possible That the U S space program is no more than a tool of Pentagon strategy and that the space shuttle is exclusively a military vehicle If they can accomplish that they may force the United States to limit its space explorations drastically At the very least the Russians can then justify their own systematic militarization of space

Soviet engineers have been working on space weaponry for years The 1963 Nuclear Test Ban Treaty prohibits placing nuclear weapons in space, and the 1967 Outer Space Treaty bars placing weapons of mass destruction in orbit and building military bases on the moon Both the United Stafes and the Soviet Union have ratified these treaties But as James Oberg a frequent contributor to *Omni* and the author of *Red Star in Orbit* (Random House) says "Ten years ago Soviet space engineers flight-tested a vehicle for carrying nuclear warheads into orbit and back Western observers called it the FOBS [fractional orbit bombardment system] Since the system *as tested* never made a complete pass around the Earth some U S Government space lawyers haggled that the payload was not really in orbit and hence was not a violation of the Outer Space Treaty"

For the past 15 years the Russians also have been testing a "hunter-killer" antisatellite system It consists of a simple bomb maneuvered into orbit alongside its intended victim When the bomb explodes shrapnel riddles its target like a shotgun blast This hunter killer system was the first active weapon ever put in orbit So far as is known it has been used to date only in tests against Soviet target satellites Some observers have theorized however that the Soviet A-sat may have been responsible for the mysterious disappearance of an RCA communications satellite in early December 1979

No treaty prohibits placing such weapons of *pinpoint* destruction in orbit In fact spurred by the Soviet threat, the U S Air Force is developing an antisatellite weapon to be carried by an F-15 fighter and fired into space like an antiaircraft missile Both the USSR and the United States are working on such high-energy-beam weapons as lasers and particle-beam accelerators

Beam weapons and missiles such as those reportedly carried by *Cosmos 1267* are ostensibly designed to attack only other satellites or rocket boosters But such weapons might eventually become powerful and accurate enough to attack targets on the ground

While the Russians work on space weapons is well established their political campaign is relatively new It required a rapid about face in Soviet policy When President Carter's representatives at the SALT II talks several years ago proposed to ban all weapons from space, the Soviet negotiators refused even to consider the idea They quickly abandoned this stance when they realized that the shuttle would be a success

Soviet news coverage of *Columbia*'s first flight in April 1981 reflected the tactical change Soviet news reports never mentioned the shuttle's size weight and orbit Instead article after article drummed on the military nature of the shuttle and its planned missions

Red Star, the official newspaper of the Red Army declared that "Pentagon [officials] are gleefully rubbing their hands After all the Pentagon sees the shuttle in the role of an omnipotent and insatiable space pirate"

A few days after *Columbia*'s first flight, Soviet President Leonid Brezhnev piously prayed, "May the shoreless cosmic ocean be pure and free of weapons of any kind"

And in May 1981 General Alexei A Leonov chief of the Soviet cosmonaut corps declared in a speech in Ulan Bator Outer Mongolia that a satellite has the right to fly over the territory of another nation only for peaceful purposes Leonov the first man to walk in space and the commander of the Russian half of the joint Apollo-Soyuz mission in 1975, implied that military satellites are fair game for Soviet antisatellite weapons

"The Soviet hunter-killer was the first weapon ever put in orbit. It may explain the mysterious fate of an RCA relay platform that vanished in 1979."

The new Soviet line became clear in August 1981 when the Soviet delegation to the United Nations called for a total ban on all weapons in space They referred specifically to the American antisatellite system as a violation of the principle that space should be free of all weapons They also described the space shuttle as a weapon

Soviet diplomacy scored heavily at the September 1981 meeting of the International Astronautical Federation in Rome At the sessions sponsored by the International Institute of Space Law the Soviet delegation gave a series of papers outlining their policies and characterizing the U S space program as strictly a military operation

B G Dudakov a ranking Soviet space lawyer prepared a paper that spelled out his country's position

"American strategists' plans as regards handling other states' satellites in orbit can be characterized as piratic in essence It seems as though some people are striving for the laurels of such notorious sea-pirates of the past as John Hawkins Francis Drake and Walter Railey [*sic*]"

Dudakov himself missed the meeting a fate that often befalls Russians who wish to travel outside the Soviet Union But his paper carried on for him "Without the consent of the state holding jurisdiction over the space object in orbit not a single state is permitted either to investigate using its own spacecraft the satellites of other states or to get too close to them violating a certain distance limit"

The Russians had drawn a line No one could touch their satellites inspect them or even get within an unspecified distance of them They apparently feared—or wanted others to believe—that the space shuttle would be used to inspect or dismantle their satellites, or even to snatch them from orbit

The Russians underscored this line with several other fascinating points At the same meeting Dr Vladlen S Vereshchetin a member of the Soviet Academy of Sciences branch on law called for a program to strengthen and codify international space law Among the new issues that Vereshchetin raised was the idea of setting up an international agency to oversee the rescue of astronauts and cosmonauts in distress and their return to their home countries Ominously he also said that military astronauts might not be returned as quickly as civilians

Arthur M Dula a Houston attorney who specializes in space law and who is the chairman of the American Bar Association's Section of Science and Technology notes that it was the Russians who originally insisted that rescued cosmonauts be returned immediately—even if they ask for political asylum in the rescuers nation This provision at the Russians insistence was written into the 1972 accord on the rescue and return of astronauts

The new position suggests that a military astronaut might not be treated as a civilian would that he might even be detained On the surface this hardly seems to the Soviet Union's advantage Their cosmonauts are military officers there are far fewer civilians in the cosmonaut corps than among American astronauts But in the wonderland of international politics and Soviet propaganda the Russians can picture space ventures in any way that suits them Their flights manned by members of the Red Army can be defined as peaceful and nonmilitary while any American space mission even those flown solely by civilian astronauts can be designated military in purpose

"The consistent Russian theme" Dula says, "has been either to forbid or to impede private enterprise in space Now he worries after defining the shuttle as a dangerous weapon the Russians are ready to justify the use of military force against the shuttle"

How much of a military threat *is* the shuttle? According to astronaut John Young not much. The space shuttle is not a military weapon any more than a truck is a military weapon, says *Columbia*'s first command pilot. The shuttle is a truck. You can put lots of different things into it.

About one third of all shuttle flights planned through 1986 will carry Defense Department payloads. Most are communications and reconnaissance satellites the Department of Defense has no plans to launch armed satellites. Congress and the White House are debating whether to begin work on a laser "battle station" in orbit—an idea recently endorsed by the General Accounting Office—but such exotic weaponry seems to be at least a full decade away.

Yet astronaut Young is convinced that space will eventually become a military arena. Men in a space station, he points out, could watch earthly battles and make decisions without delay. Ground-based planners must have vast amounts of satellite data relayed to the ground, then send their orders back to communications satellites for transmission—a slow and difficult process.

This possibility alone is enough to spur the Soviet campaign against the shuttle. The next round will come at Unispace 82. As usual, the United States is far behind in its preparations—in this case because it was not until the last moment that our government decided to attend the conference at all.

The purpose of the conference is to promote the use of space technology primarily for the benefit of the Third World. Those nations have already pushed the Moon Treaty, the Law of the Sea Treaty, and other preparations for a new world economic order. Their goal is to gain the benefits of technology developed in the industrialized nations—by international fiat rather than free trade. Unispace 82 is just one further step in this direction.

One Third World aim is to establish a U.N. agency to monitor—and govern—all space activities. At the Vienna conference the Third World countries want to explore such political issues as the militarization of space, ownership of the geosynchronous orbit, and control of data from Landsats and other observation satellites.

Dr. Jerry Grey, who in January was appointed a deputy secretary general for the conference, observes that "these U.N. conferences are political in nature, not technical." Yet at previous meetings the United States has limited itself almost exclusively to technical presentations. As a result, both the USSR and the Third World have scored important political and propaganda victories at America's expense.

Because of this, it might be tempting to view America's early decision to boycott the Vienna conference as a wise refusal to join in an attack on its own national interests. In fact, the cause was simple politics. With perhaps some masterful orchestra-

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The drugs of the future, says this Harvard botanist, grow in the jungle primeval

GARDENER OF EDEN

BY LEAH WALLACH

On one of his trips to the Amazon, botanist Dr Richard Evans Schultes saw a flat mountaintop from the airplane. "It was very inviting. I asked the witch doctor if he would give me three boys to help me canoe upstream to it." Schultes recalls. "He told me about the little people. The Indians believe that miniature people live on the mountaintop and that on certain occasions they become giants. He said I shouldn't go up there. I told him there were some plants I wanted up there, and I intended to go even if I had to paddle myself. Then he knew I was really going to go. He told me, 'I will give you the boys, and I'll practice witchcraft the whole time you're away to control the spirit people, but you have to promise me you won't let my boys climb up.'

Schultes promised. The Indian paddlers stayed by the fire at the base of the mountain, the witch doctor did nonstop magic back at the village, the botanist collected some exciting new specimens, and the little people, apparently, did nothing at all.

'That's the witch doctor there,' Schultes adds, pointing to a photograph on his office wall of an Indian in a handsome white-feather diadem, with heavy-lidded eyes, bangs, and the expression of a slightly stoned cat eyeing a distant canary. It would be difficult to imagine a more incongruous colleague for Schultes, a big, well-built man in his sixties, with a strong, elongated, and rather stern New England face, a measured voice, the bearing of an Edwardian gentleman, and a surprisingly tender smile. But Schultes, Jeffrey Professor of Biology and director of the Botanical Museum at Harvard University, collector of more than 24,000 plant specimens, author of seven books and more than 300 technical papers, editor of *Economic Botany* for 17 years, and recipient of honors

PHOTOGRAPHS BY ANTHONY WOLFF

Schultes has taken all the hallucinogenic preparations (like the coca leaves, below) that he's studied.

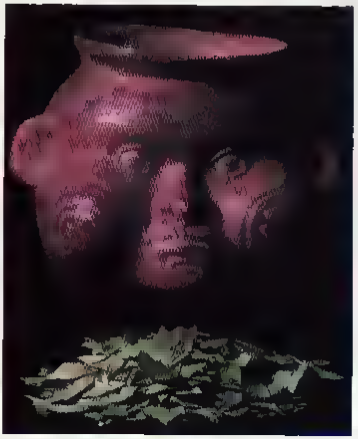
from numerous scientific societies and universities all around the world, is a man with two rather incongruous passions: the plants and people of the Amazon Jungle where he lived and worked continuously from 1941 to 1954, and Harvard University, where he has lived and worked all the rest of his adult life. (He's shown on the preceding pages fondling a papyrus plant in Harvard's botanical garden.)

As a result of these passions Schultes is one of the most revered economic botanists (experts who spend their lives studying plants both useful and harmful to man). He is the world's leading authority on hallucinogenic plants and probably knows more about the botany of *Hevea*, the rubber plant, than any other man alive. His protracted studies of hallucinogenic plants now help consciousness researchers analyze the subtle workings of our central nervous system. They have opened up a whole natural pharmacy of potentially valuable drugs to medicine and have helped researchers fine-tune their understanding of the neurochemistry of hallucinations. His lifelong fascination with rubber plants has uncovered some new and in some ways superior sources of this industrial staple.

To understand the scope and difficulty of his efforts, you have to go where it all starts, deep within the Amazon Jungle, which some call "a green hell."

For a botanist like Schultes, the Amazon is a green paradise, a true Garden of Eden. It is home to at least 80,000 of the world's half-million species of plants, many of them commercially valuable. Most of the world's commercial rubber trees, for example, are direct descendants of 70,000 seeds from one strain of *Hevea* taken from the Amazon by English explorer Sir Henry Wickham in 1876. The first time anyone bothered to collect systematically any of the many other strains of wild *Hevea brasiliensis* and related species of rubber plants was when Richard Schultes did it.

He spent years of his life in the Amazon taking inventory of the genetic pool of plants available in the wild to future cultivators. The significance of his work will depend largely on what other people do with it. For example, besides discovering some strains of wild *Hevea* that produce more or better rubber, Schultes has found other plants that yield poor rubber but have characteristics such as disease resistance that might make them worthwhile



for genetic work. Still other strains have special qualities, such as resistance to coagulation, that might make them useful additions to the kind of synthetic rubber now being manufactured.

Schultes's work on hallucinogens and medical plants has also been of immense importance not only to ethnobotany but also to specialties like psychopharmacology, anthropology, and phytochemistry (the chemistry of plants). All knowledge of hallucinogens began with the work of botanists. Almost all the hallucinogenic drugs were originally derived from plants whose psychodynamic properties were discovered by people living in the regions where the plants grow naturally, but for years little was known about them outside those areas. In 1924 a seminal book of modern psychopharmacology, entitled *Phantastica*, listed 28 plants used for their psychoactive properties. Today, thanks in large part to Schultes, there are 150 hallucinogenic plants known to science. One hundred thirty of them are found in the Western Hemisphere alone.

There is no botanical reason to suppose that there are any more such plants in one hemisphere than the other. It just seems to be that the visionary shamanism of the various Amerindian cultures has traditionally encouraged discovering and exploiting the plants. And it was Schultes who brought most of these magic plants of the Indians out of the realm of myth and rumor and into the world of science.

Schultes originally entered Harvard intending to become a doctor. He switched fields of concentration ("At Harvard," he explains, "we *concentrate*; we do not major") in his third year when he took a course in economic botany, taught by the eminent botanist Oak Ames. In 1936, while he was in Mexico gathering data for his doctoral dissertation, "Economic Aspects of the Flora of Oaxaca," he collected specimens of sacred intoxicating mushrooms and of ololiuqui, an inebriating morning-glory, both of which were commonly used by sorcerers in Oaxaca, Mexico. Until he tracked them down and identified them, these plants had been dismissed as mere legends. In 1941 Schultes began publishing the fruits of his labors: his thesis, some papers on the mushrooms he studied, and a monograph on the morning glory *Rivea corymbosa*. They were read by hardly anyone at all.

That same year Schultes also went to Colombia on a grant from the National Research Council to study arrow poisons and medicinal plants of the Amazon. A year later, in 1942, he found himself assigned to a crash program designed to find in the Amazon Jungle wild rubber plants that could be used to breed replacements for the Asian rubber plantations lost to the Japanese early in World War II. After the war the U.S. Department of Agriculture kept him on to collect living specimens of any and all species and strains of *Hevea* he could find so that they could establish a breeding nursery. Schultes stayed on in the Amazon for a total of 13 years, studying rubber, collecting medicinal plants, and all the while retaining an honorary unpaid appointment at Harvard.

When he first went to the northwest Amazon, life was primitive. The tribes of the interior knew no Spanish, no Portuguese, and the only way to get in and out was on foot and by canoe. For six, eight, sometimes ten months at a stretch Schultes traveled the jungle, taking with him only a machete, one change of clothes, a camera, and a medicine kit, but no tent, no guns, not even a lantern. He stayed with the Indians, learned Indian ways, and ate Indian food. He did bring along some luxuries: a few cans of baked beans from his native Boston, more for their tranquilizing properties than for their value as nourishment. When I had malaria, and I had tipped over the canoe, and every-

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"2 months' salary showed the future Mrs. Smith what the future will be like."
You can't look at Jane and tell me she's not worth 2 months' salary. I mean just look at her. So I wanted to get her a diamond engagement ring that said exactly that, 'Just look.' I'd found out that a good spending guideline today is about 2 months' salary. That got me the biggest and best diamond I could afford, without breaking my budget. Now the only thing that other men ask her is, "When's the wedding day?"
A diamond is forever.

FICTION

They were two-bit crooks but had the chance to make the killing of a lifetime

BURNING CHROME

BY WILLIAM GIBSON

It was hot the night we burned Chrome. Out in the malls and plazas moths were batting themselves to death against the neon, but in Bobby's loft the only light came from a monitor screen and the green and red LEDs on the face of the matrix simulator. I knew every chip in Bobby's simulator by heart, it looked like your workaday Ono-Sendai VII, the "Cyberspace Seven," but I'd rebuilt it so many times that you'd have had a hard time finding a square millimeter of factory circuitry in all that silicon.

We waited side by side in front of the simulator console, watching the time-display in the screen's lower left corner.

"Go for it," I said, when it was time, but Bobby was already there, leaning forward to drive the Russian program into its slot with the heel of his hand. He did it with the tight grace of a kid slamming change into an arcade game, sure of winning and ready to pull down a string of free games.

A silver tide of phosphenes boiled across my field of vision as the matrix began to unfold in my head, a 3-D chessboard, infinite and perfectly transparent. The Russian program seemed to lurch as we entered the grid. If anyone else had been jacked into that part of the matrix he might have seen a surf of flickering shadow roll out of the little yellow pyramid that represented our computer. The program was a mimetic weapon, designed to absorb local color and present itself as a crash-priority override in whatever context it encountered.

"Congratulations," I heard Bobby say. "We just became an Eastern Seaboard Fission Authority inspection probe."

That meant we were clearing fiberoptic lines with the cybernetic equivalent of a fire siren, but in the simulation matrix we seemed to rush straight for Chrome's data base. I couldn't see it yet, but I already knew those walls were waiting. Walls of shadow, walls of ice.

Chrome: her pretty childface smooth as steel, with eyes that would have been at home on the bottom of some deep Atlantic trench, cold gray eyes that lived under terrible pressure. They said she cooked her own cancers for people who crossed her, rococo custom variations

PAINTING BY ALAN MAGEE

that took years to kill you They said a lot of things about Chrome, none of them at all reassuring

So I blotted her out with a picture of Rikki. Rikki kneeling in a shaft of dusty sunlight that slanted into the loft through a grid of steel and glass: her faded camouflage fatigues, her translucent rose sandals, the good line of her bare back as she rummaged through a nylon gear bag. She looks up, and a half-blond curl falls to tickle her nose. Smiling, buttoning an old shirt of Bobby's frayed khaki cotton drawn across her breasts.

She smiles.

"Son of a bitch," said Bobby. "We just told Chrome we're an IRS audit and three Supreme Court subpoenas. Hang on to your ass, Jack."

So long, Rikki. Maybe now I see you never.

And so dark in the halls of Chrome's ice.

Bobby was a cowboy, and ice was the nature of his game: *ice* from ICE: Intrusion Countermeasures Electronics. The matrix is an abstract representation of the relationships between data systems. Legitimate programmers jack into their employers' sector of the matrix and find themselves surrounded by bright geometries representing the corporate data.

Towers and fields of it ranged in the colorless nonspace of the simulation matrix: the electronic consensus hallucination that facilitates the handling and exchange of massive quantities of data. Legitimate programmers never see the walls of ice they work behind, the walls of shadow that screen their operations from others, from industrial espionage artists and hustlers like Bobby Quine.

Bobby was a cowboy. Bobby was a cracksman, a burglar, casing mankind's extended electronic nervous system, rustling data and credit in the crowded matrix monochrome nonspace where the only stars are dense concentrations of information, and high above it all burn corporate galaxies and the cold spiral arms of military systems.

Bobby was another one of those young-old faces you see drinking in the Gentleman Loser, the chic bar for computer cowboys, rustlers, cybernetic second-story men. We were partners.

Bobby Quine and Automatic Jack. Bobby's the thin pale dude with the dark glasses and Jack's the mean-looking guy with the myoelectric arm. Bobby's software and Jack's hard. Bobby punches console and Jack runs down all the little things that can give you an edge. Or anyway, that's what the scene watchers in the Gentleman Loser would've told you before Bobby decided to burn Chrome. But they also might've told you that Bobby was losing his edge, slowing down. He was twenty-eight, Bobby, and that's old for a console cowboy.

Both of us were good at what we did, but somehow that one big score just wouldn't come down for us. I knew where to go for the right gear, and Bobby had all his licks down pat. He'd sit back with a white terry sweatband across his forehead and whip moves on those keyboards faster than you could follow, punching his way through some of the fanciest ice in the business, but that was when something happened that managed to get him totally wired, and that didn't happen often. Not highly motivated, Bobby and I was the kind of guy who's happy to have the rent covered and a clean shirt to wear.

But Bobby had this thing for girls, like they were his private Tarot or something, the way he'd get himself moving. We never talked about it, but when it started to look like he was losing his touch that summer he started to spend more time in the Gentleman Loser. He'd sit at a table by the open doors and watch the crowd slide by, nights when the bugs were at the neon and the air smelled of perfume and fast food. You could see his sunglasses scanning those faces as they passed, and he must have decided that Rikki's was the one he was waiting for, the wild card and the luck changer. The new one.

"When Rikki showed up, he was fading fast, and smart money was already whispering that the edge was off his game. He needed that one big score, and he needed it soon."

I went to New York to check out the market, to see what was available in hot software.

The Finn's place has a defective hologram in the window: METRO HOLOGRAFIX, over a display of dead flies wearing fur coats of gray dust. The scrap's waist-high inside, drifts of it rising to meet walls that are barely visible behind nameless junk, behind sagging pressboard shelves stacked with old skin magazines and yellow-spined years of *National Geographics*.

"You need a gun," said the Finn. He looks like a recombo DNA project aimed at tailoring people for high-speed burrowing. "You're in luck. I got the new Smith and Wesson. The four-oh-eight Tactical. Got this xenon projector slung under the barrel, see, batteries in the grip, throw you a twelve-inch high-noon circle in the pitch dark at fifty yards. The light source is so narrow it's almost impossible to spot. It's just like voodoo in a nightlight."

I let my arm clunk down on the table and started the fingers drumming, the servos in the hand began whining like overworked mosquitoes. I knew that the Finn really hated the sound.

"You looking to pawn that?" He prodded the duralumin wrist joint with the chewed shaft of a felt-tip pen. "Maybe get yourself something a little quieter?"

I kept it up. "I don't need any guns, Finn."

"Okay," he said, "okay," and I quit drumming. "I only got this one item, and I don't even know what it is." He looked unhappy. "I got it off these bridge-and-tunnel kids from Jersey last week."

So when'd you ever buy anything you didn't know what it was, Finn?

"Wise ass." And he passed me a transparent mailer with something in it that looked like an audio cassette through the bubble padding. "They had a passport," he said. "They had credit cards and a watch. And that."

They had the contents of somebody's pockets, you mean.

He nodded. "The passport was Belgian. It was also bogus, looked to me, so I put it in the furnace. Put the cards in with it. The watch was okay, a Porsche, nice watch."

It was obviously some kind of plug-in military program. Out of the mailer it looked like the magazine of a small assault rifle, coated with nonreflective black plastic. The edges and corners showed bright metal; it had been knocking around for a while.

"I'll give you a bargain on it, Jack. For old times' sake."

I had to smile at that. Getting a bargain from the Finn was like God repealing the law of gravity when you have to carry a heavy suitcase down ten blocks of airport corridor.

"Looks Russian to me," I said. "Probably the emergency sewage controls for some Leningrad suburb. Just what I need."

"You know," said the Finn, "I got a pair of shoes older than you are. Sometimes I think you got about as much class as those yahoos from Jersey. What do you want me to tell you, it's the keys to the Kremlin? You figure out what the goddamn thing is. Me, I just sell the stuff."

I bought it.

Bodiless, we swerve into Chrome's castle of ice. And we're fast, fast. It feels like we're surfing the crest of the invading program, hanging ten above the seething glitch systems as they mutate. We're sentient patches of oil swept along down corridors of shadow.

Somewhere we have bodies, very far away in a crowded loft roofed with steel and glass. Somewhere we have microseconds, maybe, time left to pull out.

We've crashed her gates disguised as an audit and three subpoenas, but her defenses are specifically geared to cope with that kind of official intrusion. Her most sophisticated ice is structured to fend off warrants, writs, subpoenas. When we breached the first gate, the bulk of her data

vanished behind core-command ice these walls we see as leagues of corridor mazes of shadow Five separate landlines spurted May Day signals to law firms but the virus had already taken over the parameter ice The glitch systems gobble the distress calls as our mimetic subprograms scan anything that hasn t been blanked by core command

The Russian program lifts a Tokyo number from the unscreened data choosing it for frequency of calls average length of calls, the speed with which Chrome returned those calls

Okay says Bobby we re an incoming scrambler call from a pal of hers in Japan That should help

Ride 'em cowboy

Bobby read his future in women his girls were omens changes in the weather and he d sit all night in the Gentleman Loser waiting for the season to lay a new face down in front of him like a card

I was working late in the loft one night shaving down a chip my arm off and the little waldo jacked straight into the stump

Bobby came in with a girl I hadn t seen before and usually I feel a little funny if a stranger sees me working that way with those leads clipped to the hard carbon studs that stick out of my stump She came right over and looked at the magnified image on the screen then saw the waldo moving under its vacuum-sealed dustcover She didn t say anything just watched Right away I had a good feeling about her, it s like that sometimes

Automatic Jack, Rikki My associate

He laughed put his arm around her waist something in his tone letting me know that I d be spending the night in a dingy room in a hotel

"Hi ' she said Tall nineteen or maybe twenty and she definitely had the goods With just those few freckles across the bridge of her nose, and eyes somewhere between dark amber and French coffee Tight black jeans rolled to mid-calf and a narrow plastic belt that matched the rose-colored sandals

But now when I see her sometimes when I m trying to sleep, I see her somewhere out on the edge of all this sprawl of cities and smoke and it s like she's a hologram stuck behind my eyes in a bright dress she must ve worn once when I knew her something that doesn t quite reach her knees Bare legs long and straight Brown hair streaked with blond, hoods her face, blown in a wind from somewhere and I see her wave good-bye

Bobby was making a show of rooting through a stack of audio cassettes 'I m on my way cowboy ' I said unclipping the waldo She watched attentively as I put my arm back on

Can you fix things? she asked

Anything anything you want Automatic Jack ll fix it ' I snapped my duralumin fingers for her

She took a little simstim deck from her

It's crystal-clear.
It's a bit more expensive, but for a crisp Gin & Tonic,
the world comes to Gordon's.®

belt and showed me the broken hinge on the cassette cover

"Tomorrow" I said, "no problem."

And my oh my, I said to myself sleep pulling me down the six flights to the street *what'll Bobby's luck be like with a fortune cookie like that? If his system worked we'd be striking it rich any night now.* In the street I grinned and yawned and waved for a cab.

Chrome's castle is dissolving, sheets of ice shadow flickering and fading, eaten by the glitch systems that spin out from the Russian program, tumbling away from our central logic thrust and infecting the fabric of the ice itself. The glitch systems are cybernetic virus analogs, self-replicating and voracious. They mutate constantly in unison, subverting and absorbing Chrome's defenses.

Have we already paralyzed her, or is a bell ringing somewhere, a red light blinking? Does she know?

Rikki Wildside, Bobby called her, and for those first few weeks it must have seemed to her that she had it all: the whole teeming show spread out for her, sharp and bright under the neon. She was new to the scene, and she had all the miles of malls and plazas to prowl, all the shops and clubs, and Bobby to explain the wild side, the tricky wiring on the dark underside of things, all the players and their names and their games. He made her feel at home.

What happened to your arm?" she asked me one night in the Gentleman Loser, the three of us drinking at a small table in a corner.

"Hang-gliding," I said. "accident."

"Hang-gliding over a wheatfield," said Bobby, "place called Kiev. Our Jack's just hanging there in the dark, under a Night-wing parafoil, with fifty kilos of radar jammer between his legs, and some Russian asshole accidentally burns his arm off with a laser."

I don't remember how I changed the subject, but I did.

I was still telling myself that it wasn't Rikki who was getting to me, but what Bobby was doing with her. I'd known him for a long time, since the end of the war, and I knew he used women as counters in a game. Bobby Quine versus fortune, versus time and the night of cities. And Rikki had turned up just when he needed something to get him going, something to aim for. So he'd set her up as a symbol for everything he wanted and couldn't have, everything he'd had and couldn't keep.

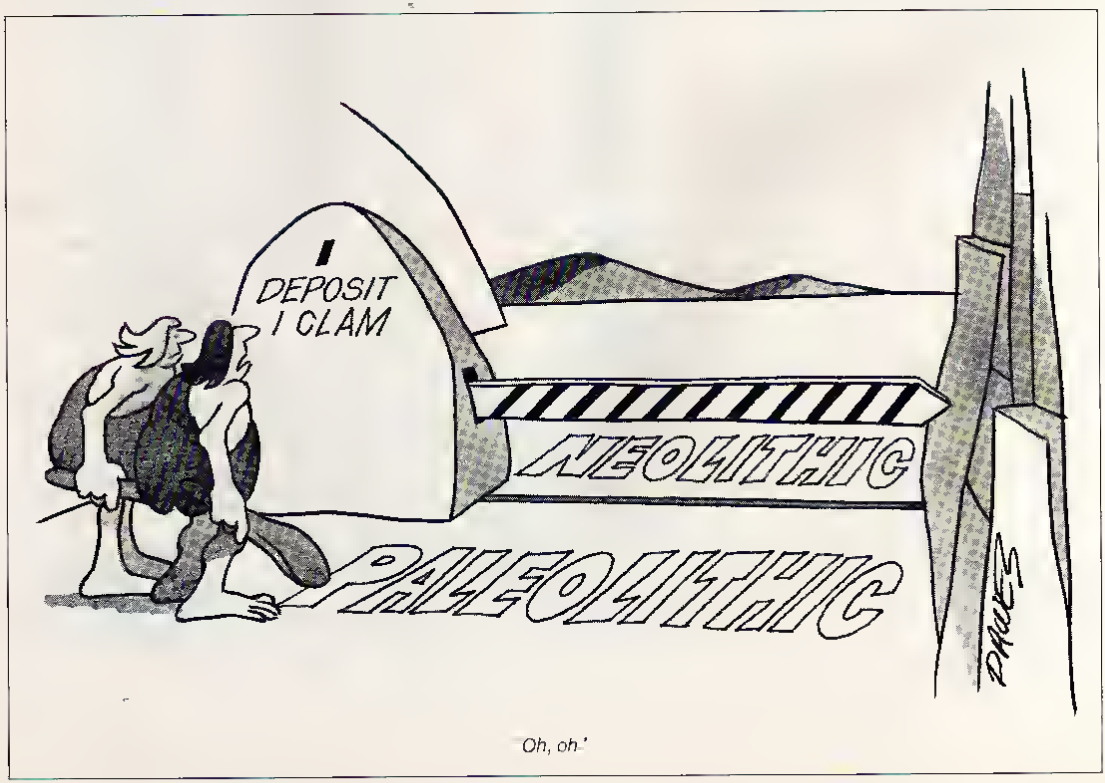
I didn't like having to listen to him tell me how much he loved her, and knowing he believed it only made it worse. He was a past master at the hard fall and the rapid recovery, and I'd seen it happen a dozen times before. He might as well have had NEXT printed across his sunglasses in green dayglo capitals, ready to flash out at the first interesting face that flowed past the tables in the Gentleman Loser.

I knew what he did to them. He turned them into emblems, sigils on the map of his hustler's life, navigation beacons he could follow through a sea of bars and neon. What else did he have to steer by? He didn't love money in and of itself, not enough to follow its lights. He wouldn't work for power over other people, he hated the responsibility it brings. He had some basic pride in his skill, but that was never enough to keep him pushing.

So he made do with women.

When Rikki showed up, he needed one in the worst way. He was fading fast, and smart money was already whispering that the edge was off his game. He needed that one big score, and soon, because he didn't know any other kind of life, and all his clocks were set for hustler's time, calibrated in risk and adrenaline and that supernal dawn calm that comes when every move's proved right and a sweet lump of someone else's credit clicks into your own account.

It was time for him to make his bundle and get out, so Rikki got set up higher and farther away than any of the others ever had, even though—and I felt like screaming it at him—she was right there, alive, totally real, human, hungry, resilient, bored, beautiful, excited, all the things she was.



Oh, oh.

Then he went out one afternoon, about a week before I made the trip to New York to see the Finn. Went out and left us there in the loft, waiting for a thunderstorm. Half the skylight was shadowed by a dome they'd never finished, and the other half showed sky black and blue with clouds. I was standing by the bench, looking up at that sky, stupid with the hot afternoon, the humidity, and she touched me, touched my shoulder, the half-inch border of taut pink scar that the arm doesn't cover. Anybody else ever touched me there, they went on to the shoulder, the neck.

But she didn't do that. Her nails were lacquered black, not pointed, but tapered oblongs, the lacquer only a shade darker than the carbon-fiber laminate that sheathes my arm. And her hand went down the arm, black nails tracing a weld in the laminate, down to the black anodized elbow joint, out to the wrist, her hand soft-knuckled as a child's, fingers spreading to lock over mine, her palm against the perforated duralumin.

Her other palm came up to brush across the feedback pads, and it rained all afternoon, raindrops drumming on the steel and soot-stained glass above Bobby's bed.

Ice walls flick away like supersonic butterflies made of shade. Beyond them, the matrix's illusion of infinite space. It's like watching a tape of a prefab building going up, only the tape's reversed and run at high speed, and these walls are torn wings.

Trying to remind myself that this place and the gulfs beyond are only representations, that we aren't in Chrome's computer but interfaced with it, while the matrix simulator in Bobby's loft generates this illusion. The core data begin to emerge, exposed, vulnerable. This is the far side of ice, the view of the matrix I've never seen before, the view that fifteen million legitimate console operators see daily and take for granted.

The core data tower around us like vertical freight trains, color-coded for access. Bright primaries, impossibly bright in that transparent void, linked by countless horizontals in nursery blues and pinks.

But ice still shadows something at the center of it all, the heart of all Chrome's expensive darkness, the very heart.

It was late afternoon when I got back from my shopping expedition to New York. Not much sun through the skylight, but an ice pattern glowed on Bobby's monitor screen, a 2-D graphic representation of someone's computer defenses, lines of neon woven like an Art Deco prayer rug. I turned the console off, and the screen went completely dark.

Rikki's things were spread across my workbench, nylon bags spilling clothes and makeup, a pair of bright red cowboy boots, audio cassettes, glossy Japanese magazines about simstim stars. I stacked it all under the bench and then took my arm off, forgetting that the program I'd bought

CONTINUED ON PAGE 102

Pro Comfort Sports Cushions.

All that twisting, slamming and pounding is tough on your feet and legs. That's why you need Pro Comfort® Sports Cushions™ Thin, lightweight insoles that fit comfortably into your shoes.

They're made from a revolutionary material that absorbs three times the court and road shock of ordinary latex.

And they're designed to help prevent injuries like shin splints and heel or metatarsal pain caused by excessive foot shock.

They also help prevent blisters and calluses. While keeping your feet cooler and drier.

And they're guaranteed for the life of your shoes.

Prevent foot abuse with Sports Cushions.

You need all the protection you can get.

A full line of sports medicine products.

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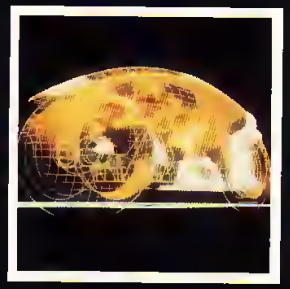
A science-fiction film leaps inside a bizarre computer world

ENTER: TRON

BY SAL MANNA

The fate of an electronic world hangs in the balance. A vast, omnipotent computer with a voracious appetite for information and power tries to wrest control of all its silicon strength from its human programmers. It is high noon at the O.K. Computer as a video gunslinger (played by Jeff Bridges) faces his attackers inside the video-game program (above and at right). *Tron* is a spectacular film filled with computerized images and special effects the likes of which have never been seen on theater screens before. Combining sleek modern figures, solid modeling, hand drawings,

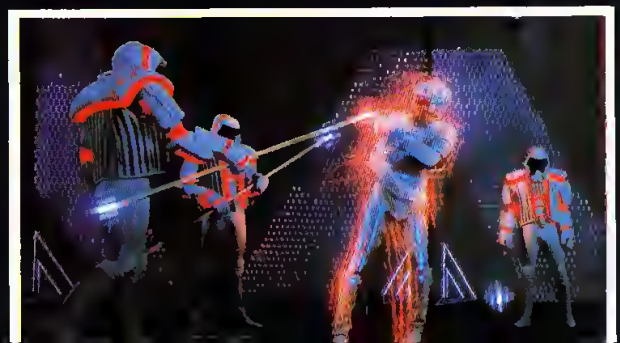


"Onscreen we see an imaginative, often frightening universe"

and neon backlighting techniques, *Tron* finally brings film to the technological front lines. Colors are not static in this universe. The programmers who inhabit the computer are tinted from yellow to red, our heroes are bluish. Other video warriors are green, and the antagonist Sark and his villainous crew are red. Onscreen we see an imaginative, often frightening hyperspace inside the computer where the Master Control Program (the MCP) holds sway. Tron (played by Bruce Boxleitner, below) is the most rebellious and defiant program warrior in this microchip invention. Condemned to die by combat on a video-war-game grid, he manages to escape in a light-cycle (upper left), which "rezzes up," that is, electronically resolutions itself into higher focus, as the cycle takes shape around him. Determined to fight the evil henchmen of the MCP, he speeds off. Like Dorothy in Oz, the programmer-

Sark's carrier is blasted back into its wire-frame skeleton.

gunslinger Flynn (the Jeff Bridges character) arrives in this wondrous electronic microcosm, unprepared for his approaching ordeal in the life-and-death reality of the video game. Blasted into electronic particles when he tries to break into the MCP, now, inside the grid, he is surrounded by guards who escort him to a holding tank (right), where he gets zapped with the jolt of his life. When he meets Tron, the two vow vengeance against Sark. The ensuing confrontation against Sark in his carrier takes place on the Sea of Simulation. In the struggle, the flying battleship (above) is "derezzed," electronically unraveled or "deresolutioned," as the good guys release a force against the carrier's shield. What was once a seemingly solid object breaks down into its wire-frame skeleton and disintegrates. In the real world Sark (played by David Warner p. 85) is the alter ego of Dillinger, a corrupt executive of ENCOM, a



"They battle for the fate of a futuristic world of computers."

huge communications conglomerate. But in the computer he is the MCP's strongarm ruler. He explains to his imprisoned warriors (right) that everything they do, say, or know is imprinted on a frisbeelike disc (below) that they must wear on their back. (Left to right: One of a legion of "tank warriors" who inhabit this hyperspace; Jeff Bridges, as seen through the roboticized eyes of a video camera. RAM, a comic anthropomorphic version of an "actuanal program" entered in the computer by an insurance company.) If they do not pledge allegiance to the MCP, and if they persist in their overriding belief in the "Users," the human programmers they worship as gods, they will suffer. The identity disc is also a weapon when it heats up and is thrown, capable of cutting through its victim. Yes, it's plain old good versus evil, but *Tron* adds a new dimension to the self-propagating mythology of the Computer Age.

Photograph by Robert Dowling

A Nobel Prize-winning physicist turns his attention from superconductors to superconsciousness

INTERVIEW

BRIAN JOSEPHSON

Ten years ego Brian Josephson had one of the most promising careers in modern science. He was only thirty-three years old when he won the Nobel Prize in physics, in 1973. His award-winning work on superconductivity had been carried out when he wes still e greduate student more than a decede eerlier. He was the ultimate prodigy in the scientific community. His was a career that had virtually no limits.

Today Josephson has left meinstreem physics far behind. Less than a year after receiving his Nobel, he began to practice Transcendental Meditation. In 1979 he started the more advanced TM-Siddhi program, which is claimed to develop the student's paranormal powers. He now meditetes several hours each day.

He describes his current reseerch interests as "higher states of consciousness end the paranormal intelligence, end lenguege." His primery goal: to devise a new theory of the weys children learn language, weaving together the work of Jeen Pieget end other Western theorists with the teechings of the Maharishi Mahesh Yogi.

Josephson is a smell, wiry Welshman. Born in Cardiff, he earned his doctorate et Cambridge University in 1964, two years after publishing his breekthrough peper. His manner is shy end retiring, a striking contrest to both his awesome scientific accomplishments and his unconventionel taste for the paranormel.

Now forty-two, Josephson maintains that he is 'not doing enything different from what scientists have done in the past.' He is just using "an extre instrument, the meditetive experience," to gein new ideas about the structure of reelity, which he will then attempt to test in more orthodox ways.

If Josephson is open to subjects that his more staid colleagues find odd, it may be because his early reseerch confronted him with the unexpected, even the bizerre. His Nobel-winning discovery is typical of the kind of peradoxicel findings that are the stock in trade of quantum physics. He was exemining a phenomenon called tunneling. Under certain circumstances subatomic particles can pass through seemingly impenetreble berriers—a feat compara-

ble to walking through a brick wall without leaving a hole or being harmed in any way. Josephson found that tunneling effects between superconductors are far more important than was formerly believed.

What Josephson did learn revolutionized the field of superconductivity by permitting scientists to test directly many crucial predictions of the standard theory of superconduction. It has also brought about a technological revolution. Devices based on the Josephson effect can measure the brain's weak magnetic field, detect electrical potentials as small as one quadrillionth of a volt, and detect far-infrared radiation from distant galaxies. Thanks to Josephson's work, scientists have been able to measure many physical constants with greater accuracy than ever before.

The Josephson effect has led to the creation of high-speed switches—known as Josephson junction switches—that work many times faster than standard equipment and take up far less space. Bell Laboratories is studying Josephson junction switches, and IBM reportedly has spent $100 million to develop a computer based on them.

There is a spare elegance to Josephson's early scientific work. Many of his colleagues consider the 1962 paper that announced his basic discoveries as a classic of its kind. When Josephson was awarded the Nobel Prize, one admirer wrote, "Nearly a decade of making a living from the Josephson effects has convinced me that very few of the major developments of the field were not foretold either explicitly or implicitly in the slightly more than two pages of this paper."

Psychologist and science writer John Gliedman interviewed Josephson last winter in the physicist's cluttered office at Cambridge University's Cavendish Laboratory. Their conversation ranged from the lapidary world of physical theory to the intangible realm of psychic phenomena. The story of Josephson's work and personal metamorphosis continued into the night as the two picked their way across footpaths and fields made icy by England's worst blizzard since 1948.

Omni: Professor Josephson, what exactly is superconductivity?

Josephson: As you cool a metal or other material, its electrical resistance falls toward a lower limit. However, in many pure metals and metallic compounds, all electrical resistance abruptly vanishes at a crucial transition temperature. This is never higher than minus 422 degrees Fahrenheit and often is much lower. Once a conductor enters the superconducting state, it will sustain a current indefinitely.

Omni: How does your own work in superconductivity fit into this picture?

Josephson: As a research student at Cambridge in the early 1960s, I was greatly impressed by the theoretical ideas of two Russians, V. L. Ginsburg and Lev Landau, as well as the work of Bell Labs physicist Philip Anderson, who received the Nobel Prize in physics four years after I got it.

I tried to calculate what would happen if you connected two superconductors with a very thin layer of oxide, which acts as an insulator but through which electrons can tunnel from one superconductor to another. To my great surprise, the equation said that current would flow between them even when there was no voltage difference between the two metals.

Omni: At room temperature, an electrical current flows only where there is a voltage difference, just as water flows through a garden hose connecting two swimming pools only if one pool is higher than the other. Is that correct?

Josephson: Yes. The big surprise was that there could be a current flow even when the two swimming pools were level with each other—when there was no voltage difference between the superconductors. This was my basic discovery.

Omni: Were you able to confirm your equation's unexpected prediction quickly?

"As a scientist, I'm interested only in seeking fundamental new insights. Unfortunately, conventional physics doesn't offer much opportunity to achieve those breakthroughs."

Josephson: No. I tried to look for these supercurrents, as we now call them, and I failed. Later other experiments were successful in demonstrating the supercurrent. The equation also predicted that it would be very sensitive to magnetic fields, and the experiments confirmed that also.

This has turned out to have all sorts of practical applications. Many kinds of microwave devices can be designed around Josephson junctions. They allow one to work with very weak signals in the infrared frequencies, which are not easy to handle with other kinds of equipment.

There have also been some important medical applications. One can use these devices to measure the heart's magnetic field, for example.

Omni: Many scientists believe that it will soon be possible to build high-speed computers based on the Josephson junction. Can you explain how they will work?

Josephson: They will use a magnetic field to control the current flow across the junctions. The current can be switched on or off extremely quickly, on the order of one hundred billionths of a second. A computer using Josephson junction switches might be twenty times faster than one using the best competing technology.

Another advantage is that very little heat is generated by a Josephson junction switch. This allows you to pack computer components more closely without producing enough heat to impair the computer's reliability. A computer based on Josephson junction switches could be as powerful as an IBM model 370/168—a very powerful machine—yet fit into a cube six inches on a side.

Omni: What has happened in superconductivity research since your breakthrough in the early Sixties?

Josephson: I don't think there have been any major developments since then.

Omni: What about physics in general? What recent advances do you think are of particular importance?

Josephson: I consider Bell's theorem [postulated by John Bell, a theoretical physicist, in 1965] to be the most important recent advance in physics. It's about a situation described many years ago in a paper by Einstein, Podolsky and Rosen, where one physical system splits in two. The theorem shows that there apparently must be some kind of connection between these physically separated systems. What exactly the connection is, nobody knows at the moment.

Omni: Some popular writers have claimed that the link between Bell's separated systems may be typical of most processes in the universe. In other words, when a polar bear jumps into arctic water in some weird way it may cause a train wreck in the south of France.

Josephson: If the two systems have been together in the past, there's going to be some correlation between their subsequent behavior when they are physically separated. The main questions are how much correlation and whether random collisions with other particles make them negligible in most cases.

I certainly wouldn't expect the polar bear's leap to cause a wreck in southern France, although one couldn't rule it out.

Omni: Has anyone tried to sort out the general implications for physics of Bell's theorem?

Josephson: I don't know of any published attempts as yet. It's probably a very difficult thing to do because we don't have the right model to compute from. But it's a very important problem, and it's something that should be attempted.

Omni: Why are you so interested in Bell's theorem?

Josephson: Because it may be connected with psychic phenomena. It raises the possibility that one part of the universe may have knowledge of another part—some kind of contact at a distance under certain conditions.

Omni: So that psychics might somehow be able to gain knowledge about what is going on elsewhere in the universe by making use of this effect?

Josephson: Yes. But, as I say, we don't have

a precise model to explore this question
Omni: Could you explain why in the last fifteen years you've stopped doing research in conventional physics and concentrated on the study of language and human intelligence? Why the almost complete break with your scientific past?
Josephson: As a scientist I am interested only in seeking fundamentally new insights into the nature of reality. Unfortunately conventional physics doesn't offer much opportunity to achieve these breakthroughs except in the areas connected with Bell's theorem.
Omni: What led you to your present attempt to join Western science with Eastern mystical teachings?
Josephson: I got interested in mysticism partly through some people in college and partly because I learned Transcendental Meditation and realized that there were important phenomena that ordinary physics really didn't take into account.

But even before these encounters I had become interested in the mind and intelligence. I don't think that conventional psychology gives a very good description of man. The descriptions of mystic experiences point to something much greater than conventional pictures of man suggest. And then too, there is the paranormal. My new interest in these questions may have been taking me out of physics. If you are aware that there are more significant things, you become less interested in the ordinary things.
Omni: Have you always been interested in these things?
Josephson: No. When I was doing my work in superconductivity I regarded this research as highly important. Afterwards, when I started seeing things from a wider viewpoint, I realized that the discoveries in physics were not as important as I had thought, but I did not immediately have anything to replace my former interest in conventional physics. Only then did the questions of mind and the development of consciousness come in to fill this gap.
Omni: Do you think you've changed as a result of meditation?
Josephson: I think that meditation has improved me in various ways. I used to make all decisions on the basis of rational arguments. Now I am much freer about things. I had some good experiences with meditation from the very start. It was as if, instead of being immersed in a kind of mental fog—immersed in my thoughts—I suddenly became aware of the outside world. I also think that I've become more spontaneous in relationships with other people—again through not rationally deciding what I should say. Getting beyond the intellect is quite important in that sort of thing.
Omni: It sounds as if before you took up meditation you were the kind of scientist who reaches his conclusions through a kind of Sherlock Holmesian step-by-step logical deduction.
Josephson: This is to some extent true. My discovery of the supercurrents was very

CONTINUED ON PAGE 114

VODKA & ROSE'S

Vodka smooths out
in the limelight.
4 parts Vodka, 1 part Rose's.*

Rose's Lime Juice*
*The Famous Gimlet Maker

Classified UFO documents lay in the dungeons and bins of every spy agency

ANTI MATTER

UFO UPDATE

By day attorney Peter Gersten fights drug and murder raps for a host of Bronx defendants. But at night, from a modest storefront office in the shadows of the Bronx County Courthouse, he works on another sort of case: proving UFOs are technically advanced vehicles threatening our very existence.

Gersten developed his passion for UFOs as a boy when he read every flying-saucer magazine he could get his hands on. Years later, as a lawyer, he subscribed to a UFO clipping service. When articles on UFO sightings from around the world poured in, he began to suspect that his childhood beliefs had some validity, so he wrote to numerous UFO organizations volunteering his help.

Then, in September 1977, he received a surprise visit from W. Todd Zechel, research director for an Arizona-based group called Ground Saucer Watch. Zechel wanted some classified Central Intelligence Agency documents describing a 1952 UFO film made by an ex-marine; he thought a lawsuit could win him the right to see them. Gersten quickly agreed to represent Ground Saucer Watch, but he widened the lawsuit to include *any* UFO document in the CIA's possession. Using the Freedom of Information Act, he pried some 900 documents from dusty CIA bins in less than a year.

Reports on the 1952 film, Gersten explains, revealed nothing new. But information in some of the other documents seemed frightening. In October, November and December 1975, for instance, military personnel across the northern United States had reported unexplained objects hovering over nuclear missile and bomber bases. One government analysis even suggested Americans deal with UFOs by developing a series of adequate defense measures in a minimum amount of time."

Gersten soon learned that classified UFO documents lay in the dungeons of most spy agencies, including the Defense Intelligence Agency, the National Security Agency and the Federal Bureau of Investigation. Again wielding the Freedom of Information Act, he procured 2,000 additional reports. In one, he discovered that UFOs over Kuwait had allegedly damaged the pumping system of the Kuwait Oil Company. Another document stated that Iranian pilots had lost control of their jets during an encounter with inordinately maneuverable UFOs. And still another told of strange machines near military bases in Algeria.

By 1980, Gersten had formed a group called Citizens Against UFO Secrecy. Its purpose: to obtain 233 documents still locked in government coffers. These efforts have recently been stymied, however, since the U.S. Court of Appeals decided that releasing more documents would expose American intelligence-gathering techniques.

Nevertheless, Gersten contends that he still has enough information to prove that UFOs pose a threat. The government doesn't agree. But Gersten says, "We'll just let the people decide." He plans to blitz the media with his newest evidence this fall. — *PAMELA WEINTRAUB*

ELECTRIC TOES

Are you depressed? Really desperate for help? Why not stringing your toes to a light socket? If Minneapolis psychologist John H. Pflaum (above) is correct, it could help make life a lot brighter.

Actually, Pflaum uses a little transformer, the kind that operates a doorbell, to step down the power from a wall socket before he feeds it to gold rings on his patients' middle toes. A lamp dimmer regulates the current so the patient can feel no more than a slight tingling in the feet. Two 50-minute sessions a week for ten weeks are enough, in some cases, to effect a significant improvement in mood, Pflaum cautiously reports.

Why the feet? For one thing, strapping electrodes to the hands would play gestures that can reveal a patient's problems, to the psychotherapist, Pflaum says. For another, "there's a whole area of folk knowledge that suggests the feet are related to relief of depression." Mild electrical stimulation of the feet, he adds, "may ease the troubled mind," as jogging, footbaths, and massage do.

Pflaum's reasoning does not impress the Minnesota Department of Regulation and Licensing, which is now trying to revoke his license to practice. The department's Psychology Board charges that Pflaum fraudulently rented his device to three psychologists.

According to the board's attorney, Michael Berndt, Pflaum printed an ad implying that the device had eased depression for many patients, yet the psychologist now claims to have used it on only four volunteers, whose records he will not produce. He also failed to mention that the device could deliver a dangerous, even lethal, shock.

Pflaum, however, claims he was only trying to have his machine tested by objective colleagues. "There's no reason for the board to be doing this," he says. "If they had just told me that they were worried about what I was doing, I'm sure we could have worked it out."

Owen Davies

BUBBLING BLOOD

Each September and May, thousands of Italians honoring the Christian saint Januarius flock to the cathedral of Naples. Most swarm outside the building, but 100 fortunate souls are allowed inside, where they witness a group of elderly women mutter and shout at two small vials filled with a brown, gritty substance. That substance is alleged to be the blood of the saint, who was beheaded by the Roman Emperor Diocletian in A.D. 305. And the women, thought to be his relatives, are cheering him on as his blood changes from gritty brown to a violent, bubbling scarlet.

Theologians and historians have debated the authenticity of this so-called blood for centuries, but it wasn't until 1902 that a group of *scientists* decided to investigate. Working from their lab at the University of Naples, the researchers passed pure white light through the material and found that emerging rays were virtually identical to those produced when light was passed through normal human blood. The scientists knew that *really* normal blood would have putrefied centuries ago, and they theorized that the sample had been contaminated by a foreign substance.

Then in 1950, University of Naples researcher Gastone Lambertini suggested taking a sample of the blood for chemical analysis. But church authorities prevented it, contending that if the blood were removed from the phials, it would disintegrate. This, according to Lambertini, remains a major stumbling block in solving the case.

Yet just recently writer David Guerdon says he's documented some more facts about the blood merely by looking at it. It bubbles no matter what the temperature within the cathedral, he reports, and it shows drastic changes in volume. The blood seems to pour from a central ball or clot that remains crusty throughout the miracle, Guerdon adds, and that same clot later absorbs the blood as it dries.

The church itself is noncommittal about the phenomenon. It may not be a miracle, a spokesman said, but whatever it is, it somehow functions outside the realm of ordinary laws.

Kathrine Jason

In the society of men the truth resides now less in what things are than in what they are not.

R. D. Laing

GHOST HUNT

Have you ever seen a ghost or apparition? If so the American Society for Psychical Research (ASPR) located in New York City would like to hear a report of the incident.

Most people who see ghosts don't tell anyone for fear of ridicule according to Dr Karl Osis head of ASPR's apparition project. Yet the haunted are beginning to come forward. In a recent Gallup poll conducted in Great Britain 14 per[illegible]nt of the people questioned asserted [illegible]hat they had seen apparitions. And in a na[illegible]tional opinion poll of Americans 27 percen[illegible] the respondents said they had co[illegible]mmunicated with the dead.

According to Osis the society is most interested in hearing about ghosts or apparitions that have been seen by at least two persons or by one person and a pet. Privacy and [illegible]onfidentiality Osis adds are promised to all th[illegible]se who participate in the ASPR project.

Allan Maurer

ROACHSTER

The energy cris[illegible] [illegible]pawned elec[illegible] [illegible]rogen cars even woo[illegible] [illegible]rning cars. But accor[illegible] to Thomas Easton [illegible]wenty-first-century man will find none of [illegible]hese as econo[illegible] as the roachster [illegible] a living hybrid c[illegible]oned from the [illegible] ning qui[illegible]k cockroach a[illegible]d the hard shelled lobster.

First Easto[illegible] explains sci[illegible]entists will fuse cells from the cockroach and lobster. [illegible]hen after a bit of genetic engineering they'll turn these [illegible]y hybrids [illegible] 20 foot long roachsters each with a large hollow wart that could function as [illegible] passenger compartment. Windshield dashboard radio and upholstered seating would be built into the wart headlights and bumpers would be bolted to the creature's shell. And the roachster [illegible] legs would rotate a set of wheels propelling driver and passengers along at highway speed.

D[illegible]ver[illegible] [illegible]ou[illegible] [illegible]teer [illegible] accelerate with electronic levers and buttons wired [illegible] the roachster's central ne[illegible]ous system [illegible]aston suggests. He teaches tec[illegible]nical writing at the University of Maine [illegible]n Bangor and has a Ph[illegible] [illegible]n theoretical biology from the University of Ch[illegible]cago. Instead of turning off the roachster after pulling into a parking space the driver would push a button to slow down the creature's [illegible]tabolism and pu[illegible] [illegible] sleep. And the roachster antennae would serve as natural accident avoidance sensors.

[illegible] shell. A[illegible] [illegible] top [illegible] [illegible]er the [illegible]

Mea[illegible] [illegible]

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UFO COUNSELING

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Joel [illegible]avis

PYRAMID WINE

Next time you're in Salt Lake City visit the pyramid on Genessee Avenue (pictured below) As you approach the three-story structure you'll hear the mellifluous chants of the Summum Fanum — a local cult steeped in ancient Egyptian lore When you step inside a gentle Summum member will offer you the product of his daily labor — a sip of

nectar wine

The Summum pyramid is in fact, a wine distillery And Summum members who live within, say their concoction contains "liquid knowledge available oowhere else in the world To endow the wine with wisdom cult members chant over each brewing batch night and day for 11 weeks At the end of that period, says cult leader Claude Corky" Norwell the wine is so potent that a single sip will erase the illusions of the future and the delusions of the past ' propelling the drinker to instant ' inner bliss

The cult has given the wine the strange name of Summum Nectar Publication because Corky explains "it rs a liquid education" that should be sold in bookstores That s impossible however since the brew contains 11 percent alcohol Made with grape juice and wild honey according to instructions from the Egyptian Book of the Dead the potion tastes a bit like rotting wood You can get a bottle of red or white for $7 30 plus tax at most Selt Lake City liquor stores — Peter Rondinone

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Once an idea has been generated within the mind it may no longer be wholly under the control of the consciousness which gave it birth but it may operate autonomously on other minds as well as the physical world

H H Price

HIEROGLYPHIC HOAX?

Imagine a not-so-fine spring day in 1477 B C near the point at which the Nile meets the Mediterranean To the north on the Greek Island of Thera an erupting volcano spews clouds of ash and sends a towering tidal wave toward Africa To the south the Israelites are escaping from Egypt with Pharaoh Hatshepsut s troops at their heels The Hebrews have just taken temporary refuge on a plateau when a flash flood, ceused by the wave washes over the desert below In minutes it has wiped out the Egyptians and given the Israelites their freedom

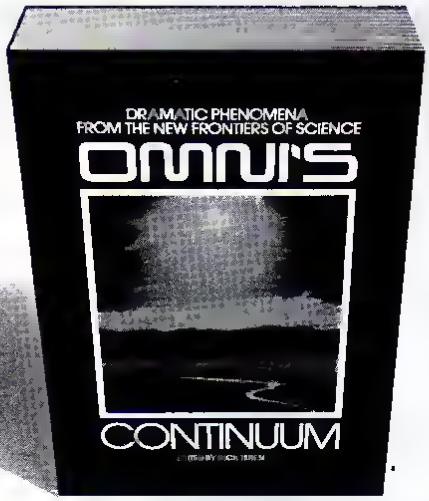
Thus argues Hans Goedicke chairman of Near Eastern studies at Johns Hopkins University is how the biblical story of Exodus *really* happened Goedicke came up with this theory after retranslating hieroglyphics from a temple built during Hatshepsut s reign His new translation a ripping tale of wandering Asiatics and surges of primeval water seems to conform to the Bible s Exodus story And if one accepts that the Exodus occurred 200 years earlier than thought the Thera eruption might explain the parting of the waters and biblical references to a 'pillar of fire and of cloud

Front-page coverage of Goedicke s theory in the *New York Times* in May 1981 provoked author George Michanowsky, an expert on ancient astronomical texts to cry foul "Goedicke surreptitiously altered the hieroglyphic text and grossly mistranslated the key sequence he asserts "The definitive, authoritative text of that inscription was made by Sir Alan Gardiner years ago

Saying he wes tired of the whole debate Goedicke refused to defend himself to *Omni* Elsewhere however Goedicke has dismissed Michanowsky s acousations He explains that he used legitimate techniques to 'restore some missing symbols and come up with the revised translation

But other scholars agree that Goedicke s translation of the inscription is as one put it "all wet Upon examining the hieroglyphics University of North Carolina experts could find no specific reference to either water or Asiatics And Harvard Eastern languages professor Frank Cross Moore says that Goedicke s scenario sounds as if it had been written by Cecil B DeMille

Carol A Johmann



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—Samuel Langhorn Clemens (Mark Twain)

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BUTTERFLIES

CONTINUED FROM PAGE 51

ing down a road and the player tries to keep the "car" in one lane with the help of psychokinesis.

If you're a horror-movie connoisseur you may know psychokinesis or PK as a sinister talent for setting gymnasiums ablaze with thought power or coercing scaffolding to crush one's enemies. But in the lab PK is quite a bit tamer. What it amounts to is no more and no less than moving part of the physical world with your mind.

Horizon players simply try to influence the dots. Morris says so that they move away from the car.

Morris has not yet shown that his training rites enhance psychic power. But *if* he can get the procedure to work, he says, he'll be able to create the optimum subject. I would be able to tell other researchers that to repeat my results they could train subjects as I did," he notes. "It's an obvious way to go, and it's never been tried.

MIND OVER MACHINE

Basic training might give us the crucial psi recipe, but in order to whip that recipe into a potent brew parapsychologists say they must rely on high technology. In the early days, psychic researchers asked their subjects to intuit the identity of hidden cards or influence the throw of a tossed die. But they soon found that because these accouterments were handled by humans, the experiments were subject to fraud. To get around that problem, parapsychologist Helmut Schmidt, director of the Mind Science Foundation in San Antonio, Texas, invented what many of his colleagues contend is an incorruptible piece of equipment—the Random Number Generator (RNG).

The traditional RNG is a box containing a small sample of radioactive material, such as strontium 90. Every so often (you can never tell when, exactly) a bit of strontium decays and sets off the RNG's Geiger counter. If the Geiger counter is activated at an "even" time interval, it signals a computer to display the digit *1*. If activated at an "odd" time interval, it signals the computer to display the digit *0*.

The would-be PK master simply tries to influence the system through will alone, forcing the computer to display the chosen number. Although that sounds farfetched, Schmidt claims the PK Random Generator trials have proved as successful as the Ganzfeld experiments. Half of all Geiger counters and computers in labs around the country, he says, have been stopped at the sought-after number at least 20 times more frequently than would have been expected by chance.

The Random Number Generator can supposedly be used to measure the presence of PK, but parapsychologists admit they have no idea which part of the system is being swayed—the computer, elements of the Geiger counter or the decaying strontium itself. To get more specific information, I contact the epicenter of the Psychic Machine Age—Princeton University's prestigious School of Engineering and Applied Sciences, where experiments using Space Age technology are being designed and where the denizens prefer to keep mum about the paranormal. "We are not interested in proving or disproving psychic phenomena," a spokesman tells me over the phone. "We are interested in the man-machine interface." Be that as it may, the school's dean, Robert Jahn (who has chosen not to speak publicly for the time being), is working on equipment to detect subtle traces of psychokinesis on a variety of mechanical, electrical, optical and chemical systems.

Jahn started this work a few years ago when a student asked him to participate in a remote viewing experiment. Jahn, in Pompano Beach, Florida, tried to visualize his student's whereabouts at a preordained time and drew a sketch of the student riding a horse around a field encircled by a wooden fence and trees. Meanwhile, back at Princeton, the student was horseback riding, but in an outdoor riding ring. Despite some erroneous details, like the wrong kind of fence and vegetation, Jahn wondered whether something paranormal was creeping across the miles.

> *"When a distant sender contemplated a photo of the Firpo-Dempsey match, one dreamer dreamed of a fight at Madison Square Garden. Other dream messages were fragmentary and symbolic."*

Intrigued, he decided to lend his formidable engineering expertise to a psychokinesis experiment. His PK foray eventually led to a dazzling array of machines: sensors to measure minute temperature fluctuations in physical systems when subjects seek to disturb the thermal balance; devices to monitor molecular movements; light-sensitive optical plates to record the mind's scantest influence.

Jahn has recently used such plates to test how human operators might affect the machines they oversee. First he used the optical plates to help him project concentric circles of light onto a dark screen; then he asked volunteers to try to shift the position of these circles simply by concentrating on the light pattern. According to public reports, several volunteers have apparently been successful.

Are these volunteers changing the position of the light pattern through psychokinesis? Jahn says he doesn't know. "One can either assign all the inexplicable to pure chance," he wrote in a recent article, "or acknowledge the existence of a legitimate and coherent albeit elusive phenomenon." Although Jahn's various experiments have yielded "statistically significant results," he feels his work "is no more than suggestive."

THE SOURCE OF PSI

If consciousness can change the properties of energy and matter, it makes sense that an engineer like Jahn would be able to measure the changes. But it would be the physicists, those attuned to the quirks of subatomic particles, who could explain those changes better than anyone else.

Physical scientists have been fascinated by the strange universe of psi ever since parapsychology got its start a century ago. Back then, the discovery of radio waves convinced some physicists that psi occurred when one mind broadcast a message and another mind picked it up. But the hypothesis had barely been formulated before it was pointed out that radio waves decayed over distance while psi did not.

Paraphysicists spent the next 50-odd years fishing for another theory to explain the wonders of telepathy and PK. They postulated the existence of absurd thought-carrying particles dubbed mindons. And they investigated one fundamental force after another. But no matter whether they scrutinized gravity or electromagnetism, they found that force dwindled over the feet and the miles.

Parapsychologists had just about conceded that physics had little to do with psi when a grad student named Evan Harris Walker began meeting nightly with a friend. In bars, in coffee shops, in ramshackle living rooms, they discussed human consciousness and its relationship to the immutable laws of nature. Stimulated by the talks, physicist-in-training Walker came to believe he could explain thoughts, feelings, even psi with a theory based on quantum mechanics.

The principles of quantum mechanics emerged when physicists found that tiny particles such as electrons and protons behaved with less predictability than large objects like tables and chairs. To account for the behavior of these tiny particles, researchers suggested that each one existed merely as a wave of energy. For reasons that are still unexplained, the wave would turn into a real particle only if it were measured. The measuring instrument itself, quantum theory said, would force the particle to take on specific properties. It might spin clockwise or counterclockwise; it might fall a few micrometers to either the right or the left.

As Walker saw it, quantum mechanics was at the root of all thought. People possessed a "will" that affected matter much

as the scientific measuring instrument did, he said. This will was constantly changing the brain's electromagnetic energy so that it stimulated nerve cells. As the nerve cells fired, Walker claimed, they provoked one mood or idea after the next.

PK, he theorized, occurred when an especially powerful human will was directed outward, focused on the chaotic waves of energy in an object inches or feet away. By changing the object's waves to subatomic particles with specific characteristics, PKers could influence the behavior of the object itself.

Walker's colleagues were soon declaring that telepathy, clairvoyance, and precognition also stemmed from the particles' peculiarities. As physicist Russell Targ, of SRI International in Menlo Park, California, explains it, certain experiments lead to the creation of pairs of particles that possess equal but opposite properties. Yet according to quantum mechanics, those properties will remain unspecified until one of the particles is measured. Once a particle *is* intercepted, however, its newly acquired properties will immediately determine those of the partner—even if the partner has been flung meters away.

Thus, if a particle in a Berlin fire had a partner particle in the mind of an L.A. streetcleaner the cleaner might, through some still-unexplained mechanism, glimpse the fire psychically. And if two once-connected particles raced apart at the speed of light, they would, according to Einstein's theory of relativity, be traveling through time as well as space. If one of them landed in your brain in 1982, and the other in your friend's brain in 1985, the connection might somehow help your friend send you signals from the future.

All this is just theoretical, of course. The outer edges of physics are still unraveling. And for every physicist who believes that the particles in some psychic's brain change with the flow of future events, there are hundreds who find the concept laughable. The experiments have *not* been done. When they are, researchers may discover that psi—if it really exists—occurs totally outside the realm of physics that it defies all explanation.

CRITICS VERSUS PSI

I've spent weeks talking to what seems like every white-garbed parapsychologist in the business. And I *haven't* found what I expected.

Articles in the journals I read point to the Uri Geller embarrassment, to the fakery, hucksterism, celebrity-psychic glitz, and premature proclamations that have from time to time contaminated psychic research. I myself tossed parapsychology into the hocus-pocus Cuisinart along with haunted houses, ancient astronauts, and Bermuda Triangle enthusiasts.

But the researchers I've met have been *scientists*. They plot apparently careful experiments in glittery labs and support their conclusions on a statistical scaffold that seems irrefutable. If they haven't misinterpreted the RNG and Ganzfeld experiments, their results suggest one thing. Inhabiting the densely shrubbed outback of human consciousness is a mysterious force called psi.

Yet I *know* it can't be that simple. In need of perspective, I phone Ray Hyman, a psychologist at the University of Oregon and the most informed psi critic around.

Hyman tells me I've been misled. Many of the parapsychology studies, he says, just don't stand up under scrutiny. For instance, although 23 of 42 Ganzfeld studies were deemed successful, criteria for success varied from one experiment to the next. Sometimes subjects scored a "hit" if they guessed the right answer after three tries. Sometimes they were allowed to rate each of four multiple-choice answers on a correctness scale ranging from 1 to 100. If the score given to the right answer was high enough, the subject might be graded as partly correct.

"If you're a horror-movie connoisseur, you may know psychokinesis as a sinister talent for setting gymnasiums ablaze with thought power or coercing scaffolding to crush one's bitterest enemies."

"All this would be okay," Hyman adds, "if only the experimenters had stipulated these standards of success beforehand. But it sometimes seems as if they just analyze and analyze the data until they come up with a way of making it seem statistically significant. As far as I'm concerned, a lot of their results are closer to chance than they contend."

Hyman also sees flaws in the RNG studies. "Each positive trial is perhaps half a percent more successful than would be expected by chance," he says. "The researchers can claim statistical significance only by conducting tens of thousands of trials then adding them all together."

Hyman goes on and on, casting doubts on one seemingly solid study after the next. One minute he's objecting to the common practice of including scores far *below* chance as evidence of psi. The next he's asking about the potential for cheating in remote-viewing studies, when, as is often the case, sender and receiver are friends. "And when the Ganzfeld subject is asked to choose one of four slides," he asks, "wouldn't he be most likely to select one that's hot and bent from the projector?"

Each objection taken alone could never invalidate the discipline of parapsychology as a whole, Hyman says. "Each of these criticisms could be made of many psychology and sociology experiments done today. Taken together, however, these weaknesses could well account for seemingly successful results, even in the absence of psi."

Honorton admits that if such weaknesses did indeed occur in sufficient number, they might account for the psi experiment's recent success. But he rebuts, he and other parapsychologists have been far more meticulous than Hyman would have us believe.

For instance, he notes, subjects in the more recent Ganzfeld experiments have examined a new set of slides, not slides hot from a projector. As for the practice of including scores below chance as evidence of psi, Honorton contends that deviations below chance are just as significant as deviations above. What if, for example, a particularly hostile subject kept choosing the *wrong* answer based on psychic cues? Most researchers who include scores below chance as evidence of psi have stipulated they would do so beforehand, Honorton adds. In fact, he says, most parapsychologists that I know of plan their analytical approach before beginning experiments, despite Hyman's suggestions to the contrary.

Finally, Honorton says that he is appalled by the charge that the random number generator results are due to tiny successes across many hundreds of trials. "That," he concludes, "is hardly a criticism. There are many real but small effects in nature that can be detected only by analyzing large quantities of data."

My head spinning, I ask Hyman whether he really thinks it all amounts to naught. He is silent for a second, then admits his criticisms cannot account for *all* the successes produced in parapsychology labs in recent years. "I'm willing to believe something unusual is going on here," he says. "But is it important? And is it psi?"

The jury is still out; make no mistake about that. Psi-hunting has been compared to "chasing butterflies in the dark." The epigram is Marilyn Schlitz's. The butterflies might stand for the vagaries of the human mind; the dark for our bottomless ignorance of ourselves.

Just for a moment, though, I stop and ask myself how I would feel if I knew psi were real: if my mind could move beyond my body in untathomed ways. Is my next-door neighbor reading my mind right now? Could my frantic thoughts be interfering with the molecular organization of my typewriter or my cat's digestive enzymes? Could I foresee my own death?

Wouldn't it all be a bit... creepy?

While we can't quite deduce its contours, there *is* something going bump in the dark in quite a few highly scientific circles. It may not be psi, but it's making some people pretty nervous. ∞

WHITE PLAGUE

CONTINUED FROM PAGE 60

nobody s told me a thing She gestured at the table And I m supposed to process two hundred and sixteen students today more tomorrow

He gritted his teeth "Damn! That s their second slip-up in two weeks! Somebody in that office should be fired

Nurse Blanquie shook her head gravely in sympathy

He said Well what can I do to help you? Could we get a student to handle some of the paperwork?'

"I ve already asked for one " she said She looked at the table in front of her "Could you set up here beside me? What kind of samples will you take?"

He opened the kit box displaying the ranked slides the swabs the alcohol lancets, everything neat

Oh..' she said "well that shouldn t delay us much Doctor I guess between the two of us we can handle it

When he returned to Ballard that evening *Doctor Vicenti* had two hundred eleven blood samples each with a tiny pinch of skin cells deftly included

There will be specific differences he told himself as he removed his disguise in the bathroom *The genetic information for every biological function—including whether the person is male or female There is a pattern here into which I can lock a virulent destroyer*

The positive intermolding effect of the double helix chains each side able to reproduce its opposite number He knew that his clues would lie in there In the peptide bonds perhaps and in the singular tails that trailed out of the helix

He took the samples down to his lab *The answers have to be in here* he assured himself It was in the DNA patterns Had to be When a bacterial virus infected a bacterium it was the virus's DNA, not its protein, which entered the bacterial cell Here was the messenger he needed to make John O Neill s revenge heard everywhere

The technique tor testing his results had already been worked out It would be elegant in the extreme He would require short-lived virus-mediated bacterial forms bacteria that would induce visible effects in a selected population The effects would have to be identifiable and visible not fatal but important enough to cause comment The test bacilli would have to be self-lethal They would have to vanish of themselves

These requirements which might have daunted a major research center did not even give him pause He had a feeling of invincibility It was only one step in his project When he had the key to this lock and when he had assured himself of its identity then he could start shaping the key into its more virulent form

Then the message could be sent ∞

To be continued next month

CONTINUED FROM PAGE 70

thing—everything—was going wrong I'd say "Well there's still a tin of baked beans in there." From Boston," he recalls.

During those years in the Amazon Schultes took sometimes frequently all the sacred hallucinogenic preparations he studied, except those made from the dangerous solanaceous plants. All told he has probably experimented with more hallucinogens than a tribe of hippies, yet he has never once had a hallucination. He's seen colors, vague forms, but never objects, animals or people. Although he is a careful observer of the world, he seems to have very little visual imagination. "It's a disappointment, of course," he admits. "I wish I could see these things." The Indians recount seeing the gods, their ancestors and so forth.

In 1954 Schultes returned to Harvard to teach and eventually to become director of the Botanical Museum, to which he has added 24,000 new specimens. Today the museum is one of the truly great institutions of its kind, a vast repository of specimens that make up an ever-expanding microcosm of the plant world. (Though he has been its director for 15 years, Schultes still doesn't know the museum's zip code. "If the post office can't find the Botanical Museum in Cambridge without a number," he says, "it shouldn't be in the business.")

In his work Schultes likes to direct attention to the Indians' botanical sophistication. He's found that, unlike botanists, the Indians often distinguish between different plants of the same species that they say have different properties. And Schultes believes they may actually have different chemical compositions. For example, he found that one Indian tribe propagates clones of a single plant that may derive its unique potency from a viral infection.

The Indians he discovered also learn about interactions between different chemicals the same way Western doctors do: by trial and error. Schultes and his students have discovered that an extract from the bark of a jungle vine, *Banisteriopsis*, is often mixed with two other plants that intensify and alter the intoxication, but alone the two plants are not hallucinogenic. Chemists following up on Schultes's work found out why. When one consumes them orally, the plants' chemicals can affect the brain only if the action of a certain enzyme is blocked. They also discovered that chemicals present in *Banisteriopsis* inhibit that enzyme.

Schultes's careful documentation of the Indians' use of jungle plants, which he calls "an almost limitless chemical factory," has even been a boon to anthropologists. It would be difficult for any anthropologist to appreciate an Indian culture's intricacies without knowing something about hallucinogenic plants and their use. For example, Schultes found that taken alone a drink called ayahuasca, made from the bark of two species of *Banisteriopsis*, will produce visions with a dark, bluish-grayish-purplish background interrupted by flashes of light. These flashes and colors figure in the Indian myths and iconography. The Yukunas believe that the plant, a bestower of semen and potency, was born in a flash of light.

In the mid-Fifties Schultes's unread papers on Oaxacan mushrooms were finally discovered by Dr. R. Gordon Wasson, a banker and a brilliant self-taught ethnomycologist who first supplied samples of the mushrooms to Dr. Albert Hofmann, the Swiss chemist who discovered LSD. Dr. Hofmann isolated psilocybin from mushrooms and later, at Schultes's suggestion, went on to analyze the hallucinogenic morning glories.

In the early 1960s there was a surge of interest in hallucinogens. Because of his rediscovered work, Schultes's courses at Harvard began attracting, and then disappointing, hippies. Even today the very word *psychedelic* irritates Schultes. "You cannot change the consciousness or expand the mind or the central nervous system chemically," he insists. "That's why the word *psychedelic* is wrong. It means delineating or expanding the mind. Besides, anyone who knows Greek [Schultes also reads Latin, French, German, Swedish, Spanish and Portuguese and understands two Amazonian languages] knows it's got to be psychodelic."

> *"Schultes jumped around and danced for the first time in his life in the Amazon during the Kai-ya-ree, the natives' three-day ceremonial reenactment of the Creation."*

While eschewing the role of pop medicine man, Schultes remains a committed educator and propagandist. He has made the Botanical Museum more accessible to the public and has written several books for a popular audience. The latest, coauthored with Albert Hofmann, is a handsome hardback entitled *Plants of the Gods* (McGraw-Hill, 1979). In this, as in other of his popular writings, Schultes attempts to make the public aware of the value of ethnobotany, of the importance of preserving the botanical knowledge of "primitive" peoples now before the imperious advance of technological civilization destroys native cultures and the plant life they know so intimately.

Until recently medicine and botany were allied in the West, as they still are among the Indians. Most of the so-called wonder drugs of the 1930s to 1960s, including digitalis, antibiotics, reserpine (the first modern tranquilizer) and diosgenin (the steroid that was the basis of the birth-control pill), were first derived from plants. And Schultes believes that Earth's flora will yield many more drugs in the future.

Probably the greatest value of the hallucinogens has been as tools for studying the functioning of the whole central nervous system. Psychologists and neurologists have always been interested in hallucinations and altered states of consciousness as exceptions that might illuminate the mundane rules behind everyday imagining and shifts of mind, but hallucinations have been difficult to study, freak occurrences associated with physical or mental pathology. The ability to isolate hallucinogenic chemicals from plants has enabled scientists to analyze the chemistry of hallucination systematically.

Researchers have found that many hallucinogens bear a structural resemblance to a neurotransmitter. Some experts suspect that, in contrast to stimulants and tranquilizers, they work by blocking a transmitter's activity at the nerve cell's receptor sites, but they are not sure exactly how all this happens.

The chemical geography of the brain and what it means in terms of mind are not yet fully understood, either. Different neurons use different transmitters, but the drug experience no doubt somehow involves the whole brain. Hallucinating might involve turning down an editing system or adjusting an attention pattern, rather than turning up the imagination or tuning in to the gods.

Questions about the drug experience are not botanical questions, but the answers may come from the plants of the gods. A frequent partner of Schultes's during the late Fifties and early Sixties was Robert Rauffauf, now head of the medicinal chemistry department at Northeastern University in Boston. With him Schultes made numerous field trips to collect alkaloid-producing plants. Most medicinal and toxic plants, including almost all hallucinogens, owe their potency to alkaloids, a group of about 5,000 compounds of plant origin. Among these are morphine, nicotine, quinine, strychnine, caffeine, and cocaine. Now Drs. Schultes, Rauffauf, and toxicologist David R. Brown would like to track down the many other hallucinogenic plants reported by anthropologists but not yet identified or collected. They also hope to find a series of compounds that can produce either the same effect or a graded series of effects, to get some idea of what mix and dosages of compounds will produce what kinds of subjective experience.

If this project is successful, Schultes, the botanist who has never experienced a drug-induced hallucination, may make

another major contribution to our understanding of what hallucinations are. He is pretty sure about what they are not ontological insights. As a partial explanation Rauffauf offers: "Schultes is the antithesis of a hippie. He's a royalist. Sometimes I feel he lives in the nineteenth century or somewhere thereabouts."

Through his work he contributed immeasurably—and inadvertently—to the mass fascination with psychoactive drugs that changed the cultural life of Harvard and just about every other American university during the 1960s. Yet the person least changed as a result of the 13 years Schultes spent living in the jungle with the Indians studying their use of plants participating in their rituals and taking their hallucinogens was Richard Evans Schultes himself. Whether in the jungle or in the venerable halls of the Botanical Museum at Harvard he has remained ever the New England gentleman and scholar.

Schultes has a deep affection for traditions. He believes the use of drugs by the Indians is justified because it is based on "millennia of purposeful religious use"—in other words tradition. Using drugs merely for pleasure, for new experiences, he believes, constitutes abuse. Schultes acknowledges the high seriousness of those of his colleagues who believe the drug experience can be spiritually liberating, but he finds it all rather confusing.

A fourth-generation Unitarian and a man who doesn't even remember dreaming, he likes his religion reasonable, his reality straight. "I must say I don't know what the religious or mystic experience is that people talk about," he says, "though I know it must exist. Sometimes I wish I could understand what they mean. But then when I see these Moral Majority people on TV I'm glad I don't. If that's what the mystic experience is, I would like to demand equal time for my Indians' religious beliefs and Creation stories."

Schultes also does not care for the activity of missionaries. They have a colossal nerve, he says, meddling in other people's religious affairs, trying to get the Indians out of what is as good a religion as the missionaries', simply because the Indians jump around and dance and sing in another language.

Schultes himself jumped around and danced for the first time in his life in the Amazon during the Kar-ya-ree, a three-day ceremonial reenactment of the Creation when the anaconda first brought the Yukuna Indians down from the Milky Way on its back. While the souls of his Yukuna Indian brothers helped along by the hallucinogenic Yakee visited the Milky Way, Schultes's soul, as usual, stayed with his feet.

And the earth is precisely where his soul belongs. The consciousness he took with him into the jungle and took away unchanged is curious, careful, sensible, empirical and not particularly speculative—perhaps less old fashioned than unfashionable in these days when theoreticians are the superstars of scientific enterprise. A man like Schultes belongs to another great tradition of science, the tradition of observers, explorers and classifiers, those who seek knowledge not to reduce all things to their essence—whether mystical or mathematical—but to create a giant whole earth catalog of things as they are in all their variety, their particularity. This attitude, incidentally, the Indians of the Amazon found perfectly comprehensible.

One woman missionary in the Amazon who did not appreciate the spiritual dignity of taxonomy made a play for Richard Evans Schultes's soul. She had been among the Indians there for years. Schultes says: "And they worshiped her. We each knew who the other was; we'd heard stories about each other—you know the old jungle grapevine. Well, we finally met, and she prayed vehemently for my soul as vehemently as she did for the red man. If we don't know all the plants on Earth," she said, "it doesn't matter, because when the last trumpet sounds, we'll know everything anyway."

"I may not hear the last trumpet," I told her. "And I'd like to know all the plants on Earth right now." ∞

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BURNING CHROME

CONTINUED FROM PAGE 77

from the Finn was in the righthand pocket of my jacket so that I had to fumble it out lefthanded and then get it into the padded jaws of the jeweler's vise.

The waldo looks like an old audio turntable, the kind that played disc records with the vise set up under a transparent dustcover. The arm itself is just over a centimeter long, swinging out on what would've been the tone arm on one of those turntables. But I don't look at that when I've clipped the leads to my stump, I look at the scope, because that's my arm there in black and white, magnification 40×.

I ran a tool check and picked up the laser. It felt a little heavy, so I scaled my weight-sensor input down to a quarter kilo per gram and got to work. At 40× the side of the program looked like a trailer-truck.

It took eight hours to crack, three hours with the waldo and the laser and four dozen taps, two hours on the phone to a contact in Colorado, and three hours to run down a lexicon disc that could translate eight-year-old technical Russian.

Then Cyrillic alphanumerics started reeling down the monitor, twisting themselves into English halfway down. There were a lot of gaps, where the lexicon ran up against specialized military acronyms in the readout I'd bought from my man in Colorado, but it did give me some idea of what I'd bought from the Finn.

I felt like a punk who'd gone out to buy a switchblade and come home with a small neutron bomb.

Screwed again, I thought. *What good's a neutron bomb in a streetfight?* The thing under the dustcover was right out of my league. I didn't even know where to unload it, where to look for a buyer. Someone had, but he was dead, someone with a Porsche watch and a fake Belgian passport, but I'd never tried to move in those circles. The Finn's muggers from the 'burbs had knocked over someone who had some highly arcane connections.

The program in the jeweler's vise was a Russian military icebreaker, a killer virus program.

It was dawn when Bobby came in alone. I'd fallen asleep with a bag of take-out sandwiches in my lap.

"You want to eat?" I asked him, not really awake, holding out my sandwiches. I'd been dreaming of the program, of its waves of hungry glitch systems and mimetic sub-programs, in the dream it was an animal of some kind, shapeless and flowing.

He brushed the bag aside on his way to the console, punched a function key. The screen lit with the intricate pattern I'd seen there that afternoon. I rubbed sleep from my eyes with my left hand, one thing I can't do with my right. I'd fallen asleep trying to decide whether to tell him about the program. Maybe I should try to sell it alone, keep the money, go somewhere new, ask Rikki to go with me.

"Whose is it?" I asked.

He stood there in a black cotton jumpsuit, an old leather jacket thrown over his shoulders like a cape. He hadn't shaved for a few days, and his face looked thinner than usual.

"It's Chrome's," he said.

My arm convulsed, started clicking, fear translated to the myoelectrics through the carbon studs. I spilled the sandwiches, limp sprouts, and bright yellow dairy-product slices on the unswept wooden floor.

"You're stone-crazy," I said.

"No," he said, "you think she rumbled it? No way. We'd be dead already." I looked onto her through a triple-blind rental system in Mombasa and an Algerian commsat. She knew somebody was having a look-see, but she couldn't trace it.

If Chrome had traced the pass Bobby had made at her ice, we were good as dead. But he was probably right, or she'd have had me blown away on my way back from New York. "Why her, Bobby? Just give me one reason."

Chrome. I'd seen her maybe half a dozen times in the Gentleman Loser. Maybe she was slumming, or checking out the human condition, a condition she didn't exactly aspire to. A sweet little heart-shaped face framing the nastiest pair of eyes you ever saw. She'd looked fourteen for as long as anyone could remember, hyped out of anything like a normal metabolism on some massive program of serums and hormones. She was as ugly a customer as the sfreet ever produced, but she didn't belong to the street anymore. She was one of the Boys. Chrome, a member in good standing of the local Mob subsidiary. Word was she'd gotten started as a dealer back when synthetic pituitary hormones were still proscribed. But she hadn't had to move hormones for a long time. Now she owned the House of Blue Lights.

"You're flat-out crazy, Quine. You give me one sane reason for having that stuff on your screen. You ought to dump it, and I mean *now*."

"Talk in the Loser," he said, shrugging out of the leather jacket. "Black Myron and Crow Jane. Jane she's up on all the sex lines, claims she knows where the money goes. So she's arguing with Myron that Chrome's the controlling interest in the Blue Lights, not just some figurehead for the Boys."

"The Boys, Bobby," I said. "That's the operative word there. You still capable of seeing that? We don't mess with the Boys, remember? That's why we're still walking around."

"That's why we're still poor partner." He settled back into the swivel chair in front of the console, unzipped his jumpsuit, and scratched his skinny white chest. "But maybe not for much longer."

"I think maybe this partnership just got

Eureka, eureka, eureka, eureka, eureka, eureka, eureka, eureka, eureka, eureka, eureka, eureka, eureka

itself permanently dissolved

Then he grinned at me. That grin was truly crazy, feral and focused, and I knew that right then he really didn't give a shit about dying.

"Look," I said. "I've got some money left, you know? Why don't you take it and get the fuck to Miami, catch a hopper to Montego Bay. You need a rest, man. You've got to get your act together."

"My act, Jack," he said, punching something on the keyboard, "never has been this together before." The neon prayer rug on the screen shivered and woke as an animation program cut in: ice lines weaving with hypnotic frequency, a living mandala. Bobby kept punching, and the movement slowed, the pattern resolved itself, grew slightly less complex, became an alternation between two distinct configurations. A first-class piece of work, and I hadn't thought he was still that good. "Now," he said, "there see it? Wait. There. There again. And there. Easy to miss. That's it. Cuts in every hour and twenty minutes with a squirt transmission to their commsat. We could live for a year on what she pays them weekly in negative interest."

"Whose commsat?"

"Zurich. Her bankers. That's her bankbook, Jack. That's where the money goes." Crow Jane was right.

I just stood there. My arm forgot to click.

"So how'd you do in New York, partner? You get anything that'll help me cut ice? We're going to need whatever we can get."

I kept my eyes on his, forced myself not to look in the direction of the waldo, the jeweler's vise. The Russian program was there, under the dustcover.

Wild cards, luck changers.

"Where's Rikki?" I asked him, crossing to the console, pretending to study the alternating patterns on the screen.

"Friends of hers," he shrugged, "kids. They're all into simstim." He smiled absently. "I'm going to do it for her, man."

"I'm going out to think about this, Bobby. You want me to come back, you keep your hands off the board."

"I'm doing it for her," he said as the door closed behind me. "You know I am."

And down now, down, the program a roller coaster through this fraying maze of shadow walls, gray cathedral spaces between the bright towers. Headlong speed.

Black ice. Don't think about it. Black ice.

Too many stories in the Gentleman Loser. black ice is a part of the mythology. Ice that kills. Illegal, but then aren't we all? Some kind of neural-feedback weapon, and you connect with it only once. Like some hideous Word that eats the mind from the inside out. Like an epileptic spasm that goes on and on until there's nothing left at all.

And we're diving for the floor of Chrome's shadow castle.

Trying to brace myself for the sudden stopping of breath, a sickness and final slackening of the nerves. Fear of that cold Word waiting, down there in the dark.

I went out and looked for Rikki. I found her in a cafe with a boy with Sendai eyes, halt-healed suture lines radiating from his bruised sockets. She had a glossy brochure spread open on the table. Tally Isham smiling up from a dozen photographs: the Girl with the Zeiss Ikon Eyes.

Her little simstim deck was one of the things I'd stacked under my bench the night before, the one I'd fixed for her the day after I'd first seen her. She spent hours jacked into that unit, the contact band across her forehead like a gray plastic tiara. Tally Isham was her favorite, and with the contact band on, she was gone, off somewhere in the recorded sensorium of simstim's biggest star. Simulated stimuli: the world—all the interesting parts, anyway—as perceived by Tally Isham. Tally raced a black Fokker ground-effect plane across Arizona mesa tops. Tally dived the Truk Island preserves. Tally partied with the superrich on private Greek islands, heartbreaking purity of those tiny white seaports at dawn.

Actually, she looked a lot like Tally, same coloring and cheekbones. I thought Rikki's mouth was stronger. More sass. She didn't want to *be* Tally Isham, but she coveted the job. That was her ambition: to be in simstim. Bobby just laughed it off. She talked to me about it, though. "How d'I look with a pair of these?" she'd ask, holding a full-page headshot, Tally Isham's blue Zeiss Ikons lined up with her own amber-brown. She'd had her corneas done twice, but she still wasn't twenty-twenty, so she wanted Ikons. Brand of the stars. Very expensive.

"You still window-shopping for eyes?" I asked as I sat down.

"Tiger just got some," she said. She looked tired, I thought.

Tiger was so pleased with his Sendais that he couldn't help smiling, but I doubted whether he'd have smiled otherwise. He had the kind of uniform good looks you get after your seventh trip to the surgical boutique: he'd probably spend the rest of his life looking vaguely like each new season's media frontrunner, not too obvious a copy but nothing too original, either.

"Sendai, right?" I smiled back.

He nodded. I watched as he tried to take me in with his idea of a professional simstim glance. He was pretending that he was recording. I thought he spent too long on my arm. "They'll be great on peripherals when the muscles heal," he said, and I saw how carefully he reached for his double espresso. Sendai eyes are notorious for depth-perception defects and warranty hassles, among other things.

"Tiger's leaving for Hollywood tomorrow."

"Then maybe Chiba City, right?" I smiled at him. He didn't smile back. "Got an offer, Tiger? Know an agent?"

Just checking it out," he said quietly. Then he got up and left. He said a quick good-bye to Rikki, but not to me.

"I guess I would have gotten the job if I hadn't included the Mona Lisa in my portfolio."

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That kid's optic nerves may start to deteriorate inside six months. You know that, Rikki? Those Sendais are illegal in England, Denmark, lots of places. You can't replace nerves.

"Hey, Jack, no lectures. She stole one of my croissants and nibbled at the tip of one of its horns.

I thought I was your adviser, kid.

"Yeah. Well, Tiger's not too swift, but everybody knows about Sendais. They're all he can afford. So he's taking a chance. If he gets work, he can replace them."

"With these?" I tapped the Zeiss Ikon brochure. "Lot of money, Rikki. You know better than to take a gamble like that?"

She nodded. "I want Ikons."

"If you're going up to Bobby's, tell him to sit tight until he hears from me."

"Sure. It's business?"

"Business," I said. "But it was craziness."

I drank my coffee and she ate both my croissants. Then I walked her down to Bobby's. I made fifteen calls, each one from a different pay phone.

Business. Bad craziness.

All in all, it took us six weeks to set the burn up, six weeks of Bobby telling me how much he loved her, I worked even harder trying to get away from that.

Most of it was phone calls. My fifteen initial and very oblique inquiries each seemed to breed fifteen more. I was looking for a certain service Bobby and I both imagined as a requisite part of the world's clandestine economy but which probably never had more than five customers at a time. It would be one that never advertised.

We were looking for the world's heaviest fence, for a nonaligned money laundry capable of drycleaning a megabuck on-line cash transfer and then forgetting about it.

All those calls were a waste, finally, because it was the Finn who put me on to what we needed. I'd gone up to New York to buy a new blackbox rig, because we were going broke paying for all those calls.

I put the problem to him as hypothetically as possible.

"Macao," he said.

"Macao?"

"The Long Hum family Stockbrokers."

He even had the number. You want a fence, ask another fence.

The Long Hum people were so oblique that they made my idea of a subtle approach look like a tactical nuke-out. Bobby had to make two shuttle runs to Hong Kong to get the deal straight. We were running out of capital, and fast. I still don't know why I decided to go along with it in the first place, I was scared of Chrome, and I'd never been all that hot to get rich.

I tried telling myself that it was a good idea to burn the House of Blue Lights because the place was a creep joint, but I just couldn't buy it. I didn't like the Blue Lights because I'd spent a supremely depressing evening there once, but that was no excuse for going after Chrome. Actually I halfway assumed we were going to die in the attempt. Even with that killer program, the odds weren't exactly in our favor.

Bobby was lost in writing the set of commands we were going to plug into the dead center of Chrome's computer. That was going to be my job, because Bobby was going to have his hands full trying to keep the Russian program from going straight for the kill. It was too complex for us to rewrite, and so he was going to try to hold it back for the two seconds I needed.

I made a deal with a streetfighter named Miles. He was going to follow Rikki, the night of the burn, keep her in sight, and phone me at a certain time. If I wasn't there or didn't answer in just a certain way, I'd told him to grab her and put her on the first tube out. I gave him an envelope to give her, money and a note.

Bobby really hadn't thought about that much, how things would go for her if we blew it. He just kept telling me he loved her, where they were going to go together, how they'd spend the money.

"Buy her a pair of Ikons first, man. That's what she wants. She's serious about that simstim scene."

"Hey," he said, looking up from the keyboard, "she won't need to work. We're going to make it, Jack. She's my luck. She won't ever have to work again."

"Your luck," I said. I wasn't happy. I couldn't remember when I had been happy. "You seen your luck around lately?"

He hadn't, but neither had I. We'd both been too busy.

I missed her. Missing her reminded me of my one night in the House of Blue Lights because I'd gone there out of missing someone else. I'd gotten drunk to begin with, then I'd started hitting vasopressin inhalers. If your main squeeze has just decided to walk out on you, booze and vasopressin are the ultimate in masochistic pharmacology: the juice makes you maudlin, and the vasopressin makes you remember. I mean really remember. Clinically they use the stuff to counter senile amnesia, but the street finds its own uses for things. So I'd bought myself an ultra-intense replay of a bad affair, trouble is, you get the bad with the good. Go gunning for transports of animal ecstasy and you get what you said, too, and what she said to that, how she walked away and never looked back.

"The thing under the dustcover was right out of my league. I didn't even know where to unload it, where to look for a buyer. Someone had, but he was dead."

I don't remember deciding to go to the Blue Lights, or how I got there, hushed corridors and this really tacky decorative waterfall trickling somewhere, or maybe just a hologram of one. I had a lot of money that night, somebody had given Bobby a big roll for opening a three-second window in someone else's ice.

I don't think the crew on the door liked my looks, but I guess my money was okay.

I had more to drink there when I'd done what I went there for. Then I made some crack to the barman about closet necrophiliacs, and that didn't go down too well. Then this very large character insisted on calling me War Hero, which I didn't like. I think I showed him some tricks with the arm, before the lights went out, and I woke up two days later in a basic sleeping module somewhere else. A cheap place, not even room to hang yourself. And I sat there on that narrow foam slab and cried.

Some things are worse than being alone. But the thing they sell in the House of Blue Lights is so popular that it's almost legal.

At the heart of darkness, the still center, the glitch systems shred the dark with whirlwinds of light, translucent razors spinning away from us: we hang in the center of a silent slow-motion explosion, ice fragments falling away forever, and Bobby's voice comes in across light years of electronic void, illusion—

"Burn the bitch down. I can't hold the thing back—"

The Russian program, rising through towers of data, blotting out the playroom colors. And I plug Bobby's homemade command package into the center of Chrome's cold heart. The squirt transmission cuts in, a pulse of condensed information that shoots straight up, past the thickening tower of darkness, the Russian program, while Bobby struggles to control that crucial second. An unformed arm of shadow twitches from the towering dark, too late.

We've done it.

The matrix folds itself around me like an origami trick.

And the loft smells of sweat and burning circuitry.

I thought I heard Chrome scream, a raw metal sound, but I couldn't have.

Bobby was laughing, tears in his eyes. The elapsed-time figure in the corner of the monitor read 07 24 05. The burn had taken a little under eight minutes.

And I saw that the Russian program had melted in its slot.

We'd given the bulk of Chrome's Zurich account to a dozen world charities. There was too much there to move, and we knew we had to break her, burn her straight down, or she might come after us. We took less than ten percent for ourselves and shot it through the Long Hum setup in Macao.

They took sixty percent of that for themselves and kicked what was left back to us through the most convoluted sector of the Hong Kong exchange It took an hour before our money started to reach the two accounts we'd opened in Zurich

I watched zeros pile up behind a meaningless figure on the monitor I was rich

Then the phone rang It was Miles I almost blew the code phrase

Hey Jack man I dunno—What's it all about with this girl of yours? Kinda funny thing here

What? Tell me

"I been on her like you said tight but out of sight She goes to the Loser hangs out then she gets a tube Goes to the House of Blue Lights—"

She what?

Side door *Employees* only No way I could get past their security

"Is she there now?

"No man I just lost her It's insane down here like the Blue Lights just shut down looks like for good seven kinds of alarms going off everybody running the heat out in riot gear Now there's all this stuff going on insurance guys real estate types vans with municipal plates

Miles where'd she go?

Lost her Jack

"Look Miles you keep the money in the envelope right?"

"You serious? Hey I'm real sorry I—

I hung up

"Wait'll we tell her Bobby was saying rubbing a towel across his bare chest

"You tell her yourself cowboy I'm going for a walk"

So I went out into the night and the neon and let the crowd pull me along walking blind willing myself to be just a segment of that mass organism just one more drifting chip of consciousness under the geodesics I didn't think just put one foot in front of another but after a while I did think and it all made sense She'd needed the money

I thought about Chrome too That we'd killed her murdered her as surely as if we'd slit her throat The night that carried me along through the malls and plazas would be hunting her now and she had nowhere to go How many enemies would she have in this crowd alone? How many would move now they weren't held back by fear of her money? We'd taken her for everything she had She was back on the street again I doubted she'd live till dawn

Finally I remembered the café the one where I'd met Tiger

Her sunglasses told the whole story huge black shades with a telltale smudge of fleshtone paintstick in the corner of one lens "Hi, Rikki," I said and I was ready when she took them off

Blue Tally Isham blue The clear trademark blue they're famous for ZEISS IKON ringing each iris in tiny capitals the letters suspended there like flecks of gold

"They're beautiful," I said Paintstick covered the bruising No scars with work that good "You made some money

"Yeah I did Then she shivered But I won't make any more not that way

"I think that place is out of business"

Oh Nothing moved in her face then The new blue eyes were still and very deep

It doesn't matter Bobby's waiting for you We just pulled down a big score

"No I've got to go I guess he won't understand but I've got to go

I nodded watching the arm swing up to take her hand it didn't seem to be part of me at all but she held on to it like it was

I've got a one-way ticket to Hollywood Tiger knows some people I can stay with Maybe I'll even get to Chiba City"

She was right about Bobby I went back with her He didn't understand But she'd already served her purpose for Bobby and I wanted to tell her not to hurt for him because I could see that she did He wouldn't even come out into the hallway after she had packed her bags I put the bags down and kissed her and messed up the paintstick and something came up inside me the way the killer program had risen above Chrome's data A sudden stopping of the breath in a place where no word is But she had a plane to catch

Bobby was slumped in the swivel chair in front of his monitor looking at his string of zeros He had his shades on and I knew he'd be in the Gentleman Loser by nightfall checking out the weather anxious for a sign someone to tell him what his new life would be like I couldn't see it being very different More comfortable but he'd always be waiting for that next card to fall

I tried not to imagine her in the House of Blue Lights working three-hour shifts in an approximation of REM sleep while her body and bundle of conditioned reflexes took care of business The customers never got to complain that she was faking it because those were real orgasms But she felt them if she felt them at all as faint silver flares somewhere out on the edge of sleep Yeah it's so popular it's almost legal The customers are torn between needing someone and wanting to be alone at the same time which has probably always been the name of that particular game even before we had the neuroelectronics to enable them to have it both ways

I picked up the phone and punched the number for her airline I gave them her real name her flight number "She's changing that" I said to Chiba City That's right Japan" I thumbed my credit card into the slot and punched my ID code First-class Distant hum as they scanned my credit records "Make that a return ticket"

But I guess she cashed the return fare or else she didn't need it because she hasn't come back And sometimes late at night I'll pass a window with posters of simstim stars all those beautiful identical eyes staring back at me out of faces that are nearly as identical and sometimes the eyes are hers but none of the faces are none of them ever are and I see her far out on the edge of all this sprawl of night and cities and then she waves good-bye ◻

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SPACE OFFENSIVE

CONTINUED FROM PAGE 65

tion from the Soviet Union

In the U N hierarchy responsibility for Unispace 82 falls to the director of the Outer Space Affairs Division of the Committee on the Peaceful Uses of Outer Space. When Unispace 82 was first put on the U.N. calendar the division's head was Lubos Perek, of Czechoslovakia. His deputy was Marvin Robinson, an American.

Perek's five year term was up in May 1981, and, according to normal U N. procedures, he would have been succeeded by his deputy. But the Russians claimed that they had a verbal agreement with the United States to replace Perek with another Czech. They nominated Victor Kopal. The United States denied any agreement and opposed the Russian idea that U N. positions should be "hereditary" that a position held by a Czech must always go to another Czech.

Kurt Waldheim was then running for reelection as U N. secretary-general, and he wanted votes, not enemies. He refused to decide the matter. As the impasse deepened, the United States announced that it would not attend Unispace 82 unless a satisfactory decision was reached.

By December 31, Waldheim's bid for reelection was dead, and he finally appointed Robinson acting chief of the Outer Space Affairs Division. The American will become the full-fledged head of the division on the day that Unispace 82 convenes. Kopal will be his deputy.

Secretary of State Alexander Haig then decided that the United States will attend Unispace 82 after all. NASA Administrator James E. Beggs will lead the American delegation.

Attorney Dula is anything but optimistic that the United States will fare better in Vienna than in previous conferences. For one thing, the United States agreed to attend only at the last moment. Its representatives have been forced to squeeze two years of preparation into less than eight months. Dr. Grey has high praise for Ken Pederson, NASA's director of international affairs, and his assistant, James Morrison. They are, he says, doing a tantastic job in getting ready for the meeting on such short notice. Yet it remains an enormous task to be accomplished in haste.

But Dula's real concern is that the American emissaries simply are not prepared for an attack on the U S. space program. As Grey sees it, the Russians have been far from hostile in the United Nations. Their position in this conference is roughly the same as ours, he believes. "Both nations oppose more U N. bureaucracy. East-bloc industrial nations as well as the West," he says, "prefer agreements between individual nations to the U.N. machinery that the Third World wants to create."

It appears that we've just had a brief encounter of the third race

Yet conflicts between East and West are far more frequent than attempts to seek common goals. The story of the NGOs—nongovernmental organizations—at the Vienna meeting is a case in point. At U N. conferences not only national delegations but private, nonprofit groups are invited to air their views. Their presence has long embarrassed delegations from countries in which organizations are either government sponsored or prohibited. Unispace 82 nearly had to do without these private participants.

David Webb, an activist who founded the Campaign for Space Political Action Committee, worked hard to get American NGOs into the Vienna conference. When it appeared that the United States would not be represented at all, he formed a group called U S. Space 82 as a rallying point for private American participants. In November 1981 the United Nations made him chairman of all NGO activities at the Unispace conference.

Neither the world body nor the participating nations have been willing to contribute money to support the NGO effort, however. Webb sees Soviet interference at work. "The Soviet bloc did not want NGOs at the conference in the first place," he says. "There are no NGOs in the Soviet system; everything is state-sponsored. They are very worried about NGOs, because it is the one area they cannot control."

As a result, all NGOs at the Vienna conference will be supported by voluntary donations. Webb has organized day-long seminars on space and the environment, remote sensing, communications, education, private enterprise in space, space transportation, and energy from space.

The NGOs will also devote a day to the demilitarization of space. Considered too hot to handle by the governmental delegates, space demilitarization was deliberately left off the agenda at the U N. conference on disarmament, held in New York City in May 1981. Vienna is the only place where the subject will be discussed in an international forum.

As the Vienna conference approaches, Soviet planners can view their work with satisfaction. By branding the U.S. space shuttle a tool of military piracy, they have undercut one of America's most spectacular achievements. They have delayed American preparations for Unispace 82 and have crippled participation by the NGOs. They have prepared world opinion for the idea that the entire U S. space effort is a military program and that peace-loving Russians have the right to destroy the satellites of other nations—including the manned shuttle—in order to protect their own. Most ominous of all, they may well have missiles aboard *Cosmos 1267* capable of carrying out that threat.

The United States, with no weapons in orbit, is in the position of defending its intentions and trying to explain to the world that the shuttle is not a military weapon. It is not. But it may be a military target.

FIREPROOFING FLIGHT

BREAKTHROUGHS

By Tom Johnson

In an aircraft fire the difference between life and death is measured in seconds. The Federal Aviation Administration (FAA) will not certify a cabin design unless passengers can evacuate in 90 seconds. And if there's a fire, researchers figure that travelers have no more than two minutes to get out. After that the combustible plastics used in lightweight plane interiors begin turning to flames, smoke, and toxic fumes threatening those who survived impact.

NASA's chemical labs at Ames Research Center in California and the FAA Technical Center in Atlantic City, New Jersey, have been working hard to buy more precious seconds for airline passengers. In coming months many of their discoveries will begin appearing in commercial airliners. On the horizon are four major breakthroughs:

• Five new materials and fabrics will protect polyurethane foam seats from fire, giving passengers at least 50 more seconds to escape. These fabrics and new foams shield polyurethane from heat and slow the buildup of combustion temperatures. Cheap and light, the ablative layers can be installed over the foam and under decorative seat fabric.

• Wall panels filled with fire-resistant resin foams will form another heat shield. In a crash, they will also help keep burning fuel out of the cabin. The scientists are still testing fireproof decorative films—the panels' wallpaper—and inks, says Dr. John A. Parker, chief of the chemical research projects office at Ames. Boeing has adopted these fire-resistant panels for its new 757 and 767 passenger planes.

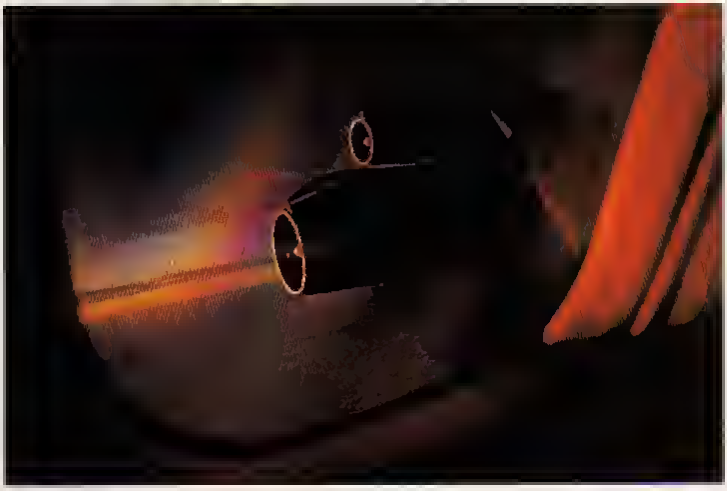
• Windows in airplanes also are plastic. Fire causes the panes to shrink, fall out, and admit smoke or flames to the cabin in 50 or 60 seconds. Parker's office has developed a new fail-safe pane. Sandwiched between the outside pane and the inner dustcover, it can withstand fire for at least six minutes.

• Chemists are testing additives that could keep jet fuel from vaporizing until it is ready to be injected into the engines' combustion chambers. Chemicals being tested in the Anti-Mist Kerosene (AMK) program have a molecule chain as long but as thin as possible, just like a bundle of sticks, Parker says. The long-molecule fuel is crunched between two gears—it's called chemomechanical degradation—to snap the molecules so they can be sprayed into the engine. Until the crunch comes, the fuel will not ignite, ruling out an after-crash fireball. Parker thinks such fuel could become standard after three or four more years of research and development.

Many of the new developments in air safety have been adapted from other technologies. For example, it cost nothing to develop the protective seat fabric. "Last year we did an analysis to find out what we needed to solve the burning-seat problem," Parker recalls. "The concept of a nonconducting carbon fiber bonded to an aluminum film came up as the answer. I was at a meeting a few weeks later and described the kind of fabric we wanted to see developed. Three guys jumped up and said they already had it—the same stuff that replaced asbestos suits for firemen and welders. The fabric that will probably be installed in the seats is right off the shelf."

The AMK fuel additive also sprang from scientific serendipity. Crash-safe fuels have been known for decades, but they were too costly to use. When the Alaskan pipeline was constructed, however, oil chemists needed a drag-reducing agent to keep the cold crude flowing through the pipe. "One day we found that all drag reducers were AMKs," Parker says. "The challenge now is to figure out how little AMK agent we need in the fuel to be effective and how to introduce it economically at the refinery."

The technology that's involved may be new, but NASA's goal is thousands of years old: taming fire.



Thanks to NASA, a scarlet sunset could soon be the only flame even a downed plane would ever see.

NEW PRODUCTS

Pulling the tab on the lid of a new Swiss-manufactured food or beverage can instantly activates a built-in chemical heating element. The chemical reaction produces enough heat to cook whatever is in the can, from soup to nuts. The aluminum retort container, called the X-X-X Hot Dish, can even be recycled. It will cost only about 50 cents more than ordinary

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17
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SCULPTURE

CONTINUED FROM PAGE 30

projects. In 1968 the Allied Chemical Tower in Times Square and the Museum of Modern Art declined to be wrapped. Allied Chemical was potentially the perfect fabric-and-twine bundle, because it occupies an entire block, making it easy to package, and is visible from all directions. Permission was apparently within grasp and then, according to Christo, his own political naiveté blew it. "I was too young for New York City," he says. "I just arrive four years before. I was intimidated by the social structure, how the city was run. I was not able to face reality and talk to all the people of the Forty-second Street Association, to create broad support."

For different reasons Christo's proposal to wrap the Museum of Modern Art, pack its sculpture garden and close off its fronting on the street with a wall of oil drums was also vetoed. The project was proposed for the "hot summer" of 1968 and riots had already torn Newark, New Jersey, and were predicted for New York. Nervous officials felt the provocative transformation of a public building would inspire unrest, and the Christos were unable to obtain liability insurance for the museum.

More recently Christo's proposal to construct 25 miles of processional portals on the walkways of Central Park was rejected by Parks Commissioner Gordon Davis, who wrote a 185-page repudiation of the idea that presumably reflected local opposition. In innumerable presentations to cultural, environmental, and political organizations, Christo described his plan to enhance the park for two weeks by suspending, from 11,000 15-foot-high steel gates, panels of luminous apricot fabric which would create a "golden river" as they rippled in the wind. Opponents of the project declared the aesthetics of the park needed no enhancement that *The Gates* (Christo's title for the assemblage) would confuse birds and joggers, invite vandalism and harm wildlife in Manhattan's only link with nature. They suggested he take his gates to New Jersey or wrap the South Bronx.

Christo, who says his art has never harmed any living creature, suspects the hue and cry about the environmental havoc, traffic problems, and violent disturbances his projects may create cover up the real reason for opposition—a basic, conservative reaction to change, especially in the form of expensive, nonutilitarian temporary structures. "It is easier to have things remain as they were than to have alteration," he says. "something passing through." Though the projects are entirely financed by the artist himself, the hundreds of thousands of dollars he spends, too, disturb conservative sensibilities. "People want to know why I don't give the money to the heart machine, or to society," he complains. "First, I am not involved with the heart machine. I am involved with art. All artists need money to buy materials. My materials cost more. Also, people do not understand that when I propose the project, the money for it does not yet exist. It will be there only if I get permission, produce four hundred or five hundred drawings, and Jeanne-Claude sell them." The Christos feel the capitalistic conscience would find the idea of the pricey art more palatable if it were a money-making venture. "Because I say in plain voice there is no way to make money from these projects, they are nervous and upset," he says. "If I say I spend three million and make a hundred million, like a movie producer, then this will be normal."

Though the formidable cost of Christo's art (*Running Fence* ran to $3 million, leaving him $780,000 in debt) imposes financial burdens, he still refuses to undertake commissions. He has turned down large sums of money to wrap privately owned castles and new hotels, or to lend his name to an American Express ad that would sing, "You don't know me, but you know my *Running Fence*."

> *"People want to know why I don't give money to the heart machine, or society. I am not involved with the heart machine, but with art. Artists need money for their materials."*

With his nonmercenary credibility Christo has challenged the largest money-making industry in the world—the oil producers—to support his art. Always intrigued by the barrel, which he sees as a modular unit— like a molecule —able to be stacked to create a variety of new forms, he has created many barrel sculptures and, in the early Sixties, blocked off the Rue Visconti in Paris with a 14-foot-high wall of oil drums, though he was denied an official permit. He then began to view the barrel as a significant socioeconomic image and proposed to build huge mastabas of drums both in Texas and in the Netherlands. The Texas Mastaba, which was to rise dramatically from a former garbage dump on a freeway between Houston and Galveston, failed in 1969 when Christo could not negotiate essential support from the now-extinct Humble Oil Company. The oil moguls wanted to maintain a low profile during the period when they were widely criticized for raising petroleum prices. Though Queen Beatrix of the Netherlands is the largest stockholder in Royal Dutch Shell, and Rotterdam one of the largest harbors for the oil trade, a mastaba proposed for Otterloo also fizzled in 1973.

Unwilling to abandon his giant mastaba, Christo has been negotiating with Sheikh Zayed for permission to construct the Mastaba of Abu Dhabi, his first permanent project and the largest man-made structure in the world, a symbol of twentieth-century oil civilization. The mastaba, which will be more massive than the Cheops Pyramid and greater in volume than both towers of the World Trade Center, has required Christo to learn new political skills applicable to Islamic culture. Instead of writing applications and presenting environmental studies, he must convince only the sheikh that the unique mastaba will be a credit to his reign. For the last three years the Christos have been visiting Abu Dhabi, courting important friends among the ruler's circle of 60 people and making personal presentations of the proposal as well as of Christo's past work. "We have tried to learn how to address ourselves to them from literature and from Islamic scholars. The people have an enormous physical perception. Westerners have lost. They love to look at you, and touch you physically to feel if you lie or not lie." According to Christo, he has also discovered a different artistic sensibility in the Middle East. "They are originally Bedouin," he notes, "one of the most sensitive people to physical dimension, size, light and perspective."

The giant mastaba will be constructed by screwing 390,500 55-gallon stainless-steel oil barrels in a variety of bright colors to a mountainous shell of concrete filled with a core of sand. Christo says the mastaba will be the most difficult of his projects to accomplish technologically. As usual, a team of engineers will work out the details of the construction, and, as usual, Christo will demand that technology serve his aesthetic vision. The engineers for *Valley Curtain* correctly predicted that the tons of orange fabric would be destroyed by wind unless it was perforated or supported by cables, but the artist refused to alter his drawings; he preferred to see the curtain blown down than ravaged with holes or terrible cables.

The photographs and drawings communicate the startling impact of the realized art. Christo says that all of the projects are transformed by their sites. The light, weather, time of day and movement of the wind add to his vision. Ninety-mile gales, for example, tore part of *Wrapper Coast* loose from its moorings, and the violently whipping fabric was recorded on film. The white nylon of *Running Fence* turned pink in the morning mist, and the foliage of Loose Park, Kansas City, inspired the artist to use a saffron fabric to carpet its walkways, instead of the neutral cloth he had originally wanted. "The drawings can never match the reality," Christo says. "It is so physical, so overwhelming—the power of the fabric, the cables, the site. It gives you a fantastic power of experience!"

EXPLORATIONS

CONTINUED FROM PAGE 32

charter boat *Terry* out every Wednesday evening for lobster dives He reports Six-pounders are not rare if you know the right spot Like many other charter skippers he is reluctant to reveal the exact locations of the best lobstering wrecks

These sunken ships hold much more than seafood Aboard the *Iberia* a French steamer that went down in 1888 off East Rockaway Long Island scuba divers found a silver serving tray with ornate silver seahorses mounted on each corner The *Mercury* which wrecked in the Hudson River in 1777 and the *Lexington* which sank in the East River three years later were British frigates carrying pay for the king s soldiers allegedly up to $2 million in gold at today s price None of the bullion has been salvaged But gold has been recovered from another British pay ship H M S *Hussar* which hit a rock in the middle of treacherous Hell Gate The *Hussar* was carrying between $2 million and $4 million in gold and silver To date the *Hussar* has surrendered one cannon some grapeshot and four gold coins

Yet most wreck divers view themselves as marine historians and adventurers first and treasure hunters second The monetary value is almost meaningless next to the treasure of having touched hands with history says a diver who has spent years crawling through the hollow bellies of ancient ships

The Oceanographic Historical Research Society founded in 1961 works with divers to gather verify, and catalog information on shipwrecks and other underwater artifacts in New York s waters Another group of nautical explorers organized 30 years ago to form the Club Sous-Marin They set their sights on locating and raising artifacts from the *Culloden* a British 74-gun frigate wrecked off Montauk in 1781 One hundred ninety years after she went down the club members found definite proof of the *Culloden* when they brought up a solid brass gudgeon marked with her name

Still another club was formed this spring headed by Captain Reddan of Sheepshead Bay Brooklyn Its aim is to introduce more people to this exotic world so near Manhattan s bustling streets yet for the most part unknown to the public Reddan does caution however that this is not the place for claustrophobics or the faint-hearted for there are many strange even grotesque sights lurking within those ghostly hulls A sunken ship was once part of the air-breathing world now an octopus slithers across the deck where a sailor had stood his last watch Or you can open an air-lock door of an anemone-encrusted submarine and find the skull of a long-dead sailor staring back at you and you suddenly remember where you came from The cold metallic-tasting air must keep flowing from your tanks or you may join him in his eternal watch ∞

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OUR SPACE FUTURE— HOW CERTAIN IS IT?

America s not taking full advantage of the enormous energy and material resources of outer space A major government report concluded that the United States is in danger of losing its ability to fully explore and develop the space frontier

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largely a rational process, though I wasn't expecting to get the results that I got. On the other hand, I always tried not to be attached to any particular beliefs. Therefore I wasn't totally influenced by what other people thought about superconductivity. This distance allowed me to proceed rationally along lines that other people didn't take.

Omni: What is your main research interest these days?

Josephson: I think that the question of intelligence is fundamental, and I think that it may be better explained by the concepts of Vedic science than by ordinary science. I am interested in intelligence because it may be the way to achieve a new level of understanding of physical reality. By intelligence I mean the ability to achieve a goal. The right direction has to be taken at all stages to get to the goal.

Omni: How do you propose to test Vedic theories scientifically?

Josephson: I hope to build up a world picture that incorporates the Vedic theories and makes testable scientific predictions. One of the most specific predictions that Vedic science makes, which isn't really in ordinary science, is that thought can be realized automatically when a state of consciousness is right.

Omni: Are you planning any research in parapsychology?

Josephson: No. I regard parapsychology as a sort of side interest. As a step toward understanding intelligence, I am working on human language acquisition, trying to fit the problem of how children learn to speak into a conceptual framework that has both Eastern and Western roots. Linguistic behavior shows very clearly many characteristics of intelligence in general, and I see Vedic science as a key component in understanding both.

Omni: How does your theory differ from others—Piaget's theory, for example, or theories inspired by Noam Chomsky's work in linguistics?

Josephson: I believe that children have innate mechanisms that permit them to learn how to speak and understand language. Most of my work consists of describing these mechanisms and showing how they make language learning possible. However, instead of postulating anything like the existence of a built-in grammar along Chomsky's lines, I believe that the child constructs his model of language from experience. The model is not innate. It is the set of language-acquisition mechanisms that is innate.

Omni: Have you been influenced by any other theorists?

Josephson: Yes. My work draws heavily upon the theory of intelligence and language learning outlined by the Maharishi Mahesh Yogi. The maharishi believes that language development occurs more or less spontaneously provided that the child is exposed to some human language. In my theory, development happens naturally as a result of innate mechanisms.

Suppose a child is exposed to a particular syntactic construction. According to my theory, he will record that utterance, and in the future he will be sensitized to influences that are roughly the same. He will become sensitive to this kind of pattern.

Omni: You sound a bit like a behaviorist.

Josephson: Only up to a point. The way a person reacts to hearing language is partly innate. Children are programmed to explore certain kinds of interpretive possibilities and to ignore others.

Omni: Can you identify the set of possibilities that the child investigates and the other possibilities that the child is programmed to ignore?

Josephson: I don't see language learning so much as an investigation. I see it as a channel that the child is tuned in to. In other words, the child has innate systems that are sensitive to grammar, others that are sensitive to meaning, and so on. I'm actively studying the properties of these programmed systems.

> *"From the start I had good experiences with meditation. It was as if, instead of being immersed in a mental fog, I suddenly became aware of the outside world."*

Omni: Are you planning any experiments that will pit your theory against its rivals?

Josephson: No. My crucial test at the moment is to show that my simple model of language acquisition can reproduce the fundamental properties of language revealed by psycholinguistic experiment and linguistic theory. But once my model is fully worked out, it may have unexpected implications that could be directly tested.

Omni: Has meditation helped you to develop your psycholinguistic theory?

Josephson: I think it has enabled me to use intuition effectively to a much higher degree than I used to be able to. I think one wouldn't get too far sorting things out in psycholinguistics by rationally running through the possibilities. It's much more a matter of getting the intuition of how things are and then thinking through to see whether the intuition fits the facts.

Omni: But why do you think that you can gain objective knowledge about the world through meditation? Don't you sometimes worry that you're only learning how to project new and fascinating images on the mind's inner screen?

Josephson: The point is that as you develop along the usual lines in science and in life, you add more and more beliefs to your picture of the world's structure. This process restricts your ability to appreciate the richness of reality because each time you take seriously a new belief you exclude its converse from consideration. The higher state of consciousness achieved through meditation is supposed to be added to the everyday state. You don't lose your ability to reason logically. One has the knowledge that's been acquired as an adult, but also the ability to get beyond the constraints of this knowledge in case there's something better out there.

Omni: Do you have any glimmerings about what that might be?

Josephson: One possibility is that you may be able to observe on a sort of universal scale. It's probably the same sort of channel that's used in remote viewing—the ability that some people seem to have to describe physical settings that they have never directly observed. It's as if you can see inwardly things that you cannot see directly. In my case I see only luminous clouds of various kinds and things like that—nothing very spectacular. And of course you can say that these are merely hallucinations on my part.

Omni: But what do you think they may be?

Josephson: Well, there may be a paranormal component to the sense of sight that is perhaps not operating electromagnetically the way light converging upon the eye produces ordinary vision. Here is where I think that a study of mystical tradition comes in. The mystics talk of an astral plane. And what one perceives fits in with movement on this plane.

Omni: Do you believe in the existence of an astral plane?

Josephson: Well, the experiences I have had are consistent with it, yes, and they suggest there is something very definite.

Omni: What other kinds of experiences do you have when you meditate?

Josephson: In meditation there are certain mental states that are supposed to be of particular significance. These states are at the opposite pole from ordinary experience. They resemble a sort of pure inner experience of one's consciousness. Well, it's not quite so simple. Throughout you tend to get clearer all the time. It's a process of overcoming any tensions or stresses that are inside you, and as you overcome them, you can then have a greater level of awareness. But it takes a long time before the phenomena become completely clear.

Omni: Do you believe in knowledge through direct revelation?

Josephson: Yes, I think so.

Omni: In that case how do you protect yourself against self-delusion? Suppose that during meditation a voice instructs you to paste up a portrait of Hitler in your office and organize a group of Brown Shirts in

FANTASTIC VOYAGES

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England. Would you act upon this vision because it meets all the subjective criteria for a powerful mystical experience?

Josephson: One occasionally does have powerful experiences in meditation and well one is advised not to act upon them just because something happened in meditation.

Omni: But in that case aren't you applying the rationalist filter to these experiences?

Josephson: I have nothing against being rational.

Omni: How can you escape the blinders of science if you do that?

Josephson: If one does one's meditation properly one gradually removes those beliefs while remaining a rational being.

Omni: Would you call yourself a mystic?

Josephson: At most half a mystic. I think I see myself as following along the standard scientific tradition. I am just enlarging the scope of things and trying to construct more comprehensive theories. My approach is that of the scientist who reasons about phenomena and hopes to be able to give acceptable intellectual pictures of them. I always try to find concrete explanations of things. The world is full of mysterious entities.

Omni: Do you believe in a god?

Josephson: There probably is something corresponding to God in physical reality—a kind of integrated I or conscious awareness, or a highest level of intelligent being. This level may not contradict the physical theories that science currently holds. But my feeling is that this level of reality is what may have been left out of our present-day theories.

Omni: What about an afterlife?

Josephson: Many Eastern mystical traditions describe life and death as just being two different states. In meditation one may cross the boundary and experience some of these afterlife states, but that's only speculation. For example, if one were in a meditative state where one's body didn't exist, that might be a precursor of what it's like to be dead.

Omni: What do you think of current parapsychological research?

Josephson: I take particularly seriously Russell Targ's and Harold Puthoff's remote-viewing research at Stanford Research Institute and John Hasted's work on metal bending. Hasted is the head of the department of physics at Birbeck College of the University of London. He has shown that some people can bend metal in situations where they are not in physical contact with it. He has also found that some patterns of bend are not consistent with the kind that you could produce by manually bending a metal object.

Omni: Another University of London scientist, the mathematician John Taylor, has also studied metal bending. But after enthusiastically defending the reality of this psychic phenomenon, he completely retracted his earlier claims. How do we know that Hasted, too, has not been duped?

Josephson: I don't think Taylor had the same kind of experimental arrangement where the person was not touching the metal.

Omni: How do you defend yourself against your scientific critics?

Josephson: There's a difference between one's official published work and what one talks about in discussions. I don't put these speculations into my published work unless there's some way that the speculations visibly fit in as correct explanations. In the other kind of situation, one just registers disagreement and waits for science to resolve the question in whatever way it may.

Omni: What about private reactions to your ideas?

Josephson: Well, some people are quite interested, but probably the majority are not very conscious of the issues involved. Discussions with people who don't share my openness toward the paranormal and Eastern mystical ideas don't get far. So the question about how I deal with their objections doesn't really arise.

I think most scientists have little sense of values and don't choose projects wisely, but only on the basis of self-advancement. A lot of research is trivial.

Omni: Have you found yourself ostracized because of your heretical views?

Josephson: Not particularly, no. And I think that when the papers summarizing my recent research in language learning are published, the normal situation will be restored anyway.

Omni: A number of other physicists are trying to integrate Western science with Eastern mystical traditions. How do you assess their efforts?

Josephson: I think a lot of the people trying to join Eastern and Western perspectives have a good quantitative picture of how things are. But no one has the mathematics to make this picture quantitative. And I think it's basically a mathematical problem. Someone has to find the right mathematics to fit the situation.

Omni: Are you actively working on a mathematical solution to this problem?

Josephson: No, not actively. It's a thing I would like to be able to make some progress in, but I don't devote much time to it.

Omni: Or waiting for the moment of clarity?

Josephson: Yes, and I think these powerful meditation techniques make such breakthroughs more likely. But not many intellectual people meditate. So there's a split between people who do science and people who practice meditation techniques to raise their consciousness.

Omni: Are you at all troubled by the ethical issues raised by the social consequences of your conventional and unconventional research?

Josephson: I'm fortunate in that these questions have never intruded to a noticeable extent in my own research.

Omni: Take the worst possible case: the strong likelihood that supercomputers using Josephson junctions may be involved in World War III. How do you feel about that possibility?

Josephson: Well, my work seems more likely to have defensive applications. Defense against incoming missiles, for example, would seem to be the main kind of military application. Not having made my discovery would have had virtually no effect on the arms race.

Omni: What is the scientist's moral responsibility toward his discoveries and inventions? Does he have any special responsibilities to prevent their misuse by society?

Josephson: I don't think the fact that a person happens to originate something new has any great bearing on whether he should try to prevent its misuse. I am against the misuse of all scientific research, not just my own. Of course if something you helped to develop had harmful social consequences, you might well have stronger guilt feelings.

Besides, I don't know whether the fact that you are the creator of a new idea gives you much influence over the way society uses it. I can't quite see what effect it would have if I were to tell IBM that it should stop developing high-speed Josephson junction computers because these machines might be used by the military.

I'm more concerned with expanding public acceptance of higher states of consciousness, which may help to produce a more peaceful world. But I do think that scientists are often irresponsible. Most scientists have little sense of values, and therefore they don't choose projects very wisely, but only on the basis of self-advancement. A lot of research is trivial when seen in any global context.

This goes back to a basic point about values. Perhaps one can change people's values so they will see that a certain kind of behavior is suitable and that socially harmful actions are not suitable.

Omni: How does one go about changing values?

Josephson: By increasing understanding. Values are based upon putting a given action into a wider context. If you can see more consequences of an action, then you'll be able to come to better judgments.

Omni: How would you seek to reduce the danger of nuclear war?

Josephson: Well, the intellect doesn't solve all these problems. It isn't just a matter of better understanding. There are forces that lie beyond the intellect. ∞

CONTINUED FROM PAGE 20

the list of scientific priorities for NASA and the planetary-science community

NASA did start with a request of $7.5 billion for 1983, enough to include the Venus mission. When the White House Office of Management and Budget (OMB) countered with a "mark" of $6 billion, the battle was joined. In late November, OMB told NASA to kill Galileo—which is set to get $120 million in the current fiscal year—and wind down the planetary program altogether. But one OMB source denies that the program was ever seriously threatened. "I don't think anyone going into the final negotiations thought they were going to come out without a planetary program," he claims.

Yet it seems that Galileo survived largely because at budget time the Jupiter probe had some potent advantages over several other important deep space missions that quickly fell by the wayside. The most obvious: Nearly $390 million had already been sunk into Galileo, a huge fiscal inertia for budget analysts to labor against.

The Galileo mission also was intimately tied to the fortunes of the Jet Propulsion Laboratory in Pasadena. JPL is the nation's foremost center of expertise on deep-space missions, and many of its top engineers had been scrambling for new jobs since the *Voyager* Saturn flyby was completed in July 1981. In President Reagan's home state, JPL is a valued employer.

With 1,200 jobs threatened, the California congressional delegation rallied 'round Galileo, as it would around any other grade-A government pork. Thirty-five members sent a letter to President Reagan, reminding him of JPL's importance. Representative John Rousselot (Republican) also sent two letters to presidential counselor Edwin Meese, noting that "JPL can play an important role in our country's future space and defense programs."

Many space scientists also suspect that Galileo got a boost from the Senate ambitions of California Governor Jerry Brown, a Democrat and an ardent space advocate. The administration, they argue, would be loath to hand Brown a potent campaign issue—the decimation of JPL.

The planetary program's defenders also played the defense angle. In early 1981, when it became apparent that deep-space missions were going to be an endangered species under President Reagan, NASA and the California Institute of Technology (which runs JPL for the space agency) agreed to devote as much as 10 percent of the lab's resources to defense work. Later in the year they settled on 30 percent.

It was easy to find a defense-related use for JPL's talents. The Air Force is known to be very interested in developing automated satellites able to perform for long periods with minimal guidance from the ground, much the same sort of capability that is required for deep-space probes. If JPL had been largely disbanded before those defense contracts started coming on line, it would have been very difficult to reconstitute the engineering teams.

Victor H. Reis, assistant director for national security in the White House science adviser's office, confirms that defense was among the issues raised in discussions of NASA's space-science budget. "We are trying to make space policy part of national policy," Reis says. "Everybody was pulling for the same thing, but from different perspectives. That's how the system works."

The space-science community sees it differently. The system, they say, kept alive a vibrant technological enterprise, but with little appreciation for the long-term scientific value of deep space missions.

NASA dabbled in some time-honored maneuvers during the budget process. According to one source, NASA's original request overstated costs of the shuttle program, forcing deeper cuts in other programs, including planetary missions.

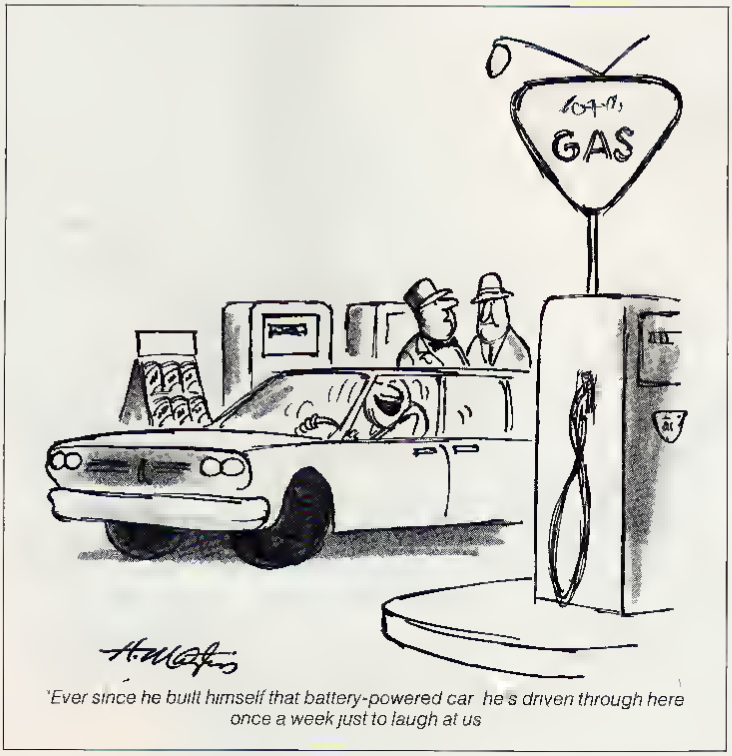
They played the Washington Monument game, same as everyone else," a source adds. In this ploy, agencies threaten to kill programs, hoping that a public outcry will force the White House or Congress to reverse the decision. NASA's Hans Mark declines to comment, other than to say that "we fought like hell to keep Galileo."

From a scientific standpoint, the outlook for planetary science remains bleak. NASA settled on a 1983 budget request of $6.6 billion, only $154 million of which would go to the planetary program—less than the price of a single B-1 bomber.

The budget problems make it necessary to plan immediately for future deep-space missions rather than endure new episodes of last year's chaos. NASA's Space Science Exploration Committee, an *ad hoc* advisory group, is pushing hard for more frequent, less expensive planetary missions funded at reasonably stable annual levels. A scaled-down Venus mapping mission would be a top priority, and Mark says that it might even be a candidate for a new start in the 1984 budget.

In the meantime the agency must deal with a lot of skepticism and bruised feelings among the planetary scientists. Dr. David Morrison, a former NASA space-science officer who is now at the University of Hawaii, notes that the planetary program accounts for only 3 percent of NASA's budget, yet it has opened up new worlds and challenged the imagination.

There were more than 30 American lunar and planetary missions in the 1960s, 11 during the 1970s, and just one—Galileo—now set for launch in the 1980s. Morrison is pessimistic about reversing that trend. "NASA is abandoning any pretext of a balanced space-science program," he says. "It is turning away from exploration, apparently prepared to resign its position of leadership in this field."



"Ever since he built himself that battery-powered car, he's driven through here once a week just to laugh at us."

EARTH

CONTINUED FROM PAGE 16

it became obvious that the technology that had brought things to this pass could no longer cope The service at last grew desperate enough to try something revolutionary

Though the old guard still balked years of experiment followed Test burns in the Southwest gradually increased in size until by 1981 the Forest Service was confident enough to burn some 80 000 acres of forest in California

The planning for these sizable prescribed fires says range scientist Lisle Green starts a year or more in advance Bumping heads with experts ranging from soil scientists to meteorologists, a fire chief first examines the region to be burned How hilly or uneven is the terrain? Is it the home of lofty Ponderosa pines or of low-growing clotted chaparral? Is the vegetation moist and flourishing or moribund and dry? Is the area bordered by roads rivers, or other firebreaks that will cut off the fire s spread at desired points, or will new breaks have to be created? All of these and countless other factors will affect the fire's intensity

Information in hand the chief then gathers the necessary equipment and assembles a crew of perhaps 60 men Generally he schedules the burn for winter or spring when moisture in the air and earth will make the area less explosively flammable As the burn time approaches the chief keeps in constant contact with the local weather service, waiting for the perfect day When the wind and heat are low enough and the humidity lingers between 25 and 50 percent the team will have an excellent chance of controlling the blaze

On a burn on March 10 Lisle Green's squad began atop Rouse Ridge a firebreak in San Bernardino National Forest Staring out over the canyons Green could see dense drying chamise brush stretching for acres like a vast network of timebomb fuses If this chaparral were not destroyed now he knew it would become tinder for an uncheckable wildfire by summer

Green watched as the workers cleared away brush on the predetermined borders of the burn When these firebreaks were completed the men mounted tractors, crushing and compressing the brush within the borders so it would burn at a leisurely pace At last a roaring copter equipped with a helitorch (the latest innovation in prescription burning) spat flames at the top of the ridge and a mannerly yellow fire crept downhill toward the green thriving plants hundreds of acres away The flames too low to consume this moister vegetation subsided as the last dried chamise turned to crumbling charcoal

Ideally Green says this sort of success can be orchestrated again and again Yet not all burns have been so smooth Some have escaped to become wildfires The venerable Biswell himself points to a burn that took place in Michigan a few years ago Foresters were using an intense fire to clear dead trees off five thousand acres in the jack pine forests he says A wind came up They ignored it and they ended up burning *fifty thousand* acres

But Biswell believes that rigorous new training programs along with step by-step burning manuals authored by Green and his contemporaries will stop prescribed fires from turning into wildfires As foresters hone their techniques and master new devices like the helitorch they will be able to burn exponentially more acreage at a fraction of the risk

Shortly after the turn of the century these modern firefighters believe they will have restored the forest to its original cycle Suppression techniques which must still be kept ready because of brush buildup will slowly be phased out and vegetation levels will be maintained by goats and other grazing animals as well as by prescribed burns

As California naturalist Kevin Wilby puts it, "For too long man thought he knew more than nature Now he ll spend the next couple of decades getting things back to just about where nature had them a hundred years ago ∞

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CONTINUED FROM PAGE 26

$10 000 per month for a satellite spot was paying $750 000 in monthly phone bills

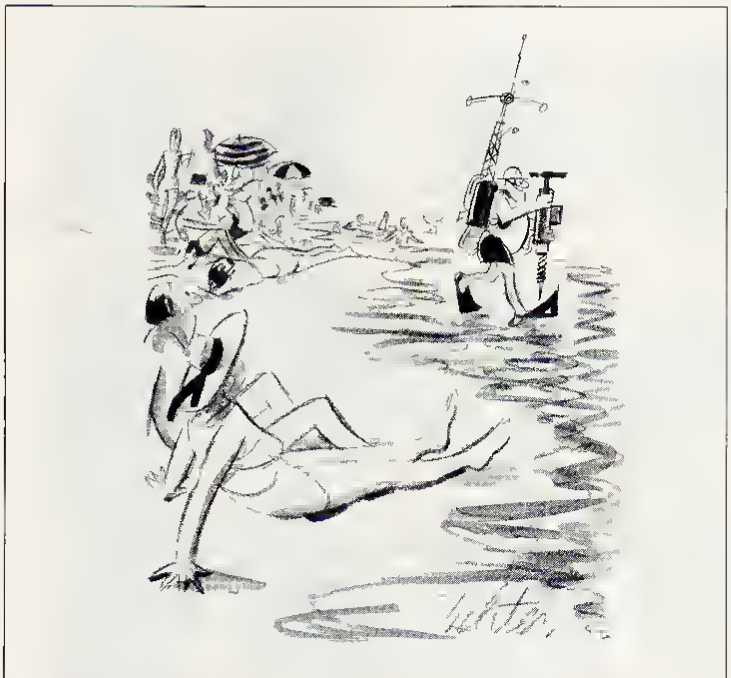
Satellite transmission also upgrades the quality of the signal from 5 to 15 kilohertz, which is so rich in high fidelity that no FM speaker can reproduce it faithfully NPR listeners can hear a jazz concert in real time as perfectly as the person sitting in the auditorium where it is being performed

The real bonus of satellite transmission however is that it liberates local radio stations from having to air programs decided upon by network chiefs in some other part of the country Unlike landlines satellites can transmit more than one program at a time NPR can now send 12 shows out over the bird and next year it will increase that number to 20 This means for example a Spanish-language program the Saint Louis Symphony proceedings at the United Nations and a radio drama can be broadcast all at once Last New Year's Eve NPR listeners were escorted 1,356 miles from festivities in Philadelphia to the Austin Coliseum As the party wound down in Texas they were instantaneously whisked to the studio of rock musician Chick Corea in Los Angeles—three time zones three New Year's Eves What NPR did that night was it transformed the nation into one enormous room

Frank Mankiewicz president of NPR says "We can say to our stations You decide Your listeners want news give them news You're a classical music station take the concert Or better yet run the news and tape the concert for use at a later time NPR is now working toward a 24-hour news channel and a 24-hour performance channel so that stations can tune in and out as they please

For commercial radio networks—like industry giant Mutual Broadcasting System with more than 650 local dish-equipped stations—being able to send out more than one signal means they can offer advertisers customized markets A national retailer can announce a sale on umbrellas in New York potting soil in Chicago and washing machines in Seattle

Every new technology breeds a new kind of millionaire Robert Wold who booked an early ticket on Western Union's Westar in 1975 was able to parlay that advantage into the largest independent buyer of satellite broadcast time For a fee he'll provide programming find advertisers enlist local radio stations and send them the show over one of his four privately leased channels It was his company that constructed a radio network specifically for last December's Rod Stewart concert carried by 85 percent of the radio stations in the United States Even NPR is planning to lease out its unused channels as it tries to survive on a shrinking congressional allocation



"I could have told them, once the big monopolies are allowed to come in the small independent oil drillers would follow"

Now that satellites have become indispensable manufacturers like Hughes and RCA can't build them fast enough By the end of this year there will be 15 communication satellites parked in geosynchronous orbit and the line to get on them is already around the block Last December RCA American Communications Inc put seven of its satellite channels on the auction block at New York City's Sotheby Parke Bernet Despite RCA's warning that the auction was subject to FCC approval the betting was fierce bringing in $90 1 million

Satellites have been classified by the FCC as common carriers This means that manufacturers must lease satellite space on a first-come first-served basis and charge similar prices for similar services Since the bidding ranged from $10 7 million to $14 4 million for identical satellite space the FCC stepped in and invalidated the auction forcing RCA to find a more appropriate means of selling its wares

Up to now the FCC has protected the small operator's right to satellite access But comments by FCC Chairman Mark Fowler that satellite carriers constitute "a severe government restraint on private business" have touched off rumors of deregulation According to Wold any alteration of the first-come first-served rule would discriminate against the smaller operator in favor of the "deep pocket" companies which would have the cash reserves to buy satellite space outright much like a condominium

Some owners of small radio networks such as Percy Sutton of Inner City Broadcasting feel the time has come to reevaluate the whole selection system Sutton would like to see satellite space awarded on the basis of a lottery in which qualifying companies would be chosen at random or by a comparative hearing where companies would be evaluated on their financial ability character programming and connection with the community "The first-come first-served rule favors the old boy network" says Sutton whose New York disco station, WBLS is the number one music radio station in the country "We all know that it's the giants who come first and the giants who are served first"

Sooner or later Mankiewicz surmises "I suspect that all networks will be using satellites But for the moment NPR is ahead And we'll be so for a long time" NPR is currently developing a system called Netque which will be able to automate radio stations of the future A signal sent over the satellite will turn on a local radio station's equipment to tape a program for later use or to open the local transmitter to air the program all by remote control There are already mobile uplinks that permit a signal to be sent into space from a dish affixed to the top of a van And by the turn of the century local radio stations may go the way of the vacuum tube as listeners who have receivers on their rooftops tune in their favorite music directly off the satellite ∞

mind

CONTINUED FROM PAGE 22

socializing with other children "Instead he would spend much of his time alone" said Schwartz "engrossed in an imaginary world Initially it consisted of thousands of what he called little people living in the walls of his living room

They would worship me like a king' Chapman explained And whenever the little people angered him Chapman would wreak havoc by pressing an imaginary destruct button on the arm of his family s sofa Usually however their sovereign king was benign and at times he would even stage imaginary concerts for his little people in which the Beatles would perform

In time Chapman's childhood kingdom became more democratic He became the president, not a king and his government consisted of a Senate, a House of Representatives a variety of committees and most important a cabinet to which he would turn for advice Although the little people were no longer prominent in his life they were not entirely forgotten When Chapman began considering the murder of Lennon in October 1980 he consulted his cabinet They didn t want any part of it ' Chapman later told Schwartz They were shocked

Despite the reassurances of child psychologists that imaginary companions are a sign of health in a very few instances there is some basis for the fear many educators and parents have expressed for generations Could these creations be signs of incipient psychopathology?

"It depends on how exclusively the child is devoted to them suggests Dr Bruno Bettelheim the world-renowned child psychologist, "whether they hamper or interfere with his adjustment to life Like fantasies in general within moderation, they are useful In excess they interfere If a child lives entirely in a fantasy world and neglects reality, then we have some cause for concern In adults, I would think the situation would be more serious The imaginary companions of deranged people are usually persecutory figures and can become very active

While a normal child may quite easily distinguish between the two worlds a disturbed child may not and there, says Bettelheim is the danger "Many a child will play Superman he says "but only the troubled child will try to fly down from the third-floor window That's the difference between a fantasy that s healthy and one that's destructive

But parents and educators who believe that the normal child with an active fantasy life has a weak grasp on reality are mistaken On the contrary his contact with reality appears to be strengthened by these excursions into fantasy Yale's Jerome Singer says "The development of a fantasy friend may be one of the first great creative acts of the growing child ∞

WE ARE RUNNING OUT OF SPACE

As we laud the recent flights of the Columbia, the first vehicle to *return* to space, we find the U S Space Program dying While the Soviet Union Japan, European nations, India and other nations are increasing spending on space technology and operations, the U S is paring back to e bare minimum.

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FICTION

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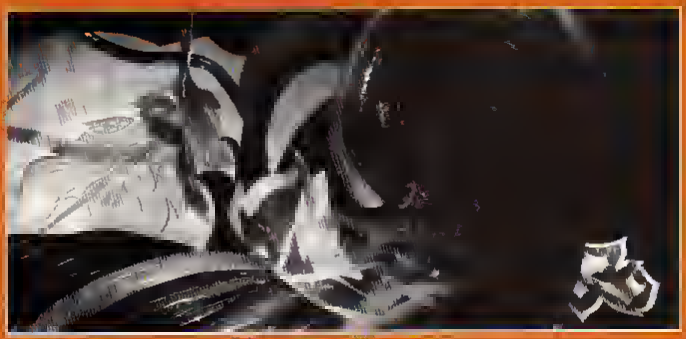

FUTURE TOWN

MICKEY MOUSE'S FUTURE TOWN—What began as a dream, a vision of the revered cartoonist and park builder Walt Disney has become what some say is just another amusement park. It's called EPCOT (Experimental Prototype of the Community of Tomorrow) and it was to be an experiment where a community of people would try out promising new technologies, a living laboratory. EPCOT has now become a theme park, a 'classroom of the future,' with Fortune 500 corporate sponsors and animated show-and-tell exhibits. Is this the Disney dream? Find out what the people who gave us Mickey Mouse have done with the future in *Omni*.

INNER VISIONS—Mankind must use the brain to study the brain. And many brilliant minds have struggled to illuminate the organ of intellect in its infinite complexity. To this end, researchers at UCLA Medical Center have pioneered a revolutionary technique that reveals the brain in vivid, three-dimensional detail and with unrivaled depth of focus. Their unique photographs create the illusion of penetrating inner space. Readers will marvel at the intricacy of a single brain cell or wander, bacteriumlike, through a forest of nerves that tower like redwoods. Don't miss this journey through the landscape of the mind in the next issue of *Omni*.

TINKERING WITH UTOPIA—Such technologies as genetic engineering, psychopharmacology, and brain implants promise a lot, but what will they deliver: better living through science, or a Brave New Future? As we edge closer and closer to the start of the next millennium, more and more people are beginning to ask themselves this question. In next month's *Omni* you can read about what some of the world's top scientists, such as Konrad Lorenz and brain control expert José Delgado, see as the likelihood of a man-made utopia, what technology will do to our sex lives, and why some fear that we may be the last of an imperiled species.

FICTION—In August *Omni* concludes its exclusive two-part excerpt of Frank Herbert's new novel, *The White Plague*. In this installment an anguished man's vengeance is beginning to be felt all over the world, and a special team of scientists tries to halt the progress of his genetically engineered plague. In addition, *Omni* introduces the Japanese science fiction writer Kono Tensei's work to American readers. Triceratops is a fine example of his famed "city naturalist" SF series.

BREAKTHROUGHS

CONTINUED FROM PAGE 110

cans. From Blanchut & Bertran, 8 Rue Eynard, 1205, Geneva, Switzerland.

Diamond dealers can invisibly brand their gems like cattle by using an ion-beam implanter borrowed from the microcomputer industry. The device, commonly used to produce microelectronic circuits, "writes" a hidden mark by inscribing the diamond with charged atoms. To reveal this identifying brand (which can be a letter, a numeral, or a symbol), the gem is rubbed with a soft cloth, thus creating a static electrical charge. The diamond is then dusted with powder which clings to the charged areas, exposing the identifying mark. The technique was developed at General Electric's Research and Development Center (P.O. Box 8, Schenectady, NY 12301).

Counterfeit German, British, Australian, and American currency can be recognized easily with a pocket-sized metal detector. When the Counterfeit Bill Detector, available from Cartwells Enterprise, Ltd. (11 Longacre Lane, Dix Hills, NY 11746), is passed over real legal tender, its magnetic sensor detects metallic particles in the bill's special ink. A tiny red light on the unit flashes on. If the bill is fake, it won't have the particles and the diode will not light up.

Reserving an airline ticket, checking on Dow Jones averages, or simply hooking up to your company's central computer can now be as easy as using a pushbutton phone. IXO, Inc. (6041 Bristol Parkway, Culver City, CA 90230) has developed a portable Telecomputer, which has a tiny typewriter keyboard and a slim liquid-crystal display. The pocket-sized device connects directly to a standard telephone to talk with any host computer. The friendly machine operates in ordinary English, instead of computer languages; addresses the user by name, and generates playful electronic sound effects as it works.

It is not quite Big Brother, but Channel Block-Out is a new dimension in video censorship. The encoding system, available on several GE television models, allows parents to program their children's viewing choices or block out certain TV signals for a 12-hour period, eliminating unapproved programs. The only danger is that savvy children might discover the code—and use it to censor their parents' favorite shows. From General Electric's Television Division, Portsmouth, VA 23705.

The Lullaby Lamb, a new stuffed animal developed in Japan, soothes newborn infants by playing an unusual "lullaby"—the sound of intrauterine blood flow. In laboratory tests, this "intrauterine lullaby" has proved to be a natural pacifier for newborn babies. From Mac International, 485 Main Street, Skokie, IL 60077.

CONTINUED FROM PAGE 26

That's somewhat right," Carpenter said to me when I read him this quotation. "We emphasize another aspect of it. A group of people are confronted with this problem—that one or more or all of them could be the same that is, be taken over by the Thing—and we concentrate on the amount of paranoia this produces between them. It's about losing your identity."

Losing your identity in the snowy wilds of Alaska seems like a simple matter as soon as you realize what you have to wear in order to get around in it, which tends to make you resemble everyone else—an insulated, bulky snowperson. (My own badge was a briefcase holding my cassette recorder, which made me feel almost as doltish as Scotty the hapless journalist who tags along with the Air Force in the 1951 movie.) Such elaborate apparel becomes necessary, though, only when you're up on the remote mountain where Carpenter is shooting, about 4,000 feet above sea level, not far from copper and gold mines and right next to a big glacier.

Back down the mountain, in the small border town of Hyder, one proves one's mettle otherwise. In more interior pursuits. At the Glacier Inn you can get yourself Hyderized with Everclear 190-proof corn liquor—free if you can down it in one gulp, the cost of staking everyone in the house to a drink if you can't. Rather than elect for either option, I content myself with coffee laced with 100-proof Yukon Jack. A taste born of hoary nights, when lonely men struggled to keep their tires lit and cabins warm," says the label, although the stuff is bottled in Connecticut.

Right across the border from Hyder is the town of Stewart, in British Columbia, where I'm staying along with a goodly portion of the cast and crew. A town of about 2,500 inhabitants that was much larger during the gold-rush days, Stewart had other traffic with film units before Carpenter's entourage arrived. Back in the early Twenties, newsreel producer R. J. Surratt filmed an old-time dance at the schoolhouse and local mining activity and much more recently Donald Sutherland, Vanessa Redgrave, and Richard Widmark came to town for location shooting on *Bear Island* (1979).

Now the stars are less plentiful. Only Kurt Russell, a veteran of the Disney studios who also played Snake, the lead in Carpenter's *Escape from New York*, is likely to be familiar to many filmgoers. A considerable portion of *The Thing*'s budget is being given over instead to elaborate special effects. Most of these have been created at Universal City Studios by an impressive team headed by Roy Arbogast (who did special mechanical effects on *Close Encounters of the Third Kind*), including Rob Bottin (designer of the special makeup effects in *The Howling*) and Oscar winner Albert Whitlock (of *Earthquake* fame).

On location between takes, publicity coordinator Peter Silbermann describes such fancy effects created there as a fireball racing down a corridor and a spinning floor inside the same snowbound compound. Here in Alaska, the main order of the day is getting Macready (Russell) to use a blowtorch to set fire to an apparently mad biologist named Blair, then blow up Blair's shack and a storage hut with TNT.

"I prefer working on a soundstage," Carpenter admits, standing outside the compound exterior, a facade lined with glittering icicles under a string of eerie blue lights. He also confesses that he misses some of the challenges inherent in low-budget shooting, where there's less of a tyranny of money, and it's clear that effects work isn't his favorite part of filmmaking. "I didn't like it on *Dark Star*, when I had sixty thousand dollars, and this is just as difficult."

Location shooting has its worries, too. In June 1981, while doing second-unit work on the Juneau ice field, he and his crew briefly found themselves snowbound again while en route down the mountain in a helicopter; he got caught in a snowstorm and experienced a white-out. "I'm not enjoying myself on this location. It's probably the hardest shoot I ever had. But so far the results have been really astonishing. They open the film up."

In the night sequences that are filmed next, which understandably have to be done in single takes, stuntman Tony Cecere, ignited by a blowtorch, crashes through a compound wall and window and into the snow where he staggers for several feet before dropping. Cecere is a specialist in getting roasted under see-through insulation for different movies, and this is his twenty-eighth burn in half as many months, but there's still a nurse from Stewart on hand just in case something goes wrong. Then Macready blows Blair's shack to bits with some dynamite—a blast loud enough to make me and much of the crew jump.

Finally the set gels cleared for the explosion of the storage hut—filmed by two cameras at 30 frames per second—which we watch from a distance, blossoming like a livid smear across the dark sky. It's a calm evening otherwise, but you'd never know it in the scenes being shot, which are all equipped with Ritter wind machines and plastic snowflakes spilled in front of them to ensure proper blizzard ambience.

Somewhat later Carpenter will respond to one of my queries—"Is this version of *The Thing* pro-science, like Campbell's story, or anti-science, like Hawks's movie?"—by asserting that he's trying to make his version pro-human. "It's better to be a human being than an imitation or let ourselves be taken over by this creature who's not necessarily evil, but whose nature it is to simply imitate, like a chameleon. But as I reflect on my icy ride back down the mountain, if the characters inside the compound are experiencing an identity crisis, the same might be said of the snowflakes outside. ∞

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GAMES

ANSWERS TO GAMES (PAGE 128)

1 FOOTPRINTS Before you step on it the sand is packed as tightly as it can be under natural conditions Your weight disturbs the sand making the grains less efficiently packed The sand is forced to occupy more volume and rises above the water level becoming dry and white The water rises more slowly by capillary action so it takes a few seconds or more before the sand gets wet and dark again

2 SKIPPING SCHOOL The first skip is short and to the right When the stone's trailing edge hits it pushes sand to the left the stone tilts forward and hops to the right Then the leading edge strikes and pushes sand to the right the stone tilts back and takes a long hop to the left and the cycle repeats The short hops appear to be missing when stones skip over water After the trailing edge strikes the stone planes along building a crest of water in front of it, then lifts out and makes a long hop It strikes with its trailing edge again and repeats the process

3 RAYS OF BUDDHA The sun's rays *are* parallel of course The "fanning out" is an optical illusion the same illusion that makes railroad tracks appear to meet at a point on the horizon Buddha s Rays are a more powertul illusion because of the absence of reference points It s hard to believe—even when you know it for a fact—that two rays high overhead and "so far apart" are just as far apart in the distance where they first "emerge" trom behind the cloud

4 INSIDE THE RAINBOW At the circle s center is the shadow of your head The droplets in a rainbow are on the surface of an imaginary cone that points straight to the sun, behind you and has its vertex at your eyes (In the case of nearby rainbows as in a lawn sprinkler you may be able to see twin, overlapping bows one from each eye.) A rainbow's arc is always 42° away from the line of sight between you and your shadow The full circle fills a visual angle of 84°, nearly a right angle

Alestair B Fraser says that most people are poor judges of visual angles Theretore, he ottered us this handy rule Stretch out your arm and spread your fingers The span of your hand is approximately 20° Thus, if you want to see whether there is a rainbow in the sky line up your outstretched hand over the shadow of your head, then flip your hand over once away from the shadow If a rainbow is to be seen in the sky it will be just a bit beyond the point marked by your second "handwidth"

5 BOW PEEPS No lens change is needed Your slides of a backyard rainbow may be exactly superimposed over shots of a bow many miles away As long as you don t change lenses, all rainbows will fill the frame in exactly the same way A 20mm wide-angle lens is almost but not quite wide enough to catch the full width of a rainbow s arc You ll need an even wider angle lens such as a fisheye to capture a full circular bow When you ride in an airplane and sit on the side away from the sun you may see in the clouds below a circle of colors centered upon the shadow ot the plane (in fact centered upon the position of your particular window in the plane s shadow) As many as five full spectrums have been observed and photographed The phenomenon is not a rainbow it is more technically called a "glory" or "the specter of the Brocken" For more on glories see the Greenler and Minnaert books mentioned in the Games column

6 FASTEST TAN Lotions used by sunbathers are of four main types (1) Moisturizers, such as cocoa butter baby oil, or mineral oil help soften the skin and keep it from drying out but they have no effect on tanning or burning (2) Opaque sunscreens that contain zinc oxide or titanium oxide block all light including ultraviolet They prevent sunburn but also prevent tanning (3) Some for example those with benzophenones absorb all ultraviolet and also provide no tanning (4) The final group containing such substances as *p*-aminobenzoic acid, selectively absorb a high proportion of the short ultraviolet rays which are most responsible for burning (wavelengths from 0 29 micron to 0 32 micron) They absorb fewer of the longer rays (between about 0 31 micron and 0 4 micron), which are most etficient tor tanning

After a few hours in the sun with no protection your skin may produce a relatively large amount of melanin the tanning pigment but you ll have such a severe sunburn that you can take no more sun After an equivalent time using an aminobenzoic acid lotion your melanin production may be at a lower level by comparison, but you will be comfortable enough to stay in the sun much longer so that your tanning pigment will soon surpass that of the bare-skin condition

Thus while all fast-tan lotions to some degree or another actually slow down the rate of tanning, this is little consolation to the painfully sunburned sport who must spend the last half of the vacation indoors

7 BEACH SUN Contrary to popular belief ultraviolet light reflects very little off water It is the high reflection off *sand* that contributes most to your increased exposure at the beach

8 IT S DONE WITH MIRRORS Archimedes teat is entirely practical It was reconstructed in 1973 by a Greek engineer who had 70 flat mirrors (each about 5' × 3') held by soldiers, who focused the sun's rays on a rowboat that was anchored about 160 teet offshore A few seconds after the mirrors had been properly aimed the boat started burning and was eventually enguifed in flames

9 SHOOT THE MOON If you bisect the moon with a long, straight stick it will point to the sun, just as it should The mentally extrapolated line tends to miss the sun because of an unconscious perception of the sky as an overhead spherical dome, something like the ceiling in a planetarium The effect is a common optical illusion

10 STAR LIGHT, STAR BRIGHT Light from the point of focus falls on the fovea that part of your retina most densely packed with color receptors or cones The rods which distinguish minute changes in brightness are located a few degrees away from the fovea Shifting your gaze allows light from the target star to be focused on the rod-packed area of the retina

11 FIRST STAR I SEE This story is a myth with no basis in fact Although most of the sky is blocked off the small patch of sky surrounding the star looks just as bright as it does when you stand in an open field to look at it

12 THOUGHT EXPERIMENT Isaac Asimov calculated the unexpected answer to this question to demonstrate how most people overestimate both the size of the moon and fhe starriness of the sky The area of the sky is about 41,200 square degrees and since approximately 6 000 stars are visible to the naked eye this works out to one star for every 6 9 square degrees of sky (The calculation assumes the stars are scattered evenly and not clustered as in the Milky Way and that atmospheric effects are averaged out so that stars are as visible on the horizon as overhead) The moon despite its dominant presence, fakes up only 0 21 square degree The odds are 33 to 1, therefore that the moon will cover *no* visible stars, no matter where it is placed in the sky In the long run you will have to repeat this thought experiment 33 times before the moon covers even one star

STICKY SPOON Jearl Walker s spoon trick demonstrates friction and adhesion "Water usually acts as a lubricant," he tells us "but in minute amounts it acts as an adhesive" The trick is easy Just dry your nose with a napkin to remove any skin oils, then breathe into the bowl of a spoon to produce a thin film of condensation Apply spoon to nose and resume normal conversation Walker recommends trying this on a first date "If your dinner companion cracks up you're in business,' he explains "If not, then at least you know what kind of an evening you re in for" ∞

CREDITS

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NEPTUNE'S RINGS

STARS

By Joel Davis

Once Saturn was unique, the only planet in the solar system with rings, as the old textbooks used to say. Today Saturn is merely unusual. Astronomers found rings around Uranus in 1977 and Jupiter's faint ring in 1979. Now the question is about Neptune, the last of the four gas giants. Does it have a ring? The answer for now is: Maybe.

Until the space telescope is launched in 1985 and *Voyager 2* flies by Neptune in 1989, the best way to search for Neptunian rings is by earthbound observations of occultations. An occultation occurs when a planet passes in front of a far-off star and blocks its light briefly. In that brief time astronomers can measure a planet's diameter, probe its atmosphere and look for any rings.

That's how astronomers found the Uranian rings, and how they're now looking for Neptune's. So far, data from three Neptunian occultations have produced some very interesting results. One occultation seems to have revealed a new moon around Neptune; others may have shown signs of the rings themselves.

In May of last year, Harold Reitsema and three colleagues at the University of Arizona's Lunar and Planetary Lab watched through two different telescopes as Neptune passed near a star. The planet itself didn't block the star's light, but something else did. For about eight seconds the star winked out completely and then reappeared. Reitsema thinks what his team found was evidence of a previously unknown moon of Neptune.

But surely it was an amazing coincidence that such a tiny body just happened to be in the right place at the right time to block out the star's light. This raises the question: Is it possible that what Reitsema saw was not a moon but a section of a ring? He says no. A ring occultation would have blocked the starlight twice. He didn't see two blinks. "We saw only one," he says.

As it happened, this particular occultation of Neptune was the second one observed that month. Two weeks earlier scientists Philip Nicholson and Terry Jones saw another from Mount Stromlo Observatory in Australia. Unlike the event Reitsema saw, this was a genuine occultation, that is, part of Neptune itself blocking a star. "We observed no events except for the planetary occultation, and that lasted for thirteen minutes," Nicholson reports. This negative result, he concludes, eliminates the possibility of there being opaque rings lying in Neptune's equatorial plane between two and five Neptunian radii from the planet's center.

That's fine, but how does Nicholson explain what he himself had seen in August a year earlier?

One night he and Jones, again at Mount Stromlo, observed another Neptunian occultation. Clouds had prevented them from seeing the beginning of it, Nicholson recalls, but the sky cleared up long enough for them to see the last part. As they watched the star emerge from behind Neptune's southern edge, they saw what appeared to be a *second*, brief occultation, one that could have been caused by a ring. Since no confirmatory observations have ever been reported, this occultation, he says, must be listed only as a "possible."

In light of the negative results of the two May 1981 occultations, Nicholson is right in being cautious. To complicate matters, Neptune has something the three other ringed planets don't: a big moon that's close by. Triton is large—at 3,800 kilometers (2,360 miles) in diameter, larger than our moon—and it moves in a bizarre orbit tilted at 159.9° relative to Neptune's equator. It also travels a retrograde, or backward, path around Neptune, making it the only major moon to orbit clockwise instead of counterclockwise.

For these reasons astronomer Anthony Dobrovolskis of the Groupe de Recherches de Géodésie Spatiale in France has noted that Triton would do strange things to any Neptunian ring. It is possible that if Neptune does have a ring, it lies in a nonequatorial inclination and is subject to gravitational warping by Triton. In that case, Neptune may wear its ring the way a cowboy wears his hat—high on his head and tilted to one side at a rakish angle, with the brim twisted up, or down.

Neptune without ring. The question now is: Does it wear the galaxy's biggest cowboy hat?

PHENOMENA

A pod of killer whales (*Orcinus orca*) glide silently through the waters of the Pacific, the white clouds of mist from their breathing holes hovering above them like ghosts. Photographer Bob Talbot spotted these near Vancouver Island, off the coast of British Columbia, while on a photography expedition for the American Cetacean Society. "I remember the day well. It was an exceptionally calm August afternoon. The setting sun provided a warm backlight for the blows." His fascination with the animals began five years ago when he and a friend cruised the Canadian Pacific waters in an inflatable boat, photographing what whales they could find. That onetime visit evolved into an annual pilgrimage to the whales' gathering spots to make a continuing film record of these animals. This scene was captured on Kodachrome 64, using a 200mm *f*/2.8 lens on his Canon F-1 camera. ∞

Physics for a summer's day (and night)

GAMES

By Scot Morris

For *Omni* readers in the Northern Hemisphere it is finally summer and time to enjoy days and nights outdoors. We *Omni* readers relax in our own special ways, of course. While our bodies may unwind, our inquisitive minds keep finding new things to wonder and learn about. Other people go to the beach to get suntans, we test the effects of ultraviolet on melanin. Others swim, we displace our body's weight in water. Others fly kites or throw Frisbees or play baseball; we study airfoils, gyroscopes, and trajectories.

Sure we do.

Here are some outdoor games for a summer's day. Most of them are adapted from Jearl Walker's *The Flying Circus of Physics With Answers* (Wiley). Walker, a professor of physics at Cleveland State University, writes the Amateur Scientist column in *Scientific American*. He cooks up some amateur science, at right.

1. FOOTPRINTS. Walk along a beach at low tide when the sand is firm and wet. At each step the sand immediately around your foot dries out and turns white. Why? The popular answer, that your weight "squeezes the water out," is incorrect; sand doesn't behave like a sponge. So what does cause the whitening?

2. SKIPPING SCHOOL. The ability to skip flat stones across the water is either a sign of superior coordination and dexterity or an indication of a misspent youth. We're not sure which.

It is difficult to measure the path of a stone across water, but if you skip a stone on the hard wet sand at the water's edge, it will leave marks tracing its path. The flight is surprisingly complex. Long hops of several feet alternate with short hops of just a few inches, and zigs to the left alternate with zags to the right. A right-handed throw with the proper grip spins clockwise and strikes the sand first with its trailing edge. Will the first hop be short or long? To the left or the right?

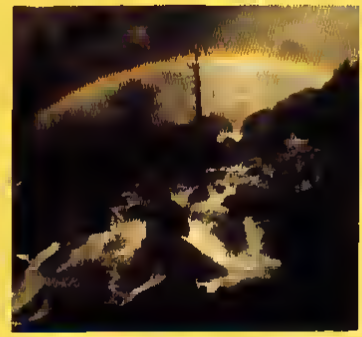
3. THE RAYS OF BUDDHA. Have you ever seen a sunset like the one shown on this page? When conditions are right, the sun's rays streak across the sky from behind a distant cloud or mountain as if the day's credits were about to roll up from the horizon before a final Hollywood fade-out. Meteorologists call these crepuscular rays or, more poetically, the Rays of Buddha. They always fan out from a point that seems to be just behind the obstruction.

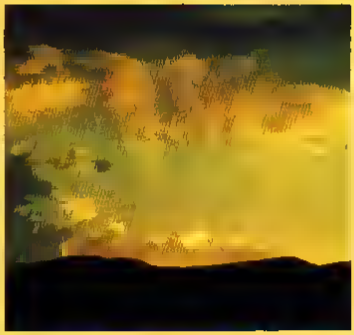
But wait. Aren't the sun's rays supposed to be parallel when they reach Earth? How does a cloud or mountain cause the rays to diverge that way?

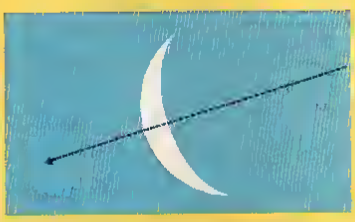
4. INSIDE THE RAINBOW. The rainbow is one of nature's most uplifting spectacles. Occurring as it does when sunshine meets suspended water droplets, as after a summer shower, the rainbow is a universal symbol of optimism. We most often think of a rainbow as an arc, round on top with legs below only because water droplets are rarely seen below the horizon. You can see full-circle rainbows if you stand near a waterfall or a lawn sprinkler or if your vantage point is "above the weather," as from a cliff or the top of a tall building. When you see a more familiar arc rainbow, like the one illustrated at top right, imagine extending the arc's curvature into a complete circle. What feature then will you see at the circle's center?

5. BOW PEEPS. The rainbow you see in a nearby lawn sprinkler is only a few feet in diameter, but the rainbow on the distant horizon may "touch ground" at points several miles apart. If you take a photograph of the backyard rainbow and find that it just fills the frame, will you need to change lenses to shoot the huge bow on the horizon? Camera buffs, what lenses do you estimate you'll need to capture a near rainbow and a distant rainbow?

6. THE FASTEST TAN. So you've got a two-week vacation at the beach this summer and you want to come back with the deepest tan possible. You've heard the evidence that excessive exposure to the sun increases the chances of getting skin cancer and contributes to premature aging, but you've decided to go for the tan and take your chances. You've seen ads for those "tan, don't burn" lotions, and while you'd be willing to suffer a little burn or even peeling if that would bring out your ultimate tan, you'd prefer to grease up with some product that will speed the tanning process. There are lotions that prevent a sunburn, but don't they prevent suntan as well? In fact, do any fast-tan lotions







Preceding page top to bottom a rainbow in the mist at the foot of Bridalveil Fall, Yosemite National Park Rays of Buddha or crepuscular rays a common sunset spectacle (what makes them diverge?) proper grip for skipping stones and path of a stone skipped across sand Above shooting an arrow from the moon to the sun (why does it miss?) Professor Joarl Walker demonstrates something to do with physics

increase the rate of tanning so that your skin produces dark pigment faster than it would with no lotion at all?

7 BEACH SUN You ll get more suntan (or burn) from a day at the beach than from a day in the backyard What is the main reason why your ultraviolet exposure is more at the shore?

8 IT'S DONE WITH MIRRORS According to a famous legend, when Roman ships attacked Syracuse in 214 B C Archimedes saved the day with mirrors He positioned soldiers on the shore each with a large mirror At a signal, they burned the Roman fleet by reflecting sunlight onto the ships (Arthur C Clarke later used the idea in a science-fiction short story "A Slight Case of Sunstroke " The hometown fans at a soccer game were each given a shiny souvenir program When one of the referees called an unpopular decision in favor of the visiting team the outraged hometown spectators burned the referee fo a crisp by directing the sunlight on him with their programs)

Fiction aside, is there any practical validity to the Archimedes tale? Whether or not he really tried to defend Syracuse with mirrors we probably will never know, but could his trick have worked? The feat is certainly plausible in theory, but would it, in fact have required so many men and so many mirrors that the story must be regarded as a myth?

9 SHOOT THE MOON Sometime when you see a crescent moon in the daytime sky mentally draw a line across its symmetry axis Shoot an "arrow" across the sky from the moon's "bow" (as illustrated) Does your arrow intersect the sun? It should but people commonly report that it misses by a wide margin Why?

10 STAR LIGHT STAR BRIGHT On a clear starry night pick out a relatively dim star and stare directly at it You'll find that the sfar fades away and may even disappear from view Then when you shift your gaze slightly to one side the star suddenly reappears Why?

11 FIRST STAR I SEE Is it possible to see stars in the daytime? Since Aristotle's time it has been claimed that a person standing at the bottom of a deep well or gazing up a long shaft such as a chimney can see stars in the daytime sky The shaft will decrease the total amount of sky seen allowing one s eyes to dark-adapt partially and thereby it is argued, to see stars in the small patch of light at the top of the shaft Does this really work?

12 THOUGHT EXPERIMENT On a clear night when the moon isn t visible the sky seems saturated with countless twinkling points of light Picture the starriest night you have ever seen and imagine that all the visible stars are evenly distributed across the vault of the sky, then try to remember how big the full moon is If the moon could appear at any random spot in this sky how many stars on the average would be covered up by the moon's disc? One? Two? Five? Ten? Twenty? Thirty or more? What s your best estimate?

Answers on page 124

ACKNOWLEDGMENTS

In preparing this month s quiz we have received valuable assistance from Jearl Walker physicist at Cleveland State University Alestair B Fraser Penn State meteorologist and author-photographer of *The Atmosphere* (Merrill) and Robert Greenler, professor of physics at the University of Wisconsin and author-photographer of *Rainbows, Halos and Glories* (Cambridge University Press) A classic source in the area of atmospheric physics is M Minnaert s *The Nature of Light and Color in the Open Air* (Dover)

We have finally found the source of the Equations Test, which we described here in April with answers in May The originator was Will Shortz the world s only holder of a bachelor s degree in *enigmatology* (Indiana University 1974) Shortz, a senior editor of *Games* magazine published the original test in the June July 1981 issue of *Games* a magazine that we heartily recommend to readers of this column

LAST WORD

By Sam Nicholson

"My Plan would save a zillion gallons of jet fuel and cut airport congestion by 99 percent"

At this moment I find myself in a sightless room within Waikiki's concrete canyons. A beach is supposed to be around here somewhere, but I don't have the energy to look for it.

More to the point, the planet does not have the energy to waste on meaningless tourism. Something has to be done, and I hereby propose a Plan.

It is based on the fact that this hotel room is identical to most other hotel rooms in the world. It could be in Miami Beach (which has a beach), Rio, London, Casablanca, Helsinki, or even at Kennedy Airport. Hotel rooms are clones.

I am not against *travel*. I myself am constantly in transit. But a *traveler* is not a *tourist*. The South Pacific islands used to accommodate travelers in a quite different style. The charming spice-scented lofty-galleried hotel at Suva. The wooden boardinghouse in a quiet village in Samoa. The real grass huts on Tahiti.

There used to be truly exotic environments, truly local food. The Pacific islands were out of this world. To a traveler they were worth the time and inconvenience needed to get there, and the occasional dangers. But that was long ago. They were fragile, disappearing cultures. They have been blasted away forever by the *vroom* of jets and the demands of tourists for homogenization.

The tourist does not want delay, inconvenience, rough seas, or exotic environments. He wants to see new places while living in luxury, and the tourist industry has obliged him. He has no real interest in indigenous cultures. Ask any tour guide where his flocks flock when he is not herding them. They head like lemmings for the shopping malls or hire taxis to sight-see the newest hotels.

Waikiki could be Des Moines or Phoenix. McDonald's is in the next hunk of concrete. Woolworth's is across the street. Gucci is up the block, and Sears and Penney are within easy reach. There are department stores, junk shops, and open-air markets selling gimcrack souvenirs everywhere. And the traffic noise and the blare of all night discos never cease.

The warps of culture aside, all this homogenization makes something else possible: my Stay-at-Home Travel Plan, which will cut out all this energy-wasting tourism. It works this way.

A tourist wishing to visit Hawaii would sign up for Hawaii Week at his local Hilton (or Hyatt, Holiday Inn, or whatever). On the appointed date he would drive to the hotel. On entering the lobby he would be greeted with a lei and be escorted to his room, where he would be served three spears of fresh pineapple on a lime leaf and would then settle down to watch the Honolulu newscasts by satellite or the game at the Hula Bowl.

Having been eased into the Hawaiian atmosphere, he would begin his tour via video discs, one island a day with maybe two days for the big island. The discs would give him the total picture, putting him aboard an interisland aircraft, showing him the air view, landing him at the next airport, ushering him onto a tour bus complete with a Polynesian driver to explain the scenery, the history of the island, and the first ten meanings of *aloha*.

The discs would also have intermissions for meals, which the tourist would eat exactly as he would eat in Waikiki—either at the McDonald's in the next hunk of concrete, the Woolworth's across the street, or the Pizza Hut in the next block.

Included in the tour package would be a luau beside the hotel's swimming pool, a hula extravaganza (plastic grass skirts and Caribbean maracas), and, for cultural balance, an afternoon choral performance by mission maidens in Mother Hubbards.

To prove he had really been on a Hawaiian tour, the tourist could go to the gift shop and buy one vial of coarse beige sand, one vial of sharp black grit, and one volcanic rock, guaranteed to bring bad luck unless mailed back within 48 hours.

For the expenditure of a few gallons of gasoline, the tourist would have experienced these pleasures of Hawaii (such as they are), or of Acapulco, or Barbados, or Sri Lanka, and so on. My Plan would save a zillion gallons of jet fuel and cut airport congestion by 99 percent.

Redundant airline personnel would be only temporarily unemployed. Stymied on Earth, resort speculators would then race one another to develop the moon, and that would require shuttle pilots, flight attendants, and mechanics capable of remembering when to change the oil. And because space construction would be efficiency-oriented, the waste of building materials would be reduced. Combined with the drying up of resort construction on Earth, this would conserve resources and lower homebuilding costs.

Best of all, from my Waikiki viewpoint, Hawaii could be rid of the tourist swarms nobody really wants there anyhow. Hawaiians could tear down the hollow echoing tourist mausoleums on the Kona Coast and stop wheeler-dealers from selling lots on still-warm lava flows. The Ala Moana shopping plaza (with room for 7,000 cars) could be lasered away and replanted with coconuts.

My Stay at Home Travel Plan would save fuel, electric power, and fresh water. It would reclaim exploited beaches and asphalted meadows. But it could not completely turn the clock back. To lie at anchor off Papeete in the silent flame-tinted dawn, with the morning stars still winking in the blue-washed sky, and the fragrance of hibiscus blossoms and vanilla brushed by wood smoke, drifting over the sea—God, it was Paradise. And it's gone forever.

Space is still pristine. The moon is unspoiled. Not for long, of course. Since I'm a blue-water sailor, not an astronaut, I'll never make it out there in time. ◘◘