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THE FIFTH FORCE: A NEW LOOK AT THE REALITIES OF ANTIGRAVITY



GRAND ILLUSIONS: WHEN SCIENCE AND MAGIC MERGE ALICE MILLER: THE TROUBLE WITH FRIEND, VIOLENCE, AND CHILD ABUSE





FIRST WORD

By Hugh Downs

It was as if we had decided to grow apples, worked long and hard to plant an orchard, brought in our first abundant crop, and said, "Now let's chop down the trees for firewood." •

1992-1993. After a year of discussions, the National Commission on Black Issues issued a blueprint to change our mind, and directing ways forward, to help support education, job training, economic action in the early 1990s, return to the north by the year 2000, and place a speech cable on Mars by 2015. And all these efforts can be linked by an unrelenting, that is, a system that will permanently establish humanity as a intelligent species.

I mean, on the plain, and it deserves
worth supports both from the government
has requested it and from the American
people. Indeed, it seems destined for the
general oblivion we reserve for barbaric
and remote and former vice presidents.

To see the future we get now, looking to the past, we head one back to the past toward the end of his life. Wornier von dem Baumgarten was reminded of the justice program after our initial brain meeting. It was, he told me, as if he had decided to grow apples, worked long and hard to plant an orchard, brought in an abundant crop, and then said, "Well, we did a slow little drip-down the hose to feed you." A year after our last meeting, there was little left of our orchard justice program but the dying skeletons of apple trees and vines.

Space expenditures, more than a dozen, troubled NASA's ability in building the shuttle when NASA was forced out of its ideal budget by shrinking development and research work, but added several hundred million dollars to the shuttle cost. The problems that destroyed the Challenger were threefold: not because they were the best available—originals considered them the best available at the time—but because they were the best available—but because they were the cheapest.

By all accounts, these professionals proved NKVD budgets for basic necessities were padded at least four times by 1940, the year's peak, showed no sign of recovery. The only major project on NKVD drawing boards is the space station. Once intended as a major advance over any satellite facility yet built, satellites reportedly have passed the design stage to something resembling the Soviet Mi-6, and are just now

If the United States is ever again to lead in space, under the guidance it has allowed these last 15 years, success will come as Apollo did—*as a one-off*—in response to the trumpet of others. We may have that chance when the Soviet Union lands men on Mars, a place that was established before Apollo reached the moon and that is off the schedule. But as we have seen, success without commitment is nearly lost.

But what of subjects with compromise? The past also suggests what can be accomplished by a government dedicated to the future. Until 1945, half had crossed the continent of Africa on the peace of the post-war order. Another were the trail

dangerous life of landmines. They could either be digging them because no one could safely go, or could be used to clear the area.

Yet in 1973, he told about a woman who "had been told she should leave San Diego to visit her birthplace in Indiana, across America. She had made the thirty-mile train journey from her home but it took her a year to reach her destination, after five broken four-hour trips. She could make that trip between 1915 and 1918, the federal government had the wisdom to sponsor aerial mail, but that could support the creation of fast, reliable airplanes capable of carrying little payloads. When World War I demanded even more sophisticated aircraft, the basic technologies had already been developed.

Chenoweth in 1973 could not have imagined that flying to New York, some 25 million people per year now cross the Atlantic by air or that cargo planes today carry everything from canned chickens to fresh fish. They supported aviation out of the faith that a powerful new technology would introduce private users.

Similarly, there should be little need to move a case for the major status of the space program—space itself will eventually provide the wisdom of going there. But even for those inclined to ignore the space program, has already proved its worth. Not just Jansky and Vesco but the entire computer industry as we know it (much of today's medical technology) and undoubtedly newer benefits have been developed from it. Chile's Economy once calculated that each dollar spent on space had returned five dollars to the national economy in the form of new products and new jobs.

in looking for a nation to ally with. Apple was even more impossible. The United States led the free world not because it had more atomic weapons than the Soviet Union or because it had such allies as the Shah of Iran. It did because it had won the respect of people the world over.

As a great power, the United States has often felt compelled to intervene in the affairs of other nations. We have moved militarily to restore democracy to Grenada; we tried to bring peace to Lebanon; and we now feel it necessary to drive the Sandinistas from power in Nicaragua. More often than not, we have succeeded only in proving that we cannot run the world—either single-handedly or in cooperation with others.

But we can all provide the leadership that the world surely needs. To be effective it must be leadership by example: by the accomplishment of great deeds for the betterment of mankind. A renewed space program is a key part of the leadership. The report of the National Commission on Space is the plan to begin.

Figure 2. Schematic diagram of the proposed system. The system is designed to be used in a laboratory setting. The system is composed of a computer, a camera, and a projector. The computer is connected to the camera and the projector. The camera is used to capture the image of the object. The projector is used to project the image of the object onto the screen. The system is designed to be used in a laboratory setting.

CONTRIBUTORS

OMNIBUS



SCHACHTER



MAY THE FORCE BE WITH YOU



GRAND ILLUSIONS



BEYOND THE CHALLENGER ERA



WOLKOFF

Having read Alice Miller's *Thou Shalt Not Be Aware*, a book about child abuse, one Omni staff member recently recalled incidents from his own childhood. His stepfather, he says, had been a prison guard who never seemed to be off-duty. At home he treated the oldest son as if he were a convict, verbally humiliating him in front of the family until the boy thought of himself as a criminal. With no sense of self-esteem, he grew up expecting to be ridiculed for every endeavor.

"Such personal responses to Miller's work don't surprise me," says psychotherapist Diane Coxson, who conducted this month's interview with the Swiss psychoanalyst (page 72). "Everyone has a history, and her readers seem to identify with her work." As Miller points out, we're all made to feel responsible for anything shameful that happens to us. But she believes the root of violence lies in the trauma of childhood and that the trauma is reactivated repeatedly. "Since discovering her work, I've used her theories in my own practice," Coxson says. "In order for the patient to make progress in therapy, the analyst must be supportive and let the child reemerge."

Miller notes that her theories took shape after she began releasing spontaneous creativity in her paintings. It was then that she became reacquainted with the child in herself. Yet, interestingly, she will not talk about her own childhood.

Bruce Schachter, who wrote "May the

Force Be With You" (page 36), definitely believes there's a child inside him—"and sometimes not so much inside," he adds. Schachter, who has a doctorate in theoretical particle physics, now reports on Purdue University physicist Ephraim Fischbach's theory of a force of nature that may counteract gravity. If Fischbach is correct, it could lead to a unified theory of the universe, something physicists have eagerly been seeking ever since Albert Einstein developed his theory of relativity.

"I always try to bring myself back to the uncritical state of childlike wonder," Fischbach says. "We're all burdened with learned prejudices, but I try to undo what I've learned in order to recapture that special spirit of fascination."

In the art of magic, of course, conjurers remind us that there are still things in the world beyond our understanding. In the past, magical tricks using scientific developments inspired inventors like Alexander Graham Bell. In the twenty-first century, however, magicians may not be able to compete with technology, according to magician Ricky Jay, author of *Learned Acts and Fineproofs: Wonders (Villard Books)*. For "Grand Illusions" (page 44) Jay spoke to such beguiling performers as Doug Henning, David Copperfield, and Penn and Teller. Their opinions vary, of course, but whatever direction future magic takes, it will still appeal to our childlike sense of wonder.

A child looks at the world with a sense

of wonder and curiosity without any preconceptions. Richard Wolkoff says. And that childlike quality aids the writer in the initial approach to a story. For "Beyond the Challenger Era" (page 62), Wolkoff focused his curiosity on current and former astronauts and their opinions of the space program and its management. Following the investigations into the Challenger accident last year, the space news have demanded to be heard. And after years of neglecting its astronauts, NASA is listening and making changes based on their recommendations. Despite the 1986 tragedy and later disclosures of flight mismanagement, Wolkoff notes the allure of flying in space still has a powerful hold over everyone.

English author Dave Barker likewise has a powerful hold over his readers. "What he does makes the rest of us look like we've been asleep for the last ten years," Stephen King has said. "His is original." What makes him—and his stories—so gripping is the way he takes ordinary people and hungrily exposes their animal urges. The urge for polymorphous perversity, for pleasure, for the satisfaction of appetite, for fascination and curiosity, are what motivate me and my fiction," Barker says. "And I don't care to cover my feelings. I want to articulate them and speak directly." Barker's Children (page 48)—an atypical Barker story with no blood and guts but possessing great charm—is from his collection *In the Flesh* (Poseidon Press). **CD**

THIS BRAIN'S FOR HIRE

FORUM

Orrin welcomes speculation, theories, commentary, dissent, and questions from readers in this open forum. We invite you to use this column to voice your hopes about the future and to contribute to the kind of informal dialogue that provokes thought and generates breakthroughs. Please note that we cannot return submissions and that the opinions expressed here are not necessarily those of the magazine.

Today we chuckle at the nineteenth-century system of phrenology, with its attempts to diagnose personal traits and qualities by individual patterns of cranial bumps and depressions. What's less well-known, however, is that phrenology was begun by Franz Gall as a serious study of cerebral localization—and his legacy endures in modern research. Brain structure does affect brain function. Yet it's those caricatured novelty-store "brain charts" that most people tend to conjure up when they think about the brain's functions.

And it may be these very same cartoon versions of modern neuropsychology for which the presenters will be remembered, due largely to the efforts of commercial popularizers who now hawk "brain training" books, tapes, courses, and seminars the way Dietrichs and red wine promoted in their time.

Actually, this phenomenon stems from two seemingly unrelated developments in the last decade or so. One is the growth of interest in brain research itself, particularly in the roles of the two cerebral hemispheres in thought and behavior. The other is the exponential upsurge of just about everything. Virtually every new idea is pressed into service for quick, fix financial applications.

Consider a recent popular book called *Whole Brain Thinking*. Sounds innocent enough, even a bit yin-yangy until you get to the subtitle, which lays down the bottom line: "Working from Both Sides of the Brain to Achieve Peak Job Performance." No mush-minded alpha-helmet types need apply. This volume—which the blurb tells us is based on a seminar

given by the authors—is full of suggestions for determining whether your company is left or right brained; for neuropsyching-out your coemployees with a Brain Preference Indicator; and for employing various brain "exercises" to achieve optimum hemispheric integration thus maximizing executive efficiency and worker productivity.

Or how about a managerial training course that, not satisfied with a simple left-right metaphor of brain functioning, lets the participant determine his or her own "dominance profile," which is then plotted—sort of like an astrological projection chart—on a multicoordinate graph? Instead of sun, moon, and rising signs, however, we get a personality profile in terms of left mode versus right mode and cerebral versus limbic. A cerebral-left type would be skilled at logical thinking, analyzing facts, and numerical processing. A limbic-right type specializes on gut reactions and interpersonal influences.

Yet another system goes as far as to combine the fringe brain concept of pioneering brain scientist Paul MacLean with the cerebral-hemispheric model of brain researcher Roger Sperry and neurosurgeon Joseph Bogen and (for good measure) a frontal-posterior dimension. This yields the Pento-Brain, a "whole-brain model of the human biocomputer." Now you can identify not only your limbic system and your left and right hemispheres but your mammalian and reptilian psychosides as well. But it takes some ingenuity to turn all this into a practical system of business management.

The problem, of course, is not whether any of these schemes and manipulations actually work. Deciding whether a business merger or a problem in employee relations calls for an analysis or a global strategy may, in fact, be a very good first move. It's just that the use of brain metaphors to back up these ideas has essentially nothing to do with their effectiveness. At best, neuropsychology is irrelevant, because we're only beginning to understand the cerebral bases of the brain's complex processes. Certainly

with nowhere near being able to prescribe methods to change cerebral dominance. Besides, if it works, it works whether or not you invoke the brain as an explanatory metaphor. At worst, neuropsychology becomes trivial nonsense. For instance, do you really believe that the reason for the postwar economic success of the Japanese is that they use a more "right-brained" business approach than America executives do? Has anyone studied Lee Iacocca's limbic system lately?

So why not just train people to be better at what they want to do and leave the brain out of it for now? Because the brain is very hot com, that's why. When you've got something to sell, peg it to what people are buying. And as long as brain-fogged products and services appeal to the upscale managerial market, we're going to see more of the same.

Not that this is all a bad thing. Just as bad diets can sometimes lead to knowledgeable health practices, as consumer sophistication in the brain-be-grows people will be challenged to learn more about how—and why—their brains actually work the way they do.

The downside, however, has to do with another aspect of the phrenology story Gall remember: was a serious brain researcher who believed that subtle differences could be traced to different brain regions. Today we know better—a little better, anyway. Gall, however, at least made the study of brain structure and function respectable. But all that was almost undone by an ornate disciple, Johann Spurzheim, who believed in making the most of a good thing while it lasted. Spurzheim traveled the world touting phrenology as a self-improvement system for strengthening the "moral and intellectual organs" of the brain by proper training. Sound familiar?

The morals: 1) Everything old is new again; 2) as in the world of diet pills and no money down, caveat emptor applies to the brain consumer as well.

Laurence Miller
Professor of Neuropsychology
Seton Hall University
South Orange, New Jersey

WORLDLY HEALERS

EARTH

By Carole Douglas

Buzz saws will topple the last of the great tropical forests by 2087. Along with the trees will vanish a million or more other species. Plants and creatures that might have helped cure cancer, halt AIDS, and produce petroleum substitutes, insecticides, new fibers, and foods will be gone. Such rampant destruction of life forms will snap subtle links in the earth's great web of life, the web that helps produce the very air we breathe and the climate in which we live.

No longer will the majestic forests take in carbon dioxide in their foliage. Massive quantities of carbon dioxide—emitted by coal, oil, and trees as they burn—will produce a greenhouse effect gone wild. This atmospheric aberration will warm the earth and lead to climatic changes that may contribute to worldwide flooding and famine early in the twenty-first century.

We seem headed toward an environmental nightmare. Yet, undaunted by the gloomy headlines, researchers around the country are adapting the best of recent technological know-how to heal

the earth's wounds. A new corps of environmental visionaries is at work, gaining support from sources ranging from nonprofit organizations to venture-capital firms. They span the sciences—from zoology to microbiology, ecology to biotechnology—applying technology to such diverse aims as saving endangered animal species, revitalizing desolate lands, and detoxifying polluted water.

Betsy Dresser, a Ph.D. in reproductive animal physiology and director of research at the Cincinnati Wildlife Research-Federation, is equally at home shooting headlines into a wild ring with a blowpipe or lecturing on animal reproduction. Dresser's mission is simply put: to preserve life on Earth. In her quest she is perfecting brave-new world techniques of reproduction to help endangered animals multiply. These techniques include freezing sperm and embryos, producing test-tube babies, cloning, and embryo transfer. High-tech births are now commonplace in the livestock industry, but applying such techniques to wild animals is an idea new to science.

Dubbed Dr. Noah, Dresser hopes to save many thousands of animal embryos frozen in suspended animation, in an "ark" that will weather centuries. "It's still a major event to produce one or two offspring of exotic animals by these methods," says Dresser. "We have to learn a lot about the reproductive physiology of each species. Just figuring out what the estrous cycle is and what hormones will influence it can be a big job."

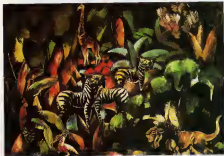
Deploying her toothy grin and quick laugh, Dresser talks about Mom. This mom, though, is a gray Cinnamon husky cat and surrogate mother. Her four fuzzy kittens are the first in the world to be created from frozen embryos.

Working on Mom helped us develop non-surgical embryo transfer and embryo-freezing techniques in cats," Dresser says. "Soon we hope to use domestic cats as surrogate mothers for endangered wildcats." Dresser plans to flush embryos from the endangered Indian desert cat and the rare African jungle cat and transplant them into domestic cats. Embryo transfer can increase the population of a dying species far faster than ordinary mating would.

Dresser hopes to also enlist lions to incubate rare tigers, while rhinos to bear endangered black rhinos, and hard-to-mate gorillas to deliver their own test-tube babies. Already she has successfully used an island—a common antelope—as a surrogate mother for an endangered bongo antelope, and recently Dresser traveled to Kenya and exchanged embryos between American zoo bongos and wild African populations, again using island re-surrogates to help boost the bongos' numbers.

There is an urgency to Dresser's tone as she says, "The public doesn't realize how fast we're losing wildlife to destruction of habitat. With frozen zoos—banks of frozen embryos and sperm—though, we can hold in one room the genetic material of all the aces in the world."

John Todd is as dedicated to restoring habitats as Dresser is to preserving animal life. A self-proclaimed "biological explorer," Todd was trained in agriculture



Someday: Frozen zoos will be thawed to repopulate the jungles and savannas of the earth.

THE EXODUS INSTITUTE

SPACE

By Edward Regis Jr.

At first glance the structure looked like just another office building in Rocky Hill, New Jersey: a small residential community a few miles north of Princeton. Once a rocket engine factory, the single-story structure has wraparound windows that look out on a parking lot. No one would guess its occupants spend their days plotting the migration of humankind into space.

But inside the Space Studies Institute (SSI) the decor is decidedly futuristic, from ultramodern furniture to wall art of orbiting space cities and lunar colonies.

The people here are not idle dreamers. Their goal is to show that money can be made in space, a feat that they hope will encourage people to leave the earth in the same way prospectors emigrated to California during the gold rush days.

And the people at SSI are in a hurry. They want to see space migration take place during their lifetimes. Today SSI is quietly establishing itself as a clearing house for information on commercializing space, as a catalyst for biannual symposia on space manufacturing and as a

research institution in its own right. Our mission is to do practical, nuts-and-bolts research," explains SSI vice president Gregg Maryniak. He hopes the research will bring space commercialization into full bloom on the moon.

"The moon is full of the resources that you need for building space stations, solar-powered satellites, and space habitats," Maryniak says. "What you need up there first are tools that will allow you to utilize those resources."

Unlike some space-advocacy organizations, which focus their energies and finances on lobbying and pickinicking, the institute concentrates on science. It keeps administrative and public relations costs to a minimum, spending the bulk of its \$300,000 annual income from membership fees and donations for underwriting studies and research projects. To date, the most promising project has been an ingenious electronic cannon called a mass driver.

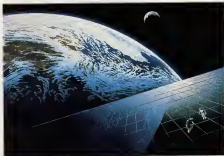
One of the biggest obstacles to developing space has always been the expense of getting materials up there. It

costs thousands of dollars per pound to send material into space on the lip of a rocket or in the cargo bay of a shuttle. Wouldn't it be nice, thought SSI founder and Princeton University physicist Gerard K. O'Neill, if you could do away with the launch vehicle and just shoot things into space?

The SSI mass driver is a prototype of the cannon that may do just that: once we settle the moon. A simple device, it has two parts: one stationary, one moving. The stationary part features a series of electric coils put together in the shape of a gun barrel; the moving part is a reusable payload-carrying "bucket," a disc that is accelerated through the coils by a wave of electromagnetic force. The electric pulse from each coil accelerates the bucket until both the pulse and the bucket are blazing along at a blinding speed.

The model Mass Driver I (at SSI) can send the bucket zooming through the coils at 300 miles an hour. A mass driver set up on the moon's surface would be much larger—about half a football field long—and many times faster. It would hurl minerals mined from the moon at the rate of 5,300 miles per hour. A mass catcher in stationary orbit around the moon would collect the ore. A funnel measuring some 200 feet across, the catcher would snag the flying packets of ore and load them into a processing plant. In would go the ore, and out would come whatever you wanted: beams, spars, girders for space stations, maybe the parts for another mass driver.

The mass driver is only one example of the manufacturing technologies SSI researchers are working on. Standing in the parking lot is an ordinary-looking flagpole. Visitors to the institute are sometimes shown the flagpole because it is made of a fiberglasslike composite fashioned from the kind of glass that is readily available in the moon's rocks and soil. "People used to think of making space structures out of metals," Maryniak says. "But now we're thinking in terms of glass composites. Aluminum beams would warp because of the temperature differentials on the moon. Beams of



Solar-power satellite. Once space projects like this are begun, space colonies will follow.

IN SEARCH OF CAMELOT

BOOKS

By A.J.S. Rayl

In 1932 two-year-old Norma Lorne Goodrich received a gift—a copy of Alfred, Lord Tennyson's *The Idylls of the King*. It was the child's first book—and her introduction to King Arthur, the once and future king who ruled over a near-utopian empire called Camelot.

Despite most scholars' having shuffled Arthur into the world of mythology, Goodrich never doubted his existence. And her conviction eventually led to King Arthur (Franklin Watts), her fourteenth academic work and another best seller. "It's the first historical proof that Arthur lived," says Goodrich, professor emerita at the Claremont Colleges in Claremont, California. And the key that unlocked the doors was etymology.

Behind those doors, she discovered the real Arthur lived during the Dark Ages, not the Age of Chivalry, as a Christian, not a pagan, in a Camelot located in Scotland, not the south of England, and there he won his 12 battles as a seaman, not as a cavalryman.

Goodrich launched her *Dark Ages*

dragnet in 1985. She read, reviewed, translated, and sometimes retranslated ancient manuscripts. Sorting out the stories that seemed to be based—at least in part—on fact, she stripped away the mythology to get to the real world. With a manuscript like the twelfth-century *History of the Kings of Britain*, she had to correct the author's misreadings and misspellings. She extracted further clues from linguistics, literature, geography, archaeology, and anthropology.

Then, on Christmas eve, 1978, Goodrich settled down to revise a thirteenth-century Old French manuscript. Titled *Sone de Nansay*, it told the tale of a man who conquered Ireland and was crowned at the Gail Castle. Reading it was not difficult for Goodrich, who has a double doctorate in French and Romance philology from Columbia University.

Midway through *Sone*, Goodrich came across something that made her shiver: a description of the Gail Castle with at least 12 specific directions. It was the religious and educational center of Arthur's kingdom, but its identity had

been one of the world's most closely guarded secrets," she says. "Nobody ever had directions to the castle. Even in Arthur's day, you could find it only by accident. But nevertheless, there it was, right in front of me."

Goodrich was convinced that proof of Arthur's existence lay in such manuscripts. The earliest versions of the Arthurian story are not fiction at all, she says. "There is just too much precision in geography, history, politics, and customs. Every summer she traveled to Great Britain with her husband, whose knowledge of armies, battles, ships, and harbors proved invaluable. Together they spent hours in museums, drove down old roads, and followed overgrown paths. With the aid of ancient maps, they surveyed historic sites and sought out ancient monuments.

Such fieldwork allowed Goodrich not only to decipher locations according to existing landmarks but also to determine when a particular location was the same despite its having many different names in at least a half dozen different languages.

This was how she determined that Arthur probably had two principal Camelds, one of which was Scotland's Stirling Castle, the primary mustering spot for British forces through the years. The other was near the modern city of Carlisle in northwestern England. Camelot, it seemed, was wherever Arthur was residing at the moment, his identifying pennant with its clawed hammer raised above the highest tower. Indeed, in the Celtic language, Goodrich says, Camelot means "Fort of the Hammer," and Arthur was often referred to as "the Hammer."

Goodrich also discovered the real Round Table. And it wasn't a table at all, she says. The first mention of the Round Table in Robert Wace's adaptation of *History of the Kings of Britain* reads: "Fist Arlus in rounde table, and translates as Arthur made (or built) a tabled *rotunda*." In Old French the adjective follows the noun, so the noun in this case is *rotunde*, not table. Goodrich says, "Inaccurate translations had reversed the words and corrupted the meaning."



Fact or fiction? New research offers the first historical proof of King Arthur's existence



CONTINUUM

THE TRUTH ABOUT BLACK BEAUTY

Halvor N. Christensen has met the enemy, and it is Bambi. Also Black Beauty, Babar, Peter Rabbit, and other fairytales of beasts that give children an overly sentimental view of the animal kingdom. Indeed, the eminent professor of biological chemistry at the University of Michigan Medical School in Ann Arbor would have us believe that cute little kittens, talking ducks, and intelligent, introspective horses are waging an insidious antisience campaign in our very living rooms.

Some children's literature, Christensen warns in an article he wrote for *Perspectives in Biology and Medicine*, "presents a biology so sentimental and unreal that the reading or listening child is in danger of developing an emotional bias that could handicap him or her throughout school and life, even to the point of allowing recruitment for antisience crusades." In other words, animal-rights activists who besiege scientific laboratories probably got their ideas about monkeys from Curious George.

Perceptions of animals acquired in childhood—to a considerable degree, I believe, from stories," Christensen writes, "may derail the forward progress of medical research. For how is a scientist to uphold his Nuremberg Code obligation to test new therapeutic procedures in animals before applying them to persons when characters like Bambi have clouded the differences between animals and persons?"

"Bambi may do a lot of harm," Christensen said in a telephone interview. And the Walt Disney film version of it magnifies the faults of its thoroughly unreal biology. "In the story itself," Christensen notes, "the very issues on the tree speak their philosophic doubts about the meaning of their fall. If such anthropomorphisms were fair play, one might be justified in constructing a story about a dog that grieves because his life must be uselessly sacrificed at the pound rather than usefully in the laboratory."

Christensen is a dedicated researcher who took his recent, published stand against children's stories after writing some 235 scientific papers over the course of his nearly 50-year career. As a member of the Midwest section of the American Academy of Arts and Sciences, Christensen was horrified by the attitudes he encountered against animal research. He believes children's stories are at least partially responsible, and he calls for constant vigilance on the part of parents, grandparents, teachers, and

authors to counteract the use of offending stories. He's a grandfather himself, one who writes long letters to his grandsons, complete with pictures illustrating his love of nature. He now takes exquisite care in selecting books for their Christmas and birthday presents and notes the day he introduced his own children to Dr. Dolittle and Freddy the Pig. "My children enjoyed them so," he recalls. "But in retrospect they're not pertinent to my cause. They neglect the questions I don't like to see neglected: What are animals like? How much are they like or unlike us?"

Authors are lured, Christensen thinks, by the "easy money" in children's animal stories. If they insist on writing animal stories he feels they should follow three rules.

First, strive for "biological honesty." Everybody should take a page from E. B. White's book—the one called *Charlotte's Web*—which chronicles the exploits of a pig named Wilbur and the efforts of a spider, Charlotte, to save him from his fate of bacon and pork chops. What Christensen loves about this book is that it is "true to some of the harder facts of nature," especially Charlotte's bloodthirsty propensity for flies. Once Charlotte has narrated her natural history, including the scientific names for the seven segments of her hairy legs, Christensen can overlook her other, less biologically honest traits. To wit, Charlotte easily outwits the foolish humans around her by using a few choice words (COMING TERRIFIC, RADANT HUMBLIS) in her web.

Second, avoid gabby animals. Or as Christensen puts it, "If an animal must talk, the author might seek to adjust what is said to a level plausible for its understanding of its current experience." Probably the worst example in all children's literature was set by *Black Beauty*, who prattled on for several hundred pages in his well-known autobiography, expressing complex moral doubts.

Third, "signal the presence of fantasy" by mixing a few toy characters in with the animals. "We may recall that Hans Christian Andersen, along with other writers of children's stories, imbued not only animals, however sentimentally represented, but also toys, such as a tin soldier, with personalities in ways that perhaps guided the child against taking too seriously the attributes temporarily bestowed on an animal in the same story."

Wouldn't we hold A. A. Milne in lower regard today, given this argument, if Winnie the Pooh had been a koala instead of a teddy?—CAMA SOBEL



CONTINUUM



Why do people smoke? According to Dr. Pomerleau, nicotine causes a particularly effective coping response, providing smokers with improved alertness, memory, and overall performance.

NICOTINE RESPONSE

One explanation for the stubborn refusal of so many habitual smokers to give up the habit may lie in nicotine's peculiar ability to provide an effective "coping response," as the behavioral psychologists call it, to the demands of daily living.

One such psychologist is Orville F. Pomerleau, who teaches at the University of Michigan School of Medicine and directs its behavioral medicine program. He has spent 13 years in lab work and treatment of nicotine addicts, studying the effects of the drug on the human mind. Pomerleau has come

to the conclusion that the motives for smoking may be improvement in response alertness, memory and overall performance. He says smokers follow a pattern of arousal when they smoke, followed by a calming, tension-reducing state.

Some smokers can actually adjust their nicotine intake to enhance those effects selectively, which also adds to the allure of the cigarette. "They tailor their levels of smoking to the situation, although I don't think that they do it consciously," he says. Conversely, the absence of nicotine for the habitual smoker who decides to give up cigarettes leads

inevitably to "a difficulty in concentrating, anxiety, memory troubles, and a craving for nicotine that varies in intensity from smoker to smoker. That's one reason why so many people go back to smoking."

—George Nobbe

FISH TALK

Arthur Myrberg spent 15 years listening to four-inch-long damselfish talk. Now he has learned how to talk back by chirping at them in what passes for their own language: a series of popping noises, grunts and chirps of varying length.

Myrberg, a marine biology

professor at the University of Miami's Rosenstiel School of Marine and Atmospheric Science in Virginia Key, Florida, says he can even control some of the damselfish's behavior under laboratory conditions, a feat made all the more difficult because many fish simply clam up in lab tanks.

Of his work, Myrberg says, "What this suggests is that one day we may be able to understand, predict, and perhaps even control the behavior of more useful or commercially valuable species, not just for human use but also for the species' own good."

So far, Myrberg has learned the language only of the damselfish, though he plans additional work with other talkative species. The practical possibilities are endless, ranging from summoning them to waiting fishermen to warning them of environmental danger, even to masking the sounds of submarine military operations.



The talkative damselfish. A series of pops, grunts, and chirps

The darts-like vocabulary includes a popping sound, which establishes territorial claims; a short chirp, which is the male's mating call; a grunt, meaning it's time to spawn; at least as far as the male is concerned, and a longer, almost plaintive chirp, which is the cry of the rejected male, spurned by a female that won't enter his nest.

—George Nobbe

THE BRIGHT SIDE OF NUCLEAR DESTRUCTION

The ongoing threat of nuclear war, it has long been assumed, has darkened the outlook of Western youth. But if the results of a survey by a Canadian psychiatrist are indicative, things are looking up. In fact, concludes Dr. Frank G. Sommers of Toronto, our research suggests that kids who worry about nuclear war are psychologically stronger than those who don't.

Sommers surveyed 1,011 Canadian students aged twelve to eighteen, asking them a broad range of questions on future concerns. Of those, 10 percent reported that they thought about nuclear war on a daily basis and that those thoughts caused them a significant amount of anxiety. Yet that same group also felt the most empowered to do something to prevent nuclear war, and many of them reported that either they or their parents had taken some kind of direct and personal antiwar action. On the other hand, the much larger group



The most scared seem to cope best with the nuclear threat

(50 percent) that never thought about nuclear war also felt virtually unable to do anything to prevent it. "That," says Sommers, "is a red-flag finding."

"Personally," he concludes, "I'm much more concerned about the larger group that doesn't worry. The world could go straight to hell, and they wouldn't do anything to stop it." —[M] Linnren

PEAT CRISIS IN IRELAND

According to Gaelic legend, it was in the sixteenth century that the English cut down most of Ireland's forests, presumably so that the heather rebels would no longer be able to hide from the encroaching Englishmen.

That forced the Irish to start digging for peat—the first transitional stage that turns compressed plant growth into coal. And so it was that peat, a pungent material whose aroma pervades many a country lane and village, came to be used to heat little homes, to cook meals, and to fertilize small gardens. By the twentieth century the Midland peat bogs produced as much as 17 percent of Ireland's electrical power needs.

Now Ireland is running out of peat. In the last two years disastrously wet summers have cut the harvest. Thousands of bogmen are out of work, and the government

has promised a \$25 million loan to Bord na Mona, the agency that presides over an industry that some experts claim wears the emperor's new clothes.

One such expert is Richard Bradshaw of Trinity College Dublin, who predicts that Ireland's greatest natural resource—4,000 to 5,000 years in the making—may well be gone in 20 years. To ward off that possibility, he is looking to Ireland's mountains for a substitute for bog-land peat, which is stripped off in thin layers by enormous harvesters, milled into a fine powder, and then compressed into briquettes.

Mountain peat, however, rarely reaches depths of seven feet. Midland bogs go down as far as 29. In the Midlands, peat is easily harvested and easily transported. Not so in the mountains, with their ambiguous property claims, individual harvesters, grazing sheep cross-country bikers, and terrain that makes access difficult for heavy machinery.

The rate of erosion is accelerating, says Bradshaw. What we need is a man-aged area in which to measure the effects of climatic changes and soil erosion. The Wicklow Mountains would be perfect. —George Nobbe

It is precisely in its smallest and simplest structures that nature shows itself most perfect and accomplished.

—Piero della Fiesse

"Aggressiveness is the principal guarantor of survival."

—Robert Ardrey



Peat bog, Ireland's greatest natural energy resource, is fast disappearing, so Irish scientists are looking to the mountains



CONTINUUM



The giant clam: 100 pounds of hermatypid bivalve

GIANT CLAMS OF TONGA

Giant clams—some of them more than a yard long and weighing more than 100 pounds each—were a protein-rich dietary staple of the 170 islands that comprised the South Pacific kingdom of Tonga long before Captain James Cook renamed them the Friendly Islands in the 1770s.

Sadly, since then these huge clams have fallen on hard times. They are now considered an endangered species, threatened by overfishing and hungry gastropods alive. The clams are bivalves adrift in a sea of marine biological ignorance that Richard H. Cheshier hopes to clear up. He has come up with a three-year plan that might save these huge hermatypid bivalves from extinction by using an ancient taboo as an ecological tool.

His plan, which has the

blessing of Tonga's King Taufa'ahua, is to build three sets of two concentric circles of *Tridacna derasa* to use the species' proper Latin name. Two sets of circles will be placed off the Vavale islands, and the other, in the Ha'apai island group. Sety-six of the creatures will comprise the outer circle, 33 the inner one, and a single clam—the largest—will sit in the center. The configuration, for reasons long lost in Tongan antiquity, warns fishermen away. For equally obscure reasons, it stimulates the reproductive processes of the clam, whose increase in egg production is logarithmic. A single three-foot-long clam can lay more eggs than a million smaller individuals. Says Cheshier, who has spent more than 20 years in Oceania, "There is something especially wrong with the idea of the extinction of such a magnificent and useful species. What works for Tonga could work for hundreds of other Pacific islands." —George Nobbe

PRIMES AND LOVE

Software engineer Dave Slowinsky got a unique birthday present. Using a high-speed test program he wrote, programmers at Chevron Oil routinely trying out a supercomputer stumbled on the largest prime number (divisible only by itself and 1) ever discovered.

Programmers in Houston had been putting a new Cray X MP supercomputer through its paces when the machine suddenly came up with the 65,050-digit number, long enough to fill nine *Ozma* pages. The number, which starts off 1121212 and ends 1212121, took three hours to verify on the two-processor 400-million-calculations-per-second Cray.

Even more impressive to number theorists, however, is the fact that the figure is a rare Mersenne prime. Named after a 16th-century monk, Mersenne primes have the form $2^x - 1$, where x is also a prime number (for example, 7, which is $2^7 - 1$).



If you had a Cray supercomputer, wouldn't you use its 400-million-calculations-per-second capacity to win back your girlfriend?

There are only 30 specimens known, compared with billions of ordinary primes.

It is the fifth time Slowinsky's program has discovered a Mersenne prime since he launched it in 1989, when only 25 of the rare numbers were known. No one else has succeeded during that time.

Slowinsky's specialty is making computers run at top speed. "They told me only the fastest computers and cleverest programmers could have a hope of finding new Mersenne numbers," he says, "and I couldn't resist the challenge." He also hoped to impress a girlfriend he confesses. "She didn't marry me, but now I guess I can ask again!"

—Anthony Livnatledge

DEFEATING DEATH HORMONES

A mixture of synthetic hormones and minerals misted on the leaves of soybeans can help increase the plants' life span and boost yields by counteracting naturally occurring substances, dubbed death hormones, that apparently trigger the plants' deaths.

University of Michigan biologist Larry Nooden has spent the past nine years studying the regulatory mechanisms of soybeans focusing on the self-induced death of the plants when their bean pods are developing. Nooden says his new treatment, which includes hormones like cytokinins and auxins, helps soybeans to prolong their lives and also helps the plants retain nitrogen late in their life cycle.

He says the hormone—nomenclature might also be used as a misting agent on such supermarket vegetables as lettuce and spinach to retard spoilage. This use, however, would first require approval by the Food and Drug Administration.

Earlier in his research Nooden demonstrated that the size and age of soybean plants did not cause death. He once grew a 21-foot-tall soybean plant, compared with the normal size of two to three feet.

This and other experiments indicated to Nooden that a substance produced in the bean pods acts as a death hormone, killing the plant as the seeds develop. While studying this death agent, Nooden found that a natural cytokinin appeared to be working against the death hormone. Further experiments showed that a synthetic cytokinin in combination with a synthetic auxin produced even better results in prolonging the life span of soybeans.—Joel Schwarz



Soybeans: Now a pile is short-circuited their suicide.



Olmec head: Proof that the Peruvian Indians were African? No? Well, then, would you believe the Mexicans were really Japanese? That's the new theory of a specialist in pre-Columbian art.

ANCIENT JAPANESE MEXICANS

What was a Japanese wrestler doing in Mexico centuries before Christ was born? That's a question Alejandro von Wuthenau, a professor and specialist in pre-Columbian art at the University of the Americas in Puebla, has been asking himself ever since he found a terra-cotta statue of an Oriental athlete—dated between 1000 and 800 B.C.—in the mountains of Guerrero.

In fact, over the past 50 years, the eighty-six-year-old Von Wuthenau has found dozens of ceramic statues with Oriental features, some

dated from 2000 A.C. These artifacts, he insists, show that the Japanese visited the Americas long before Europeans did.

After finding so many Asian-looking faces, I began to wonder how these people arrived here. They could have come only by boat," he insists.

And recently Von Wuthenau announced the discovery of what he believes may be a replica of a sea-faring vessel used by early Asian explorers. The foot-long terra-cotta bowl contains ten ceramic figures, says Von Wuthenau, with distinctly Japanese faces.

Von Wuthenau also claims

to have discovered pottery showing ancient Africans and Jews. He believes the may point to a Jewish migration from Egypt to what is now Mexico around 500 B.C.

"The Peruvian Indians look very Asian, and the Olmec Indians have large African lips and heads," he points out. "This, plus the figurines leads me to believe that the Americas were visited by people from all over the world who settled from what is now Peru to Arizona. I think these ancient explorers probably came with a specific purpose in mind: to form a cosmic race. I call the process the great genetic lottery." —Sherry Baker

CONTINUUM

HERPETOLOGICAL HORROR IN THE GREEK ISLES

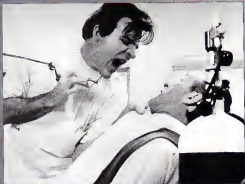
Long before the dinosaurs had vanished, the amiable leatherback turtle was plogging by night up the beaches of Laganá Bay, on the shores of Zakynthos in the Ionian Sea, depositing clutches of eggs the size of Ping-Pong balls in warm, wet sand.

As many as 800 leatherbacks, some weighing 240 pounds, still come ashore to lay their eggs and camouflage their nests between June and August.

But in recent years the leatherbacks, a threatened species, have gained in herpetological horror as a booming tourist industry on the west side of the island—population 36,000—has begun to disrupt their fragile environment with cafés and hotels, bright lights along the causeway, and the noisy thud of disco music. Some enterprising Zakynthians even started taking customers to



Leatherback. Basking on the beach at night. Bright lights and disco music.



For a long time, a root canal gave the dentist a little bit of a headache. Now a new injection technique cuts the killing time down from 45 or 50 minutes to 10 or 12 seconds.

the bay to watch the turtles. Their flashlights lightened the dry creature and disoriented their hatchlings, who sometimes headed away from the water instead of toward it.

These turtles are very easily disturbed, says John Behler, curator of herpetology at the Bronx Zoo in New York. A new piece of legislation is working its way through the Greek parliament in an effort to enable man and turtle to coexist. Says Behler: "On paper it will provide protection. But in actuality it probably won't really accomplish much when you consider the power of the development interests." —George Nisbete

ROOT CANALS AND GOLF BALLS

Gutta-percha, a rubbery, adhesive gum from the leaves of several Southeast Asian trees, has been used in dentistry since 1840 for root canal surgery.

But Andrew Michanowicz, an endodontist and University of Pittsburgh professor of dentistry, has developed a procedure that involves injecting the substance directly into the tooth with a disposable needle rather than using the current method of manually placing 10 to 20 gutta-percha cones resembling toothpicks into the canal. It's a technique that

saves both patient and dentist a lot of wear and tear, cutting the root canal filling time down from 45 or 50 minutes to 10 or 12 seconds.

"In the old days," says Michanowicz, "the dentist would kill the nerve, pull the tooth and build you a partial bridge. Today we remove the nerve, seal it off and remove the damaged tissue. Then we apply heat to the gutta-percha to soften it and inject it to fill the canal."

Gutta-percha is marvelous stuff. It was used to insulate the first transatlantic cable. At one time golf balls were called "gutties" because they were filled with it," he says.

—George Nisbete

THE GRASER

Scientists at the Los Alamos National Laboratory are conducting experiments they hope will lead to the world's first gamma-ray laser—a device they fondly call a "graser"—which one day may revolutionize biological research, surgery and even telecommunications.

Preliminary tests show the scientific principles on which this arcane contrivance is based are sound. But the researchers admit that right now they are working in uncharted areas, trying to build a technical foundation for the futuristic instrument.

Reduced to its simplest terms, the graser would be energized by some—a class of materials produced in nuclear reactions. The problem, according to Peggy Dyer, a nuclear physicist at Los Alamos, New Mexico, is to find the right corner, purify it, and learn how to incorporate it into a special type of crystal—which would be the heart of the graser—without destroying the crystal itself. If they succeed, the crystal will emit a high-energy beam in much the same way conventional lasers produce high-intensity, coherent, amplified light.

"At some point, someone is going to make a graser. It's just a matter of whether it will take three years or thirty," says Dyer, adding that such a device could, among other things, function as a sophisticated microscope capable of creating three-dimensional images of living cells, replace scalpels and other instruments used in



Contingency: A scientist with a beam of gamma rays

delicate surgical procedures, and transmit a vast volume of satellite messages around the globe.—George Nobbe

Creative imagination must stop well short of delirium.

—Calvin Welle

You have all the characteristics of a popular politician: a homely voice, bad breeding, and a vulgar manner.

—Anatrophanes



Don't squish that roach. He may be your cousin—neuropeptidically speaking. Cockroach and man, it seems, share identical brain hormones.

THE COCKROACH LINK

From Cain to cockroaches. It sounds like a far-fetched family tree, but man and creepy, crawling cockroaches may be kinsmen, half a billion years removed.

That's the word from U.S. Department of Agriculture (USDA) scientists who, in the never-ending struggle to control the cockroach population, stumbled upon a hormone in cockroach brains that resembles a human hormone. In people and cockroaches, the hormone is a neuropeptide that controls the digestive tract.

Government scientists in California and Texas discovered the hormone, which they call leucokinin, while analyzing the mashed heads of 3,000 cockroaches. The researchers claim the substance bears an uncanny resemblance to at least two neuropeptides found in the brains and guts of humans, called gastrin II and cholecystikinin, or CCK.

The homology (the degree

of similarity) is so great that it precludes a coincidence," explains USDA chemist Ronald J. Nachman. They are related, and that implies a common origin.

What the scientists are not attempting to do is prove to creationists that mammalian and insect life had from the same primordial soup, although it's further evidence that evolution did take place," says Nachman.

Because the neuropeptide aids in the digestion of food, Nachman and others believe that if they can interfere with it, they can slow down the pesky insect or even kill it. Scientists however cannot simply extract the neuropeptide itself to starve the cockroach's genetic code. "We must use it as a model or template," states Nachman, "to design new and specific insecticides." If nothing else, the scientists hope to starve the roach or at least upset its water balance.

And just how far-reaching is the discovery? According to Nachman, the hormones are more similar than any others found in man and insect to date. "We do believe, though, this is not unusual—that this particular hormone will be found in other insects."—Michael Dele

"Man is nothing else than food sperm, a sack of dung for the worms. You have never seen a viceroy dungbird."

—St. Bernard of Clairvaux

"Experience is a comb that nature gives us when we are bald."

—Belgian proverb



CONTINUUM

SATELLITE GEOGRAPHY

In case you needed proof even in the waning years of the twentieth century, that geography remains at best an inexact science, consider what satellite mapping has done to the territorial claims of England and Ireland in the Celtic and Irish seas.

It seems that the British have been using maps drawn up in pre-satellite times. The Irish have not. Using more modern technology, that is, the satellite, they have proved that Ireland owns some 85 feet to the north and 394 feet to the west more than it thought it owned. That's thanks to five American TRANSIT satellites now orbiting the globe in relatively low orbits.

Their figures have led to internationally agreed-upon calculations about who owns what in the channels that separate England from the Irish Republic.

A source of much amusement to Ireland, those findings won't bring smiles to many English faces, especially if oil is discovered in either the Irish or Celtic seas. According to Cheryl Tench of Petroleum Research Associates in New York, "Ireland has several gas fields that are now operative. Some fifty-four blocks are now being offered for leased exploration," she adds.

The British have attempted to downplay the whole geographical mix-up, which in this case could yield Ireland millions of dollars even though their claim is based on just a few feet



If oil is discovered in either the Irish or Celtic seas, the Irish will be millions richer, thanks to American satellite mapping.

Says John Dixon, a senior lecturer in surveying at the Dunsink Observatory at the Bolton Street College of Technology: "Thanks to satellites, our ability to measure the earth has improved and whereas before we had to do everything locally, now we can get a far better determination by computing the radii of the whole earth."

—George Nobbs

"A man is as old as his arteries."

—Pierre J. G. Cabanis

"Time, whose tooth gnaws away everything else, is powerless against truth."

—Thomas Henry Huxley

CROSS-CULTURAL DREAMING

If dreams are the "universal language," then there are more things separating the Chinese and Americans than a Great Wall.

For the most part, dreams are seen as sweet and beautiful in the West but dreaded in the People's Republic of China, according to psychologist Joan Wai's who is conducting pioneer cross-cultural dream studies in conjunction with colleagues in the United States and China.

When Wai's and colleagues at Appalachian State University gave dream question-

naires to 271 Chinese college students and 340 American students, she found that only 13 percent of the Chinese believed "having many dreams is good for a person's health," while a resounding 81 percent of the Americans felt that way.

In addition, most Americans (88 percent) like to dream, while only 28 percent of the Chinese do. Also, the Chinese are more afraid of having bad dreams than are Americans.

Why? Wai's believes the Chinese quailms are rooted in the belief that illness is reflected in dreams. "If you hold the belief that having a lot of dreams makes one uncomfortable," Wai's speculates, "then dreaming is not as desirable an activity as it would be for us."

Here are the other major differences between Eastern and Western dreams:

- Most Americans (74 percent) dream in color, as compared with just 28 percent of the Chinese.
- Americans dream more about finding or losing money and valuables.
- Both cultures dream about "people I love," but Americans dream of sweethearts much more often than the Chinese do.
- More Americans dream of sexual experiences: 95 percent, compared with only 41 percent of the Chinese.

"We are the sons and daughters of Freud," adds Wai's, "and people in America are very interested in dreams. There is not that kind of heightened awareness of dreams and dream life in China." —Michael Dale



MAY THE FORCE BE WITH YOU

BY BRUCE SCHECHTER

Ephraim Fischbach thinks he's found gravity, the "M force." Now all he has to do is prove it.

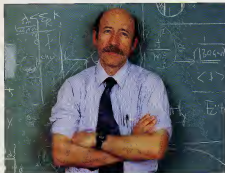
For the first 40 years of his life Ephraim Fischbach had been blessed with the ability to fall asleep anywhere and at any time. A hard bench in a New York City subway car was as good as a feather bed. But about a year ago Fischbach started waking up in the middle of the night.

He paced the halls of his house, unable to sleep, wondering if somewhere in his calculations he had made some lumbic stupid mistake. A lot of very smart people seemed to think he had.

Fischbach and his collaborators believed they had discovered a new force of nature—one that seemed to push objects apart, literally counteracting the pull of gravity. If the force existed, textbooks would be rewritten, and Fisch-

bach might even win a Nobel prize. That was the least of it. Documentation of a new force would clue us in to how the engines of the universe work. For years scientists had been seeking a Theory of Everything, in which all matter and energy could be explained by a single law. While physicists had already constructed several such theories, they didn't know which, if any, were correct. If Fischbach is right, however, and these

•Fischbach's new force might help revolutionize technology, develop a unified field theory, and decide the ultimate fate of the universe •



is another force in the universe, it could be the vital clue as to what the one true Theory of Everything really is.

A new force might even help decide the ultimate fate of the universe. Forces, according to modern physics, arise from the exchange of particles. The electrical repulsion between two electrons is nothing more than the result of a photon tossed like a medicine ball from one electric field to another. A new force would imply the existence of a new, extremely light particle, which has already been named the hyperphoton. Swarms of hyperphotons might exist undetected throughout the universe. If they do, they could be slowing down or even reversing the universe's expansion. So a new force could help determine whether the universe will go on expanding and cooling forever or whether it will one day fall back on itself, ending in a final crushing reversal of the Big Bang.

Finally, Fischbach's force could revolutionize technology right here on Earth. "Any force that exerts an influence over macroscopic distances—in this case, meters or tens of meters—can be controlled by us," Fischbach states. "And as soon as it can be controlled, you have to open your mind to the possibility that someone will control it to do something useful. Even at the stage

we've considered the possibility of building navigation systems with it." Indeed, because the force seems to locally affect different materials to different degrees, scientists might use it to tell them not just that something is there or what shape and size it is, but what it's made of.

The very smart people who were causing Fischbach's insomnia—the world's greatest physicists—were skeptical. That was fine with Fischbach, who calls himself a Jos Bopack physicist. Skepticism is part of the scientific method. But some had crossed the line separating scientific skepticism from unscientific nastiness.

Nonetheless, their doubts were easy to understand. Before Fischbach came along, every experiment in the history of physics could be explained in terms of just four fundamental forces. Gravity, the force of attraction between any two masses, is responsible for pinwheeling galaxies, planetary orbits, and progressively sagging jowls. Electromagnetism, the force between charged particles, is responsible for the flash of lightning, the power of batteries, and the attraction of electrons to protons. It is the glue that binds most of the material world we live in. The strong force binds protons and neutrons together within an atomic nucleus, and the weak force causes radioactive decay.

Following Einstein's lead, physicists searching for a Theory of Everything have

been attempting to unify the four forces showing that they are just different roles played by the same virtuoso actor. The electromagnetic and weak forces are now recognized as aspects of a single force called the electro-weak force. Theories that tie the strong force to gravity are in the works. The search for a unified model of the universe has even caused an explosion in what could be physics' most grandiose vision to date: the superstring theory, in which space has 11 dimensions and matter resembles tiny bits of string.

In fact, the physics community was doing just fine until January 5, 1986, when the CBS Evening News announced that a fifth force discovered by some guy named Fischbach was at large in the universe, throwing a wrench into the theoretical works. Henry Iye, a high-energy physicist at Cornell, was one of those who watched the news that night. "I decided," he now says, "that Fischbach's claim had to be trash because a discovery of that magnitude would be known by everybody in the world of physics before it got on the evening news."

The next day the discovery of the fifth force was headed on the front page of *The New York Times*. Physicists were humbled. Richard Feynman, the Caltech Nobelist who would dip the O ring in ice water to demonstrate why the space shuttle exploded, read Fischbach's conclusions resulted from "overenthusiasm." And Harvard's Sheldon Glashow, another Nobel laureate, called the work "garbage."

The critics were irked, in part, because they felt that to avoid errors, scientific debates should be conducted in accredited journals and not in public. Most did not realize that Fischbach, a Purdue University physicist on sabbatical at the University of Washington, had in fact published his claim of a new force in *Physical Review Letters*, the most influential and respected physics journal in the world. It's just that *The New York Times* had managed to beat the publication, delivered by mail to the physicists' homes. And those who had received their *Physical Review Letters* mostly skipped by the paper, which had the rather unexciting title: "Reanalysis of the Eötvös Experiment." As readers of *Physical Review Letters* all know, Eötvös was ancient history as relevant to the physics of the Eighties as say, Galileo's trip to the Leaning Tower of Pisa.

The Eötvös experiment was in fact, a descendant of Galileo's work. Al Pieta, Galileo had refuted Aristotle's contention that

far from ball of one hundred pounds, falling from a height of a hundred cubits reaches the ground before a one-pound ball has fallen a single cubit." Trying the experiment himself, Galileo found that the larger precedes the smaller by two fingers' breadth—and this was probably due to air resistance.

By modern standards two fingers is quite a lot. And physicists continued to wonder whether gravity acted on all things equally—whether all materials, regardless of weight or structure, fall at precisely the same rate. In the late 1600s Newton used a pendulum to show that all bodies fall at the same rate to within about one percent. And in the early 1800s Roland Edötvös, a Hungarian baron and physicist, decided it was worth doing the experiment to an even greater degree of accuracy.

Edötvös realized it would be hard to achieve this accuracy by dropping or swinging weights, and besides, he had a better idea. Working in the basement of the university that now bears his name, he made a tiny barbell—a stick with test weights on either end. The barbell was balanced and suspended from its center by a long, thin quartz fiber. The weights were pulled downward by gravity and pushed sideways by the centrifugal force of the earth's rotation. By carefully balancing these two forces, Edötvös showed that no matter what the composition, weights fall at speeds that vary by less than one part in a billion.

Finally, in 1964, physicist Robert Dicke of Princeton did experiments that were a hundred times more sensitive than Edötvös. Instead of measuring the rate at which objects fall to Earth, he used an ultra-sensitive balance to learn how objects on Earth are influenced by the gravitational force of the sun and moon. His measurements complete, he showed that the sun and moon do indeed tug at earthly objects. But he found no evidence that the weight or structure of the test object affected the gravitational force.

These experiments convinced physicists of the truth of Galileo's assertion. Since even a minute force would have shown up in Dicke's extremely precise experiments, the implication was that gravity and gravity alone acted between bits of matter.

But Fischbach, who had spent years looking for evidence of a new force, was not convinced. He saw what so many had overlooked, that if a new force acted only over a short distance—a few hundred yards, say—it would not have shown up in the Dicke experiment, which measured only forces that could reach from the earth to the sun. Such a force might, however, show up in the Edötvös experiment. To find out if he was right required only a trip to the junkyard of science—the library—and a return to the habits of his youth.

Fischbach's approach to science is rooted in a fascination with the ordinary, a knack for glimpsing magic in the mundane. His grandfather was a carpenter, he

explains, and his father, a lawyer with an interest in building things. As a boy growing up in Brooklyn, he followed those paternal inclinations, tinkering in his father's basement workshop for fun.

He was a bright kid, and soon he made his first important discovery. A gas station with a testable garbage can was only two doors away! Every day Edötvös would fish out some new treasure. One day it was an old carburetor, the next might be a refrigerator compressor (run backward, this makes a nifty vacuum pump), a high-voltage neon-sign transformer, a handful of gears, or who knew exactly what. Whatever drops he found was transmuted into treasure by his imagination.

With the fruits of his trash-barrel picking and with chemicals donated by an uncle who was a chemistry professor at Columbia University, Fischbach built himself an attic lab. "I took junk from the gas station, junk from the junk from that and put it together to see what I could come up with,"

“The pants disintegrated, okay? I was standing there completely naked. I realized that this was a problem, because even in New York there are limits to what you can do.”

he recently recalled while scanning his office, which is crisscrossed with museum reproductions, typed quotations ("Great spirits have always encountered violent opposition from mediocre minds"—Einstein), a chunk of meteorite, A-Calder mobile, balanced like some insane Edötvös experiment, hangs from the ceiling. Today a small thin man, bald at the top, with a drooping mustache and vintage Brooklyn accent, Fischbach admits that most of the things he built from his scavenged treasures were pretty useless. But they taught him the value of what most people just throw away.

Fischbach entered Columbia University in 1959. Soon he was overnight babydollar for a huge experiment devised to isolating a rare isotope of oxygen. He still keeps a picture of the experiment, which resembles an of refinery crammed into a broom closet, on his office wall. Though he has forgotten many of the details of this intricate experiment, he does remember that it used a lot of nitric acid, which was forever leaking from hundreds of tubes.

Nitric acid is funny stuff. It weakens test-tube fibers so they just crumble into dust. Returning home one day after a long, weary

shift, Fischbach undressed and found that his underpants had dissolved. Ah, well, he thought, and went to bed.

The next day I went on the subway with a new pair of underpants, obviously but the same Lewis, he says. It was the Broadway/Seventh Avenue line. You know, walk-to-work people. You could die on the spot, but you'd still be standing up because there's no place to fall. Suddenly I noticed, or felt, that my pants had disintegrated right around the groin. What I immediately realized was that there was this topological fact that for the nitric acid to get to my underwear it had to pass through my Lewis. The pants promptly disintegrated, okay? Now I was standing there completely naked. I realized that this was a problem, because even in New York there are limits to what you can do. I just had a T-shirt on, and I stepped to the waist and wrapped the T-shirt around my legs. I was totally bare-chested, and in those days, that was also ridiculous. People were looking at me, what the hell was going on? So I had to go for an hour and a half back to Brooklyn, hoping nobody would see that I had no pants on. This incident had a major negative effect on me.

But there were compensations. To pass the time while working on the night shift, Fischbach read. One day while searching through the Dennis Avenue branch of the Brooklyn Public Library for a Sherlock Holmes book, he came across an unusual book by Lilian Lieber about Einstein's general theory of relativity. It was filled with amusing drawings, and the text read like a poem. But it was possible to learn the rudiments of general relativity from it. In those days Einstein's theory of relativity had a reputation among laymen for being practically incomprehensible—only about a dozen people in the world supposedly understood it. Einstein once remarked that of these dozen, he had met about four hundred. Intrigued, Fischbach took the book out and began reading. "I said, Look, this stuff is hard, but it's not that hard. I can understand this. That book and my pants dissolving took me out of chemistry and into physics."

By the time he reached graduate school at the University of Pennsylvania, he began reading around in old physics journals as if they were the trash bins of his youth. He was soon taking a little bit of this, a little bit of that, and putting it together to come up with some clever little thing worthy of publication. He became a working-class physicist. Those who know him trusted that he would turn out good, competent work.

Fischbach topped up a respectable list of publications. He worked hard at his physics, taught his courses, got married, had three kids. And as the years passed, his interest in the scientific junkyard—in this case the realm of discarded anomalies—convicted him there just might be a hidden universal force.

The great science historian Norwood Russell Hanson once described anomalies

as the "windows through which the anatomy of the universe can be witnessed." And in 1979 Fischbach and collaborator Sam Aronson of the Brookhaven National Laboratory in Upton, New York, found themselves a new window in the form of the kaon—a type of elementary particle that exists only 10 billionths of a second before decaying into lighter particles. Einstein's theory of relativity predicts that as a kaon—or any other particle or object, for that matter—approaches the speed of light, its lifetime will increase. The reason is Einstein's well-documented finding that at near-light speed, time literally slows down. But scientists at the Fermi National Accelerator Laboratory in Illinois found that the kaon's lifetime did not increase as rapidly as predicted by Einstein's equations. Perhaps Fischbach and Aronson reasoned that was because some mysterious force was slowing down the kaon.

They hypothesized that if a new force existed, it might be coupled to something called hypercharge—a still-hypothetical, repulsive force supposedly proportional to the total number of protons and neutrons in an atom. If hypercharge caused kaons to slow down, it would probably influence other forms of matter as well. While Fischbach and Aronson were wondering just where else the new force would show up, they heard about the work of an Australian physicist named Frank Stacey.

For the past few years Stacey and his graduate students had been going down into deep mines to measure the acceleration of gravity. With less mass between themselves and the center of the earth, they knew gravity would exert less pull, and the gravitational acceleration of their test particles would decrease. That's what they found—except that the force of gravity did not decrease in exactly the fashion predicted by Newton's well-loved laws. The implication was clear: Either Newton was wrong (not a happy idea) or, as Fischbach was quick to see, a new force was mucking up the works.

Fischbach soon began casting about for still other experiments in which a new force might have surfaced. And then, in September 1985, he realized the old Eötvös experiment was sensitive enough to detect a force of the magnitude glimpsed in the Australian mines. He took a quick trip to the library where, after some searching among the dusty old journals, he found the Eötvös paper. "I leaped through it," Fischbach says. "Then I saw a table and I was absolutely stumped."

The table listed differences in the rates at which the test masses had fallen. Had Eötvös' experiment been perfect (and had there been no other forces), these numbers should have been zero. They weren't. "I was shocked to see in the paper that here was a result that was four standard deviations [a measure of statistical significance] from zero, there was a number two standard deviations from zero and so on and so forth," Fischbach explains. "But

without detailed calculations, it was impossible to know whether those results meant anything."

So he did what any other respectable physicist would have done under the circumstances—he dumped the paper on one of his graduate students, a large, sandy-haired kid from Indiana named Carolek Talmadge, and took off for the week end. Talmadge recalls Fischbach saying to him, "I'm sure there isn't anything here, but just to humor me, you might as well try to check some of these."

Eötvös had compared the gravitational accelerations of whatever substances were handy: water, copper, copper sulfate, platinum, bellow, asbestos, and even bits of snikewood. Had Eötvös known about hypercharge, which wasn't hypothesized until the Sixties, he might have done what Talmadge did that weekend. He might have made a graph comparing the gravitational accelerations of the test masses with their hypercharges. If hypercharge were truly working in opposition to gravity, substances more affected by hypercharge would appear to be less affected by gravity. The greater the ratio of hypercharge to mass, the smaller their acceleration. That is, a proportional relationship would always exist. If gravity were on one axis, and hypercharge on the other, then the points of the graph would always fall on a straight line. Talmadge was amazed as the points, one by one, all fell on the line. "It was just inconceivable," Talmadge recalls. "You've predicted that there's an effect in the Eötvös experiment. You go out and look for it and there it is. It's just sort of saying you've proved there's a force."

Soon Sam Aronson and Fischbach's two other graduate students, Daniel Sudarsky and Arnon Szafer, were checking Talmadge's work. The Eötvös data, seen in the new light of hypercharge, seemed to say that a leather ball 30 feet would beat a chunk of lead falling the same distance by about a billionth of a second. The reason: A pound of lead, with a greater number of more densely packed protons and neutrons, has a greater hypercharge than a pound of feathers. The hyperforce, which literally pushes up from the earth, slows the lead's descent.

Theory in place (and a physics revolution in the wings), Fischbach could no longer sleep. He was writing the paper that would announce his results to the world, and he knew that if he made even a tiny mistake, the world would pounce.

Getting a scientific paper published can be a long, Byzantine process. Before the editors of a journal like *Physical Review Letters* will print a paper, it must be read and okayed by at least two outside experts in the tiny subfield of the paper. Fischbach suspected that one referee would be Robert Dicke, the eminent physicist and gravity expert who had tested the gravitational force of the sun. If Dicke read the paper, he was okay then at least it would be published. And if Dicke could find no errors

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Someday magicians will change the color of the sky, stop Earth from rotating, and saw Manhattan in half

GRAND ILLUSIONS

BY RICKY JAY

On a recent broadcast of *Saturday Night Live*, a verbally incommunicative magician named Teller sat at a sophisticated computer terminal in an NBC studio. His partner, Penn Jillette, who more than compensates for Teller's silence, accepted a couple in Times Square and insisted they select one playing card from a standard pack of 52. Penn flashed a fan of the remaining 51 cards in front of a TV camera; this information was relayed to Teller, who immediately indicated a graphically displayed computer search. Working at lightning speed, the computer sorted through the deck, checked which cards were present, and instantly identified the card selected by the couple on the spot. Teller relayed the information to his partner by having it appear on the huge electronic billboard high above

Times Square. The participants whose backs faced the billboard, were startled when Penn proudly revealed the name of their chosen card.

Is this simply a parody of high technology—an elaborate joke based on a technique witnessed and described 400 years ago by Francis Bacon? Or is this event an augury of things to come in the world of magic—a glimpse of the twenty-first century when magicians will rely on an impressive arsenal of computer, laser, fiberoptic, and hologram technologies to astound an increasingly sophisticated audience?

For centuries magic, science, religion, and philosophy were closely linked. In ancient Greece, for example, temple doors opened mysteriously to the accompaniment of thunder claps and lightning; animated statues poured soaked

bones; and idols delivered predictions in oracular jargon. The principles of hydraulics, acoustics, and optics formed the basis of these strange phenomena, which were more likely to create devices than to impress audiences.

By the eighteenth century, when magic was first viewed in theatrical settings, the showmen were often self-styled professors of natural philosophy who demonstrated all sorts of effects—scientific devices unknown to the public.

Karlheinz, who performed magic and lectured on "philosophical, mathematical, optical, mechanical, electrical, physical, chemical, pneumatic, hydraulic, hydrostatic, synergetic, pneumatic, and capillary art," did exhibit an actual solar microscope. But he was more the target of scorn than the subject of praise and was even jailed as a

PAINTING BY MICHAEL PARKES

rogue and vagabond. At the same time, however, one could be mystified by remarkable mechanical figures: a lifelike duck that could groom its feathers, eat and drink, men who beat a drum with precision or played delicate tunes on the flute, and a wonderful machine that drew portraits.

A computer that plays chess may fascinate, but it would not mystify modern-day spectators. In the 1700s, however, a life-size, turbaned Turkish chess-playing machine was built to please the Austrian empress Maria Theresa. To audiences already familiar with wonderful automata, a machine that can think and play chess could be considered a reality. Capitalizing on such thought and using his own reputation as a skilled scientist and mechanic, the Hungarian baron Wolfgang von Kempelen fooled audiences by cleverly concealing a human director within the compartmented but nonfunctional gears and levers of his chess machine.

It disturbed Von Kempelen that his fraudulent chess player caused a sensation, but his creation of a machine able to re-create human speech was all but ignored—largely because a magicians' trick version of such a speaking machine, which relied on information transferred by concealed tubes, had been exposed. The British scientist Sir Charles Wheatstone built a crude model of Von Kempelen's speaking machine, which intrigued a youngster who happened to see it. The boy built a pretty fair speaking machine of his own. His name was Alexander Graham Bell.

In the early 1800s a Belgian optician, Robertson, created a show called Phantasmagoria. Using scientific principles, he conjured up images of skeletons and resurrected dead heroes of the French Revolution before terrified audiences.

The technology that produced the frightening images was based on the use of aptly named "magic lanterns," which, when first constructed in the seventeenth century, commanded the attention of prestigious scientists like Kircher, Huygens, Descartes, and Robert Hooke. By the early nineteenth century showmen had so perfected these techniques that one, Andrew Cather, combined projection with roars of thunder, bolts of lightning, and electric shocks. He so frightened the governor of Mexico that the magician was thrown into a dungeon 150 feet underground.

By the middle of the century, the art of producing ghosts had become a theatrical specialty. Images were reflected on sheets of glass, allowing actors to pose with phantom forms. These glass reflections no doubt gave rise to the frequently echoed phrase "It's all done with mirrors."

In the nineteenth century even more interesting examples of the wedding of magic and science were realized. Robert Houdin, the great French conjurer and "father of modern magic," came out of retirement to accept a mission from his government. He traveled to Algiers, where the Maraboutes, a sect of magic-worshiping reli-

gious fanatics, were attempting to incite a revolution against France. Houdin performed a "dualing baryon" match with Marabout chieftains. He melted an Algerian of great strength to mount the stage and try to lift a small wooden chest by its brass handles. This was accomplished with ease. Robert Houdin then waved mysteriously at the Arab, claiming he would make him as weak as a child. When the Arab again tried to lift the chest, it would not budge. Renewing his efforts, he grabbed the handles of the chest and suddenly started to shake convulsively, eventually collapsing on the stage. Robert Houdin, with another wave of his hand, ended the Arab's agony.

Modern readers can no doubt enter the method: below the stage, a huge electromagnet in the chest, a concealed iron sheet, and a hidden induction coil that led to the brass handles of the chest, providing the shock. But in the middle of the nineteenth century, such technology was unknown and remarkably effective.

*• In what must
have been the strangest of
stage acts, ice
cream was made in less
than a minute,
flowers were frozen solid,
and rubber balls
became as fragile as glass •*

In 1898 Newt Monroe Hopkins published a book in which an apparently solid, silver miniature elephant—spiked atop a pedestal and covered with a simple shade—completely vanished. Hopkins had molded the elephant in mercury and had it frozen solid by the evaporation of carbolic acid dissolved in ether. When the figure melted, it drained into a hole in the pedestal, disappearing without a trace.

Teakettles became the focus of two important technological magic effects early in the century. In a music-hall act an ordinary kettle was placed on a block of ice, and to the musical accompaniment of "Poly Put the Kettle On," the liquid inside began to boil. The bubbling, steamy liquid was poured into the hats of spectators in the front rows. In what must have been one of the strangest of successful stage acts, ice cream was made in less than a minute. Flowers and grapes were frozen solid when put in contact with the "mytic water," and rubber balls became as fragile as glass. The act—performed by Ninola Madda Hunt, Queen of the Magic Kettle—was nothing more than a demonstration of the properties of liquid air, at that time largely

unknown to the general public.

The Talking Teakettle, introduced by amateur magician David P. Abbott, also caused a sensation. A kettle was handed to spectators, whose questions were answered as they held the spout to their ears. A faint, distinct voice emanating from inside the kettle astounded audiences of the period. Eric Abbott's method was induction. Six thousand feet of very fine wire and a receiver were wrapped inside a paper-mâché kettle, and an unseen accomplice with a sending coil and a series of dry-cell batteries answered the questions from the basement of Abbott's house.

Of all the technologies available to or developed by magicians in the years directly preceding and succeeding the turn of this century, none was more important than the development of the motion picture. Although magicians were the subjects of early films, the developers of trick films and special effects, and the presenters of cinema in their stage shows, for the first time they found their own illusions less magical than the technology of film itself.

Technological advances were no longer the secret weapons of the magician but an important tool in the presentation of magical illusions. Instead of using new scientific principles, the stage performer spoke about them, coached his presenters with addresses to them, and created illusions around them.

The utterly astounding technological advances we now take for granted, as well as the prognostications for even more remarkable achievements in the future, will, I think, lead magicians of the twenty-first century back to basics. No longer will they be Connecticut Yankees in King Arthur's Court, relying on the latest scientific advances to fool the public. They will, I believe, turn more to effects of pure sleight of hand—conjuring with such everyday objects as cups, balls, cards, and coins—to provide a contrast to the very technology with which they will be unable to compete. They will rely on the simple but difficult path because magic is ultimately a live, intimate personal and emotional art form best experienced at close range.

Leading professional and amateur magicians, however, have widely different visions of magic in the twenty-first century.

Martin Gardner, who has brought mathematics and magic to life for millions of readers through his Scientific American columns and numerous books, is an extremely creative conjuring enthusiast.

Analyzing the trends of the last 20 or 30 years, Gardner speculates that there may be more women and blacks gaining prominence as magicians in the future. But technological advances with lasers and holograms, he feels, are less likely than the development of incredibly strong but very thin, undetectable fibers that might fit a person off the ground.

The major trend today, says Gardner, is the influence of television on magic. "David Copperfield's vanishing Statue of Liberty

CONTINUED ON PAGE 19

FICTION

BABEL'S CHILDREN

*Making decisions can be
child's play, even when the results affect
the fate of the world. Just
follow the rules and win the game*

BY CLIVE BARKER

Why could Vanessa never read the road that had no signpost marking it, the track that led to God alone know where? Her enthusiasm for following her nose had gotten her into trouble often enough in the past. A near-fatal night spent lost in the Alps, that episode at Munksgaard that had almost ended in rape, the adventure with the sword-swallower's apprentice in the wilds of Lower Manhattan. And yet despite what bitter experience should have taught her, when the choice lay between the marked roads and the unmarked, she would always, without questions, take the latter.

Here, for instance. This road that meandered toward the coast of Kithnos. What could it possibly offer her but an uneventful drive through the scrubbed hillsabouts—a chance encounter with a goat along the way—and a view from the cliffs of the blue Aegean? She could enjoy such a view from her hotel at Merikis Bay and scarcely get out of bed to do so. But the other highways that led from the compounds were so clearly marked: one to Loutra, with its ruined Venetian fort, the other to Drapias. The fact that they were so clearly named seriously framed their attraction for her. This other road, however, though it might—indeed probably did—lead nowhere, at least led to an unimagined nowhere. Thus lured by sheer perversity, she set off along it.

The landscape to either side of the road, for as it rapidly became, rocky, was, at best, undistinguished. Even the goats she had anticipated were not as evidence here, but then, the sparse vegetation looked less than nourishing. Unlike Santorini, with its picturesque villages, or Mykonos—the Sodom of the Cyclades—with its plush beaches and plush hotels, the island Kithnos could boast nothing

PAINTING BY SALVADOR DALÍ



that might draw the tourist. That in short was why she was here: as far from the crowd as she could conspire to get.

The cry she heard from the hillocks all to her left was not meant to be ignored. It was a cry of naked alarm, and it was perfectly audible above the guffawing of her sorted car. She brought the ancient vehicle to a halt and turned off the engine. The cry came again, but this time it was followed by a shot, and a space then a second shot. Without thinking she opened the car door and stepped out onto the track. The air was fragrant with sand lines and wild thyme—scents that the patrol stench inside the car had effectively masked. Then as she breathed the perfume she heard a third shot, and this time she saw a figure mounting the crown of one of the hillocks, only to disappear into a trough again. Three or four beers later, and his pursuers appeared. Another shot was fired but she was relieved to see into the air rather than at the man. They were warning him to stop rather than aiming to kill. The details of the pursuers were as indistinct as those of the escapee except that—an ominous touch—they were dressed from head to foot in billowing black garb.

She hesitated at the side of the car not certain of whether she should get back in and drive away or go and find out what this hide-and-seek was all about. The man in black had disappeared after her query but she pinned her eyes to the spot they had left and started off toward it.

She picked her way among the squinting cucumber for fully ten minutes before she became certain that she had missed the spot from which pursuer and pursued had vanished—and by that time she was lost in a sea of grass-crested knolls. The chase had long since ceased, the shots too. She was left only with the sound of the gulls and the rising debate of coacods around her feet.

She selected the largest hillock and trudged up its flank. Her feet uncertain in the sandy soil, to see if the vantage point offered a view of the track she left or even of the sea. If she could locate the cliffs, she could orient herself relative to the spot on which she left the car and head off in that approximate direction, knowing that sooner or later she'd reach the track. But the hummock was too puny, all that was revealed from its summit was the extent of her isolation. In every direction the same indistinguishable hills, rising their backs to the afternoon sun. In desperation she licked her finger and put it up to the wind, reasoning that the breeze would most likely be off the sea and that she might use that slender information to base her mental cartography upon. The breeze was negligible, but it was the only guide she had and she set off in the direction she hoped the track lay.

After the incessantly breathless minutes of tramping up and down the hillocks, she scaled one of the slopes and found herself looking not upon her car but at a

cluster of whitewashed buildings—dominated by a squat tower and ringed like a gamecock with a high wall. It immediately occurred to her that the running man and his three overattentive admirers had originated here and that wisdom probably counseled against approaching the place. But then, without decisions from somebody might she not wander around forever in this wasteland and never find her way back to the car? Besides, the buildings looked reassuringly unprepossessing. There was even a hint of foliage peeping above the bright walls that suggested a sequestered garden within where she might at least get some shade. She heeded toward the entrance.

She arrived at the wrought-iron gates exhausted. The frugal scoria the hillocks had reduced her thighs and shins to quivering incompetence.

One of the large gates was ajar, and she stepped through. The yard beyond was paved, and mottled with doves' drop-

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myrtle tree and cooed at her. ◆

pings. Several of the culprits sat in a myrtle tree and cooed at her appearance. From the yard several covered walkways led off into a maze of buildings. Her perversity unchastened by adventure, she followed the one that looked least promising, and it led her into a balmy passage lined with plain benches, and out the other side into a smaller enclosure. Here the sun fell upon one of the walls, in a niche of which stood a statue of the Virgin Mary—her notorious child, fingers raised in blessing, perched upon her arm. And now seeing the statue, the pieces of this mystery fell into place. The secluded location, the silence, the plainness of the yards and walkways—this was surely a religious establishment.

She had been goddess since early adolescence and had seldom stepped over the threshold of a church in the intervening twenty-five years. Now, at forty-one, she was past aweal and so felt doubly a trespasser here. But then, she wasn't seeking sanctuary, was she? Merely directions. She could ask them and get gone.

As she advanced across the sunlit stone she had the curious sensation of self-consciousness that she associated with being

spied upon. It was a sensibility her life with Ronald had sophisticated into a sixth sense. His notorious jealousy—which had, only three months earlier, ended her marriage—had led him to spying strategies that would not have shamed the agencies of Whitehall or Washington. Now she felt not one but several pairs of eyes upon her. Though she squinted up at the narrow windows that overlooked the courtyard, and seemed to see movement at one of them, nobody made any effort to call down to her, however. A male order, perhaps, their view of silence so profoundly observed that she would have to communicate in sign language? Well, so be it.

Somewhere behind her she heard running feet, several pairs, rushing toward her. And from down the walkway, the sound of the iron gates clanging closed. Her heartbeats tripped over itself and alarmed her blood. Startled, it leaped to her face. Her weakened legs began to quaver again.

She turned to face the owners of those urgent footsteps and as she did so, she caught sight of the sign. Virgin's head moving a fraction. Its blue eyes had followed her across the yard and now were unmistakably following her back. She stood stock-still, best not to run, she thought, with Our Lady at your back. It would have done no good to have taken flight anyway, because even now three nuns were appearing from out of the shadow of the cloisters their habits billowing. Only their beards and the gleaming automatic rifles they carried frustrated the illusion of their being Christ's brides. She might have laughed at this incongruity but that they were pointing their weapons straight at her heart.

There was no word of explanation offered, but then, in a place that harbored armed men dressed as nuns, a glimpse of sweet reason was doubtless as rare as feathered frogs.

She was bundled out of the courtyard by the three holy sisters, who searched her high and low as though she had just raped the Vatican. She took this invasion without more than a custody objection. Not for a moment did they take her rifle sights off her and in such circumstances obedience seemed best. Search concluded, one of them invited her to re-dress, and she was escorted to a small room and locked in. A little while later one of the nuns brought her a bottle of palatable retina, and to complete the catalog of incongruities, the best deep-dish pizza she'd had this side of Chicago. Alice lost in Wonderland could not have thought it curricular.

"There may have been an error," the man with the waxed mustache conceded after several hours of interrogation. She was relieved to discover he had no desire to pass as an arbiter, despite the garb of the garison. His office—if such it was—was sparsely furnished, its only remarkable artifact a human skull with its bottom jaw missing, which sat on the desk and peered vacuously at her. He himself was beher

dressed his bowtie immaculately tied, his trousers holding a lethal crease. Beneath his calculated English, Vanessa thought she sniffed the hint of an accent: French? German? It was only when he produced some chocolate from his desk that she decided he was Swiss. His name, he claimed, was Mr. Klein.

"An error?" she said. "You're damn right there's been an error!"

"We've located your car. We have also checked with your hotel. So far your story has been verified."

"I'm not a liar," she said. She was well past the point of courtesy with Mr. Klein despite his bribes with the confectionery. By now it must be late at night, she guessed, though as she wore no watch and the bald title room, which was in the bowels of one of the buildings, had no windows, it was difficult to be sure. "I'm glad you reassured," she said. "Now will you get me back to my hotel?"

"Klein shook his head. "No," he said. "I'm afraid that won't be possible."

Vanessa stood up quickly, and the violence of her movement overturned the chair. Within a second of the sound, the door had opened and one of the bearded satists appeared, pistol at the ready.

"It's all right, Stanislaus," Mr. Klein purred. "Mrs. Jape hasn't slit my throat."

Sister Stanislaus withdrew and closed the door behind him.

"Why?" said Vanessa, her anger distracted by the appearance of the guard.

"Why? Why?" Mr. Klein asked.

"The rules."

Klein puffed heavily. "In my own opinion, much of this is redundant. Mrs. Jape, and you have my personal assurance that I will see you released as rapidly as is humanly possible. Meanwhile, I beg your indulgence. Think of it as a game." His face sounded slightly. "They like games."

Who did?

Klein frowned. "Never mind," he said. "The less you know the less we'll have to make you forget."

Vanessa gave her skull a steady eye. "None of this makes any sense," she said.

"Nor should it," Mr. Klein replied. "You made a negligible error in coming here, Mrs. Jape. And indeed, we made an error letting you in. Normally, our defenses are stricter than you found them. But you caught us off guard."

"Look," said Vanessa. "I don't know what's going on here. I don't want to know. All I want is to be allowed to go back to my hotel and finish my holiday in peace." Judging by the expression on her interrogator's face, her appeal was not proving persuasive. "Is that so much to ask?" she said. "I haven't done anything. I haven't seen anything. What is the problem?"

Mr. Klein stood up.

The problem, he repeated quietly to himself. "Now there's a question." He didn't attempt to growl, however. Merely called, "Stanislaus?"

The door opened, and then, as there was

"Return Mrs. Jape to her room, will you?"

"I'll pocket to my embassy!" she said, her resentment flaring. "I have rights!"

"Please!" said Mr. Klein, looking pained. "Shouting will help none of us."

The run took hold of Vanessa's arm. She felt the proximity of his pass.

"Shall we go?" he asked politely.

"Do I have a choice?" she replied.

No.

The trick of good force, she had once been informed by her brother-in-law, a sometime actor, was that if he played with deadly seriousness. There should be no sly winks to the gallery, signaling the farcical comic intentions, no business that was so outrageous it would undermine the reality of the piece. By these stringent standards she was surrounded by a cast of experts: all eeling—hubs, wimples, and spying Madonnas notwithstanding—to perform as though the ridiculous situation was in no way out of the ordinary. Try as

Just about dawn she was awakened by a light tapping on her door. The small window in it opened, a face of an old man—with a fungal beard and wild eyes—pressed to it.

she might, she could not call that but not break their po-faced, not win a single sign of self-consciousness from them.

She slept well, helped on her way by half the contents of a bottle of whiskey that some thoughtful person had left in her little room when she returned to it. About dawn she was awakened by a tapping on her door. Her head felt swollen, and her tongue like a suede glove. It took her a moment to orient herself, during which time the tapping was repeated and the small window in the door opened from the other side. An urgent face was pressed to it, that of an old man, with a fungal beard and wild eyes.

"Mrs. Jape," he hissed. "Mrs. Jape. May we have words?"

She crossed to the door and looked through the window. The old man's breath was two parts stale pipe to one of trash air. It kept her from pressing too close to the window, though he beckoned her.

"Who are you?" Vanessa asked, not simply out of abstract curiosity but because the features, sunburned and leathery, reminded her of somebody.

The man gave her a fluttering look. "An admirer," he said.

"Do I know you?"

He shook his head. "You're much too young," he said. "But I know you. I watched you come in. I wanted to warn you, but I didn't have time."

"As you a prisoner here too?"

In a moment of speaking, "Tell me, did you see Floyd?"

"Who?"

"He escaped. The day before yesterday," he said.

"Oh," Vanessa said, beginning to thread these dropped pearls together. "Floyd was the man they were chasing?"

"Yes. He slipped out, you see. They went after him and left the gate open. The security is shocking these days."—he sounded genuinely outraged by the situation—"Not that I'm not pleased you're here." There was some desperation in his eyes, she thought, some sorrow he fought to keep submerged. "We heard shots," he said. "They didn't get him, did they?"

"Not that I saw," Vanessa replied. "I went to look, but there was no sign."

"Ha!" said the old man, brightening. "Maybe he did get away then."

It had already occurred to Vanessa that this conversation might be a trap, that the old man was her captor's dupe and this was just another way to squeeze information from her. But her instincts instructed her otherwise. He looked at her with such attention, and his face, which was that of a clown, seemed incapable of forged feelings. For better or worse, she trusted him. She had little choice.

"Help me get out. I have to get out."

He looked crestfallen. "So soon?" he said. "You only just arrived."

"I'm not a thief. I don't like being locked up."

He nodded. "Of course you don't," he replied, silently admonishing himself for his selfishness. "I'm sorry. It's just that a beautiful woman..." He stopped himself, then began again on a fresh track. "I never had much of a way with words."

"Are you sure I don't know you from somewhere?" Vanessa inquired. "Your face is somehow familiar."

"Really?" he said. "That's very nice. We all think we're forgotten here, you see."

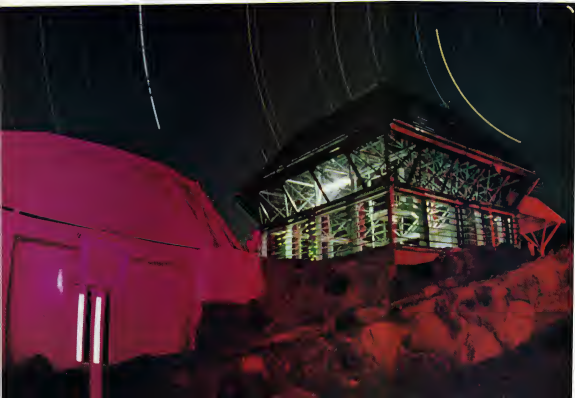
"Ah?"

"We were snatched away such a long time ago. Many of us were only beginning our researches. That's why Floyd made a run for it. He wanted to do a few months' closet work before the end. I feel the same sometimes." His melancholy from halted and he returned to her question. "My name is Harvey Gorn. Professor Harvey Gorn. Though these days I forget what I was professor of."

Gorn? It was a singular name, and it rang bells, but she could at present find no tune in the chimes.

"You don't remember do you?" he said, looking straight into her eyes.

She wished she could, but that might alienate the man—the only voice of sanity she'd found here—more than the truth.



Life in the ultimate
microcosm: the world's jungles,
savannas, oceans,
and deserts under one roof

BIOSHelters

BY DORION SAGAN

If we travel to the stars or have to inhabit an Earth devastated by nuclear war, we may live out our lives in a structure like Biosphere II, a self-supporting, sealed world soon to be constructed on an isolated patch of Arizona desert. One of the most daring and imaginative environmental projects now under way, Biosphere II will be, in effect, a microcosm of Earth (Biosphere I), complete with its own miniature rivers, grasslands, forests, deserts, oceans and human population.

As it is now conceived, Biosphere II will be a massive complex of two interlocking nested structures called biomes. The human habitation biome is a four-story white domed building that will include apartments, laboratories, offices, workshops, a library, and computer and communications facilities. South of that is a glass-shrouded intensive agriculture biome, where crops will be grown. The tallest structure in the complex is the rain forest biome, which will enclose a small mountain, a rain forest, and a waterfall that sends a stream flowing through a transition biome. This structure will include a miniature tropical savanna, a freshwater marsh, a saltwater marsh, and a miniocean,

complete with a coral reef and a wave machine. Farthest south in the glass-and-metal microcosm is the desert biome, a desert environment duplicated in miniature.

In addition to the flora and fauna, say the project's developers, there will be eight human volunteers who, sometime in 1989, will let the Biosphere II air lock seal them in the two-acre ecosystem for two years. It will be their job to test the feasibility of living in and operating a totally self-sustaining manned station such as might be needed on Mars or beyond.

Like the nineteenth-century writer Henry David Thoreau, who lived out his philosophy of self-reliance at Walden Pond, the eight Biospherians will be part of the ecology of the biosphere. They will depend on renewable food and energy sources: the

At left, test module building, where various Biosphere II-related first tests will occur.

PHOTOGRAPHS BY
PETER MENZEL

• Its builders see in Biosphere II more than just a habitat for the space program. They want it to serve as a kind of control world.



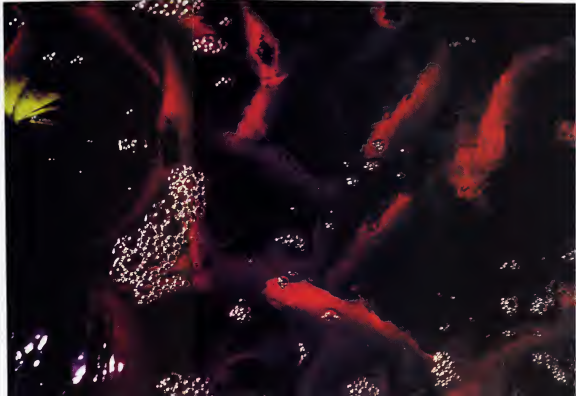
animals they raise, selected plants, and the management of their own recycled wastes. Fish farms will provide many of their protein needs, and they will depend on benign techniques such as using ladybugs for pest control to maintain ecological harmony.

They will know that any carelessness on their part could poison their biosphere and ultimately themselves. There will be no physical contact with the outside world, although Biosphereans will have access to it through telephone, television, radio,

and computer networks. The money for this futuristic venture—estimated at \$30 million—is being provided primarily by Edward P. Bass, son of a Texas oil baron and chairman of Decal's Teams, Ltd., and Space Biosphere Ventures, the formal names for the Biosphere program. Under Bass, Decal's Teams, Ltd., will be a for-profit undertaking, with funding to continue over a seven-year period.

The project will be developed and run by the Institute of Ecotechnics, a London-based international ecological development firm. A contract

Hydroponic gardens and fish farms (above and right) will feed the Biosphereans.





for the design of Biosphere II has been given to Barbed, Ltd., a British architectural firm. The Arizona site is especially attractive because it is so near the experts and the sources of the Environmental Research Laboratory of the University of Arizona, which has years of expertise in greenhouse and alternative agriculture. Also participating are the New York Botanical Garden Institute of Economic Botany and the Marine Systems Laboratory of the Smithsonian Institution.

Although construction of the Biosphere II complex has not yet begun, associated structures have already been completed. Currently in operation is a greenhouse/hydroponics/tissue culture complex that shelters preparatory research facilities for Biosphere II. It contains facilities where various kinds of greenhouse agriculture techniques—such as hydroponics (growing plants in liquid nutrients) and aeroponics (growing them in nutrient-enriched mist)—and aquaculture designs are being tested.

Researchers have successfully grown small crops of cucumbers, tomatoes, lettuce, eggplant, okra, papaya, banana, corn, green beans, broccoli, cauliflower and tomato in the greenhouse section of the complex. They have also designed a nursery where plantlets and seedlings for future crops grow and a log of nurturing man, which is pelleted into the air at regular intervals.

The aquaculture bay of the facility uses an ingenious synergy of plants, algae, bacteria, and sunlight in its 45-tank fish farm. At the bottom the plants and algae release ammonia in the form of excrement into the water. The water is moved to a bubbler where bacteria extract the ammonia and convert it to nitrate. In turn, the nitrates are redistributed as nutrients for the water plants and algae. The system not only maintains itself but also produces a bumper crop of plants and fish, which Biospher-

Opposite and top: Ladybugs will be used for scale and natural pest control

Biosphere II could be deliberately manipulated to simulate environmental problems that might someday afflict Earth.



cans can harvest according to their needs. Should the unthinkable happen and a plague wipe out all of Biosphere II's crops, there is an ingenious backup system: tissue culture banks where plantlets will be stored. With it, Biosphere II would be able to revive a damaged ecosystem.

Also finished is an 18,000-cubic-foot test module of Biosphere II. It was erected to test the structural materials, the glazing techniques, the boulevards, the heating/cooling systems, and the computer systems designed for the complex.

Although only a fraction of the finished size of Biosphere II, the module is already the largest existing sealed structure that admits light. As Philip Hawes, co-director of Biosphere II and onetime student of Frank Lloyd Wright, points out: "Simply to be able to seal something that big represents a huge advance."

It will also use a model of Biosphere II's "large," a special structure that will be able to expand or contract in reaction to shifts in the atmospheric pressure inside the enormous structure. Its job will be to compensate for the space stresses that come with atmospheric shifts inside and outside the sealed building. Without it, the glass skin of the building could crack.

This is not the first attempt at building a living module for space. The Soviets have been making similar, albeit somewhat less sophisticated efforts. Russian "biospheres" for three months made their Georgian crew 3 during a hypothetical flight to Mars.

But its buttons are in Biosphere II more than a habitat for the space program. They want it to serve as a sort of "control world" in which environmental and ecological processes can be closely observed.

As a living palette for us all, Biosphere II could be deliberately manipulated to simulate environmental problems that might someday afflict the earth. For example, Carl Hogges, director of the Environmental Research Laboratory in Tucson, Arizona, suggests that by closing the louvers or windows of Biosphere II and shutting out all light, one could simulate the most extreme effects of a nuclear winter (namely atmospheric darkening caused by vast clouds of soot and dust). Hogges also says that by using the carbon dioxide level, one could simulate the greenhouse effect: a current global warming trend that could at its present rate melt the polar ice caps and raise the sea level, putting the city of New York underwater by the year 2040.

Whatever the uses, science has much to gain from the project. Physical and former astronaut Joseph Allen has gone so far as to suggest that the science of combining biospheres may eventually become as important to our understanding of the biological world as modern quantum mechanics is to an understanding of the physical world. Creating a viable, self-contained biosphere, he says, amounts to the creation of a biological form, one with the potential to touch a whole new field of study: comparative biospheres. **OC**

BEYOND THE CHALLENGER ERA

BY RICHARD WOLKOMIR

*A proposed space program
from the people who know: the astronauts*

PAINTING BY ATTILA HEJJA



Like a cobra charmed from its basket, the shuttle's robot arm undulates over the greying cargo bay. The astronaut at the flight deck's console moves a lever and the arm snakes up—cautiously—toward a shiny cylinder floating overhead.

The operation looks good. But this is not the real shuttle. A full-scale training replica, this vehicle sits in Building 94 at NASA's Johnson Space Flight Center, south of Houston. And the twisting cylinder is a helium-filled balloon.

Only the astronaut manning the controls is real. And he is frustrated because in 1987 this is all that America's manned space program does—make believe.

A lot of guys would leap into the shuttle right now if it were sitting on the pad, says astronaut Dave Griggs. A Clark Gable man, he regards his visitor with a no-blink, look-you-square-in-the-eye stare. Runner-up, the forty-eight-year-old Griggs could pass for thirty-six and exemplifies the latest generation of astronauts. A Navy test pilot, the Annapolis graduate piloted A-4s in Southeast Asia, earning the Distinguished Flying Cross and 19 other medals.

Griggs became an astronaut in 1978 and, during an April 1986 shuttle flight, performed history's first unscheduled EVA (extravehicular activity—a spacewalk). He was to pilot his second shuttle flight in 1986. But astronauts flew only twice that year, on January 6 in the Columbia and in the Challenger's 73 second flight on January 28.

When the Challenger exploded in a cloud of smoke and debris, America's space program faded out with it. Ever since Griggs and his approximately 80 fellow astronauts have been in limbo, continuing to train—and wait—for the next flight.

The Challenger disaster demonstrated that NASA was not the can-do super-agency it seemed. In leaked memos and off-the-record interviews, astronauts went public with complaints that had been simmering long before the Challenger disintegrated. Astronauts charged that NASA management had been sacrificing crew safety to maintain a crowded launch schedule. Some said the crew-selection process—left entirely in the hands of George W. S. Abbey, the director of flight-crew operations—was biased and destroyed morale, particularly of the scientist-astronauts. "Morale is poor" in the space station program, one briefing paper from a group of astronauts and NASA engineers asserted. Astronauts complained that NASA's space station was too ambitious for them to build and maintain with the existing shuttle fleet.

But now our voice is being heard, says Griggs. Astronauts are being given larger administrative roles to play in the space program. In February of last year, Admiral Richard H. Truly, a former astronaut, was appointed associate administrator for spaceflight, heading the space shuttle program. And those still active in the astro-

naut corps have been moved into important administrative positions. As deputy director for operations, Robert L. Crippen will be among those deciding whether to launch the next shuttle. Fred Gregory is the chief of a newly created safety branch within NASA; astronaut Bryan O'Connor is chairman of the Safety Task Force. Sally Ride has been appointed special assistant for planning, and Paul Weitz, acting deputy director of the Johnson Space Center.

The astronauts still have concerns. Chief among them: No clear vision guides the space program. "Back in the Apollo days it was quite clear that what we wanted was to put people on the moon, and we devoted a lot of time to doing that," says astronaut Norm Thagard, a Marine F-4 pilot in Vietnam, an electrical engineer, and an MD. "These days we talk in more general terms about having a space station and a transportation system that will provide routine access to space. But we don't talk about specific uses for those things."

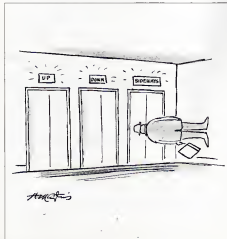
He and many other astronauts want a strong national commitment to explore space. And by that they mean deep space. Former astronaut, Don Lind, for one, says we should head there in several steps. We would start with the space station and then establish a lunar colony with crews spending six months on the moon, then returning to Earth. After that, Lind would send an unmanned lander to Mars to select a site for a manned landing. He envisions a kind of robotic jeep funding across the Martian deserts, sending back television images and digging up rock samples with a robotic arm. It would also scout out landing sites for manned landings.

Lind has already been to near space. A 20-year member of the astronaut corps, he flew on a shuttle flight in April 1966, then left the astronaut corps to teach at Utah State University just two months before the Challenger accident. "My first step would be to get science back into some reasonable priority in the space program, the way it was twenty-five years ago," he says. "Look what's happened to the poor planetary program: emaciated to pay for overhead costs on the shuttle."

"I'm talking about unmanned launches at first—the X-ray telescopes, the gamma-ray telescopes, and the most important next step, the Hubble [space] telescope."

There are a few earthly problems that need to be resolved first. One of them is the dubious status of the scientist-astronauts. Half the reason I left the astronaut office was that I had always intended to teach college-level physics. The other half was the crew-selection policy, says Don Lind. "I saw while I was an astronaut—and I was there for twenty years—a great shift in what I considered a wrong direction."

Lind points out that early in the program NASA began to blend scientist-astronauts with the original test-pilot astronauts, since space was clearly a research frontier. Many of the scientist-astronauts were also qualified jet pilots like Lind, but science was to



be their specialty on space missions.

There were people at headquarters who said, "All right, these scientists need to do science, and so they encouraged them to maintain their affiliations with institutions that had cyclotrons or mass spectrometers—whatever instruments they needed—so they could keep up their scientific proficiency. It was a wise and reasonable policy," says Lind. "Unfortunately it was left to be implemented by test pilot types who didn't give a damn about science."

As a result, he charges, scientist-astronauts have been less than encouraged to continue their research. In fact, they have been punished. Lind says that scientist-astronauts who keep up in science are banished from the flight crew rosters. And crew selection, as Lind puts it, is "the only thing that motivates astronauts." They urgently want to fly in space, or they would not have taken on a job that involves 50 to 70 hours a week of training in simulators and jet cockpits, all computer exercises, and from books. All the riskless training is for the possibility of a few days of extraterrestrial adventure in the shuttle.

Reviewing the history of the antispace mind-set, Lind says, "Under Deke Slayton things were pretty grim under George Abbey; they were intolerable. They shifted to an attitude that any time you're thinking about science you're neglecting your responsibility as an astronaut."

Today brilliant young scientists who join

the astronaut corps sometimes can survive if they see which way the political winds blow. If they immediately abandon all thoughts of science and consciously put on the protective coloration of engineers, they will do rather well, says Lind.

Consequently, the best possible space program, says Lind, would start with a new mandate from headquarters requiring the astronaut office at Johnson Space Center to reestablish a reasonable scientist-astronaut program. "If it would mean firing George Abbey then I certainly would vote for that," he says.

Deke Slayton, who was once chief astronaut and director of flight-crew operations, dismisses such complaints. "For one thing, you've got to have a flight crew to fly the vehicle," he says. "For another, whether someone else flies or doesn't fly depends on the mission's specific requirements, which means that a lot of astronauts won't get to fly on a lot of flights, particularly payload specialists."

Meanwhile, still clouding future shuttle flights is the issue of safety. For many astronauts it is a sore subject but not for reasons the general public might imagine.

All the astronauts accept risks, even of annihilation, as part of the job, but they resent being kept in the dark about what the risks are. For instance, after the Challenger disaster the director of the Solid Rocket Booster program at Marshall Space Flight Center in Alabama testified to the pres-

idential commission that a failure in a primary seal in a booster rocket nozzle part on Norm Thagard's 1985 flight was a cue that NASA should have stopped flying shuttles and fixed the problem. "Well, I never knew that until I read a presidential report," says Thagard. "That's not the way to find out."

And Lind says it was not until long after the same flight that he learned that the shuttle had come within seconds of blowing up. Again, the incident became public only when the presidential commission began investigating the Challenger disaster. Former astronaut Robert Overmyer spoke for many astronauts when he commented, "As long as astronauts have an honest assessment of the risk, they can help management evaluate it. When Chuck Yeager was flying his missions, he knew the risks. The concern with the Challenger was that they weren't told how big a risk they were taking because that booster was the one system they thought was one hundred percent [safe]."

It is hardly a question of astronauts being afraid to fly. "I think a lot of people would fly with that original booster right now only they'd do it in warmer weather," says Overmyer. "By knowing what the risks are, at least they can decide."

We knew all about the main-engine problems. We heard about them every Monday morning," Lind adds. "We knew about all the brake problems. We heard about them every Monday morning, too. But we didn't know about the O-ring problems. When I found out that we came within seconds of blowing up, I felt betrayed."

I agree with the Queen of Hearts—all with their heads," he says. "I wanted the guys who sent us up under those risks and did not tell us about them fired."

We need an improved shuttle, but that doesn't necessarily mean an altogether new one," says Overmyer, a former shuttle pilot and now an aerospace consultant. "You could just tear out the cockpit, gut the thing, and rebuild it from the inside, replacing 1972 technologies with modern equipment. The IBM PC sitting on your office desk has more computing power than what's in the shuttle right now."

He would also like to see what he calls more "margins" built into the machine. "For instance, remember the mission when we retrieved *Solar Max*?" he asks. "We had a hard time getting the satellite because we were running out of fuel. It looked like we were going to blow it," says Overmyer. "It would not be that hard to increase the complement of fuel onboard to give the crew a comfortable fuel supply margin to perform those kinds of maneuvers."

Worries about safety are not restricted to the shuttle but extend to its landing sites as well. In a memo made public last spring, chief astronaut John Young complained about how risky shuttle landings were at the Kennedy Space Center in Florida. The runways are short and narrow, and the weather can be unpredictable. Some re-



troups have even said the Kennedy landing ship should be limited to emergency landings. To complicate things, the shuttle comes in as deadweight. No engines are operating, so the pilot gets only one chance. Given a choice, most would prefer the wide, long landing strip on the lake beds of Edwards Air Force Base.

Sure you'd like to always be able to land on a lake bed. Overmyer says. But if you can't, why not provide the shuttle with a go-around capability so they have more than one shot at the landing? Right now the shuttle requires test pilots to fly it because they have that extra training. It's a demanding flying machine, and I'd like to off-load the pilot's workload a bit."

As for shuttle equipment, Overmyer thinks the manned mobility unit, the out-proposed module the astronauts fly outside the shuttle, would be more effective if it were made maneuverable and could fly farther away from the ship. Lind has his own candidate for improvement: the space toilet, which he describes as "one of the great tragedies of American engineering."

In spite of the criticisms, no one is ready to scrap the shuttle totally. Every astronaut interviewed wants to get back into space as quickly as possible. And that means staying with the proven design. "The shuttle is fifteen years old, and the technology is aging," says Duke Stalton, one of the original Mercury seven, but the flip side is that since you're trying to operate a fleet whatever you build as a replacement for the Challenger will have to be compatible with our existing facilities.

The astronauts seem willing to go back into space in anything—a Mack truck, if necessary. But some have questioned the wisdom of how our next step in space, a permanently manned space station, will be executed. As the station is now conceived, there will be two core structures, a crew module for living quarters, and a separate laboratory module. These will abut a 500-foot-long boom with a giant pair of solar panels attached to each end. The boom will brace a giant rectangular truss to which other modules can be attached.

Dave Griggs says that if he could have the space station he wanted and funds were no object, his first requirement would be more room. Skylab, sent aloft in 1973, was 27 feet in diameter. The crew module in the 1984 space station will be only 13 feet in diameter. It's inside the shuttle cargo bay. Nobody wants to live in a trailer when you can live in a mansion, he says. "You also want some windows." But most important, he would minimize the number of spacewalks required to build the station.

It would be preferable to have as few EVAs as possible, agrees Norm Thagard, "because physically they're very tiring. When you're inside a space suit everything you do is hard. My feeling is that it would be difficult for one person to do more than a couple of EVAs a week."

Lind and a few other astronauts have more fundamental criticisms about the sta-

tion design. "I think we absolutely need to build a space station," he says, "but I think we're building the wrong one. First of all, it has to be assembled with so many shuttle flights. Do you know how big the whole space station is?" he asks. A football field would fit inside the truss if you laid it down on the ground. The solar panels would hang out over the stadium. The modules would form two eleven-story buildings on the fly-around line. It's going to take years to assemble it. We can't begin like that."

What we ought to do, he says, is to get some experience with a smaller structure first and gradually work our way up to the bigger version, once we know what works and what doesn't.

Physicist Joseph Allen, who retired from the astronaut corps in 1966 after 18 years, believes the astronauts' criticisms of the space station design reflects a deeper problem: the lack of a national commitment to space. "What you heard from astronauts was dismay with the system," he maintains. "It's not that anyone is disgruntled with the space station. It's just that they're really saying, if you won't give us the equipment to build it, don't ask us to do the impossible."

Whatever their complaints or disagreements, all the astronauts share one strong feeling: They believe in space exploration. "Don't think I'm a rebel. I'm not. I'm a supporter of the space program. I enjoyed being an astronaut," stresses Lind. I just want to make some changes.

Currently the astronauts' chief concern is fulfilling their stilled personal dreams. "We're trying to get back into the flying business," says Norm Thagard. "Most folks came here for one reason only: to fly in space. Let's face it, if I thought I wasn't going to fly again for years and years, I wouldn't stay."

Some of the glamour of the days of the Mercury seven may be gone, but the allure of being an astronaut still has a powerful hold over the space elite.

"It's not mundane, like a lot of other things I might be doing," explains Thagard. "It's exciting. So exciting it's difficult to decide what to do afterward."

He crosses back in his chair, a look on his face with intense blue eyes. They do not blink. The astronaut's stare.

"The question is," he says, "what do you do when you grow up?"

Across the Johnson Space Center campus, three NASA technicians wander the Mission Control room, ignoring the pressures of computer consoles and the wall-size map of the world. It is blue. Their attention is drawn to one video monitor. One of them clicks it on and, as the screen comes to life, does some careful tuning. The rest settle into the worn chairs and study the screen. It is an odd scene. They seem oblivious to the irony. Here in the control center for all manned spaceflights in the United States they watch a baseball game, the New York Mets playing the Houston Astros. The Astros lose. **CD**

THE FORCE

CONTINUED FROM PAGE 41

in their analysis, maybe there were none.

Much to Fischbach's relief, Dickie evidently liked the paper. "It's one of those revolutionary things that, if right, has great importance," he said. I can pick any holes in the analysis. "Physicist Review Letters" took him at his word, publishing Fischbach's paper on January 6, 1986.

On January 7, the day after the Times story hit the stands, Fischbach was exhausted. He had been talking to reporters from all around the world, patiently discussing his claims, trying hard to be simple and interesting. After a long day of this, he dragged himself home.

"I was standing around while my wife Jane was trying to make some dinner when the phone rang," he recalls. "She picked up the receiver and said, 'It's The National Enquirer.' Oh, God. I thought, how can I relate the fifth force to sex and violence?" I picked up the phone, and it turns out it's my friend Bruce Weinstein. He says: Hi, ho, it's only me."

Weinstein, it happened, was calling for a reason. Fischbach was scheduled to talk at Stanford in a few days, and Weinstein wanted to make some plans. Overwhelmed by anxiety and sick with the flu, Fischbach wanted more than anything to cancel the trip—except that he realized everyone would call it a cop-out. "Because he couldn't renegé and he couldn't stand the thought of subjecting his violent head cold to the pressures of a plane flight, he drove from Washington State to Stanford," Weiss' ears hurt so much even on the ground his, he recalls, "that I could barely focus." Fischbach ended up giving his talk and driving back home, only to learn that his five-year-old, Michael, had fallen gravely ill. "Michael had to be hospitalized for dehydration," says Fischbach. "These were his poor old, I held him in my arms while they tried to get an IV in him. I felt crushed. It was the end of the world."

Finally, on Friday January 10, amid a barrage of phone calls and criticism, Fischbach was able to take Michael home. "At last we were all together," Fischbach relates. "It was about eight-thirty at night, my eight-year-old, Jeremy, was running out of the shower naked and all, and the phone rang. Jeremy picked up the phone and said, 'Daddy, it's for you. It's a Mr. Feynman.'" The only Feynman Fischbach knew of was Richard Feynman, one of the greatest physicists of this century.

Feynman knows me from a hole in the ground. I've never spoken to the guy, never met him. It was obviously a joke. So I picked up the phone and say, "Okay, Bruce, enough is enough. I'm really tired." He says, "This is Richard Feynman."

"I say, 'All right, Bruce. I get the message. Cut it out.'"

He says: This is Dick Feynman. I'm a theoretical physicist.

"I say 'Oh, come on, but finally I listen to him. This is either the best imitation of Feynman I've heard or it's Feynman. And finally after a lot of those go-rounds, I realize it's Feynman."

Feynman warned him about a letter he had sent to the Los Angeles Times in response to their editorial on the fifth force. In the letter Feynman expressed his doubts about the fifth force, declaring that if it really existed, its effect on other physics experiments would have been undeniably evident. Feynman's conclusion was devastating: "It is unfortunate," he declared, "that a paper containing within itself its own disproof should have gotten so much publicity." As a courtesy he was calling to tell Fischbach before the letter appeared.

Going through the mail for the next few months was a harrowing experience. "I got several of those green-and-white envelopes every day from *Physical Review Letters*—mostly papers to referees," Fischbach says. "Every time I opened one, there was trepidation. Was it going to be from the one guy who could prove me wrong? One by one we opened the envelopes and looked inside." Nobody ultimately found Fischbach's work incorrect, but some people found mistakes.

One word in particular would prove to be an embarrassment: Fischbach had compared the strength of the new force as determined by the Edvös experiment with what Frank Stacey had measured in his mines. The numbers differed by a factor of 15, which Fischbach called "remarkable agreement." Feynman, along with others, did not find this at all remarkable.

More careful calculations have resolved these problems. "The resolution came from understanding what hunk of matter influenced the original Edvös experiment," Fischbach explains. "It was natural for us to think that the earth as a whole acted on the apparatus. But we now realize that the influence of the local environment—the mountains, the buildings and the basement itself—is far more profound." Fischbach wrote to Edvös University administrators who provided the dimensions of the building in which the work was done. Using those figures, he has reduced the discrepancy to a factor of three. "Nobody regards that as a problem," Fischbach adds, and "now when I get a letter from *Physical Review Letters*, I don't feel as if it's the end of the world."

Even if Fischbach's analysis is correct, people have trouble embracing data from an 80-year-old experiment. The reason, theorist Mike Turner from the University of Chicago explains, "is that you're supposed to embed down everything that was done so that in five hundred years people can follow it. But this standard of care is rarely met. In Edvös case, things were even worse. He died before he wrote up his work, and his historic paper was actually written by his coworkers."

As a result, similar experiments are currently being performed around the world.

At the Florentine International Conference on General Relativity and Gravitation held last summer in Stockholm, experimenters met to discuss their schemes for testing in on the fifth force. No matter what the experimental setup, the goal was to take more sensitive measurements than Edvös did while eliminating environmental factors that might have distorted his results.

Physicist Roly Newman of the University of California at Irvine described his version of the Edvös experiment. It will be very much like the original but with modern bells and whistles: vacuum containment, magnetic shields, computers.

Jim Faller from the Joint Institute for Laboratory Astrophysics in Boulder, Colorado, took some of the earliest and sharpest jabs at Fischbach. But today he is building a miniature Tower of Pisa in his lab in order to drop objects and see if there is any difference in the rates at which they fall.

Paul Boynton's experiment at the University of Washington was also described.

**Scientists
at major laboratories all
over the world
have voted for Fischbach
by committing
both their time and
their budgets
to pursuing his lead.**

In an ingenious variation on Newton's pendulum, he has fashioned a small disc, with each half made out of a different material. Suspended from its center by a quartz thread, the disc will twist back and forth. The experiment is being performed at the side of a mountain. If there is a fifth force, the mountain will attract the two halves of the disc unequally, and that will affect the rate at which it oscillates.

Plenty of physicists—from world-famous demigods to colleagues at Purdue—fell snipe at Fischbach. Just recently Robert Dicke of Princeton and Shu-Yuan Chu of the University of California at Riverside published a paper stating that the discrepancy in the Edvös data stemmed not from a fifth force but from compass-like changes that created "a gentle wind" in the room.

Fischbach strongly disagrees. "We took that possibility into account when we did our calculations," he says. The Edvös experiments were conducted over a period of four years, and it's unlikely that the temperature would have had the same effect on all the test materials day in and day out throughout all that time.

There's not much he can say to Sheldon Glashow, however, who acts as if Fischbach were a used car salesman pulling the wool over physicists' eyes. Glashow summarizes the arguments for a fifth force—based on known data, Stacey's mine experiment, and the weirdness of the Edvös experiment—this way: "Fischbach and his friends offer a silk purse made of three sows' ears, and I'll not buy it."

Only experiments will settle the issue of whether a fifth force exists and these are being done. Despite the likes of Glashow, scientists at major laboratories all over the world have voted for Fischbach—not by making statements to the press but by committing their time and their budgets to pursuing his lead.

At the University of Washington in Seattle, Eric Adelberger and his colleagues have built an Edvös-type experiment.

"Fischbach raised an interesting point that has an experimental answer," he says. "It needs greater exploration."

Brookhaven's Peter Thieberger, who has been working on a project that, in principle, is related to the Edvös experiment, says there is strong evidence for a force related to hypercharge. Will it be powerful enough to resist its critics? Can Fischbach and his team possibly be correct? Says Thieberger cautiously: "Maybe."

Vol. Fitch, a Nobel prize-winner from Princeton, has recently joined the search for the fifth force. Says Fitch: "Fischbach showed that there was a whole new window to look [at the universe] through."

Frank Stacey agrees. "What Edvös has done is damn clever," he says. "To explain the criticism that Fischbach has received, Stacey invokes the story of the lion and the hyena. The lion, he explains, makes the kill. Then the laughing hyena feed off the carcass."

Whether Fischbach's catch proves ultimately nourishing will remain unknown for months or even years. Meanwhile, he is once more sleeping soundly at night. By day he wonders what a universe with two forces would look like. With Aronson he is planning a kaon experiment that would unambiguously show the effects of a fifth force. "We'd like to be able to predict," he says, "just what the force can make kaons do." His little notebooks with admittedly far-out plans for how a fifth force might some day be controlled.

While there was noise with electromagnetism in the middle 1800s, Fischbach says, "Though electromagnetism is now the cornerstone of all modern technology from cars and rockets to telecommunications and lasers, we couldn't have bothered these things a hundred years ago. It's too soon to say what the new force will bring, but if it can be controlled, it will be used."

Fischbach also stays in constant touch with all the experimenters pursuing his lead. Any day now, he says, he might get the phone call telling him Galileo was wrong and the fifth force is real. Maybe he'll even hear it on the evening news. □



In a rare conversation the famed Swiss psychoanalyst and controversial writer offers a means to banish child abuse, terrorism, and violence from the human race

INTERVIEW

ALICE MILLER

I describe pictures of people, use histories of them as mirrors. And then many come and say, "This is exactly what I felt all my life but couldn't say." I don't want to be a guru. I don't want people to believe me. I only encourage them to take their own experience seriously. "Alice Miller's stories portray abused and silenced children who later become destructive to themselves and to others," Adolf Hitler says. Miller, who was such a child. Constantly mistreated by his father, emotionally abandoned

by his mother, he learned only cruelty, he learned to be obedient and to accept daily punishments with unquestioning compliance. After years, he took revenge. As an adult he once said, "It gives us a very special, secret pleasure to see how unwise people are at what is really happening to them." Miller, famed throughout Europe, wrote of Hitler's childhood in *For Your Own Good: Hidden Cruelty in Child-Rearing and the Roots of Violence*. In the same work she tells Christine F. tell her own story: "I had trouble telling the letters H and K apart. One

PHOTOGRAPH BY JULIA MILLER

evening my mother was taking great pains to explain the difference to me. I could scarcely pay attention to what she was saying because I noticed my father getting more and more furious. I always knew what was going to happen. He went out and got the hand broom and gave me a flogging. Now I was supposed to tell the difference between H and K. Of course by that time I didn't know anything anymore. So I got another lashing and was sent to bed." Christian went into the street and became a drug addict.

"We do not need books about psychology in order to learn to respect our children," Miller says. "What we need is a total revision of the methods of child rearing and our traditional view about it."

The way we were treated as small children is the way we treat ourselves the rest of our lives, with cruelty or with tenderness and protection. We often impose our most agonizing suffering upon ourselves and take on our children.

In 1979 Miller's first book, *The Drama of the Gifted Child*, was published in Germany. First titled *Prisoners of Childhood*, its three short essays described how parents project their feelings, ideas, and dreams upon their children. To survive and be loved, the child learns to obey. In repressing his or her feelings, the child tries to atone to be herself or himself. The result, said Miller, is all too often depression, obituary of vitality, the loss of self. The *Drama* drew wide audiences in Europe and then the United States. Two more books quickly followed: *For Your Own Good* and *Thou Shalt Not Be Aware* continued to focus on the child but moved into deeper studies of child abuse, attitudes of child rearing, psychological theory and treatment.

Last summer Miller published *Pictures of a Childhood*. A collection of 66 watercolor paintings, it represents a small fraction of her art. As she tells us in the book's introduction, Miller started to paint 14 years ago. "Five years after I began painting spontaneously, I started writing books. This never would have been possible without the inner liberation painting has given me. The more freedom I got playing with colors, the more I had to question what I had learned twenty years ago."

"It wasn't until I wrote my books that I found out just how hostile society was toward children," she says. "I have come to realize that hostility toward children is to be found in countless forms, not only in day camps but throughout all levels of society and in every intellectual discipline—even in most schools of therapy."

Born in Poland in 1923, Miller was educated and lives in Switzerland. She studied philosophy, sociology, and psychology and took her doctorate in 1953. She completed her psychoanalytic training in Zurich and as a practicing psychoanalyst she has been involved in teaching and training for more than 20 years.

As her writing progressed, Miller's view of the child became more and more op-

posed to that of traditional Freudian theory. Miller at first dedicated *Thou Shalt Not Be Aware* to Freud on the one hundred twenty-fifth anniversary of his birth. "His discoveries of the survival of childhood experiences in the adult unconscious and the phenomena of repression have influenced my life and way of thinking," she says. "But I came to different conclusions than Freud when I could no longer deny what I learned from my patients about the repression of child abuse."

Today Miller has departed from the traditional analytic approach to treatment and from Freudian theory. Early in his work Freud believed that the root of neurosis was actual trauma, often violent and sexual in nature, that had been repressed in childhood. Later he altered his view, deciding that the child is by no means innocent but is born with drives that are sexual and destructive in nature. Why has Freud's Oedipus complex lasted so long? Miller asks. "Because in the Freudian view the parents,

● To be skillful,
admired, famous, and then to
abandon all this
to go your own way is very
frightening to
most people. But I had to
do this in
order to become free. ●

not the child, are innocent. The Freudian view fits society. It overlooks in Oedipus the abused child and sees him with incestuous wishes that lead to his killing his father, marrying his mother, and ultimately blinding himself."

Traditional analysis, says Miller, duplicates the parent-child relationship: with the conventional analyst in the position of power. But there is hope in therapy if the therapist is a true advocate of the patient. Respect for the child within the patient and his discovery of his real history must play a role in the treatment process. The child undergoes a long inner struggle "between the fear of losing the person he loves if he remains true to himself, and panic at the prospect of losing himself if he has to deny who he is. A child cannot resolve a conflict of this nature and is forced to conform because he cannot survive by himself. Therapy should not repeat this condition."

Miller uses the phrase poisonous pedagogy to describe what we inflict on children: "for their own good" out of our hypocrisy and ignorance. She perceives that we inflict humiliation, shame, fear, and guilt as we are "taming" children. By encouraging

conformity, suppressing curiosity and emotions, a parent reduces a child's ability to make crucial perceptions in later life. "Children are tolerant. They learn intolerance from us."

While Miller's work is ignored or attacked by the orthodoxy, Jungian therapists often hail it as monumental in its analysis of hidden cruelty and the roots of violence. Anthropologist Ashley Montagu stated that *Thou Shalt Not Be Aware* "will undoubtedly prove to be a watershed in the history of psychoanalysis."

"My antipedagogical position is not directed against a specific type of pedagogy," Miller notes, "but against pedagogical ideology in general, which can be found also in the permissive theories." She fears that as a consequence of adults' arrogant attitudes—including "permissive" attitudes—toward children's feelings, children are trained to be accommodating. But their own voices will be silenced, and their awareness killed. And more blind and arrogant adults will be the result.

Interviewer Diane Connors, also a psychotherapist, visited Miller in her apartment near Zurich. Small in stature, Miller radiates a sense of both caution and fragility, and a clear-eyed, unflinching commitment to what she is saying, and an awareness of society's resistance to her work.

Connors: When did you realize respect for the child would be your central focus?

Miller: I looked from the beginning, I think from my childhood, for the answer to why people behave in such an irrational way. I always needed to understand and make things clear. I didn't get much information from my mother, who would say "It is this way, it is so and so and so." She never gave me an explanation if I asked. I was very alone as a child.

Maybe I was five years old when I saw a woman with a child. The girl was three or four. She fell down and was hurt. Her mother who was talking to another mother slapped the child just because she came crying with bloody knees. I remember my question then: "This child is punished twice: first by falling down and then by the mother. Why does she punish the child? She is not guilty—she needs her mother's help, not punishment."

Connors: Did you ask your mother?

Miller: I did not dare ask this question, but it was the "prequestion" of my life. Then I saw the war, and I asked why people hate so much and behave in this absurd way. They must have a hidden reason. I guessed. I found no answer in philosophy and none in psychoanalysis. I found it in the later years of my life when I faced the child within myself and when I began to listen to the child in my patients.

I had to forget the theories. Even Freud says that the child is guilty if he is hurt. The child is always guilty. The mother of my childhood memory was angry that the child was a problem when she wanted to talk to a friend. I could see that because I was five

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and didn't know any heroes at that time. Grown-ups don't see. They learn theories that cover up the most obvious explanations, and they believe these theories.

You know Andersen's tale: "The Emperor and the New Clothes"? I think it is my role in society now and in analytic society to say the emperor is without clothes. And many now say: Oh, I am so glad because I knew it too but didn't dare say it. Yet there are others who say he is wearing clothes because they are afraid of losing power.

In "The Drama" I'd hoped to reach the professionals, my colleagues, so I spoke in psychoanalytical language. Meanwhile I went beyond this language, and I don't use it anymore. I no longer try to reach people trained as I was. Even as they deny what I wrote, their patients say: "She describes my own experiences. I know what she is talking about."

Orme: Why do some professionals deny what you're saying?

Miller: Because they are not allowed to face reality. You know it was interesting. The first time I talked on these ideas was when I spoke to about three hundred analysts on the narcissism of psychoanalysts. They were so surprised because it was very unusual to hear a colleague side with the child. First they reacted naturally: were just grateful and did not show much resistance to their feelings. They thanked me and said, "But how did you know it was my life you described?" And I said: "It was my own life

I described." Many men had tears in their eyes. Then I tried to publish this article in a German professional review but the editors refused it. Resistance was already established. They sent it back because they had to see everything as Freud would have, otherwise it is frightening or dangerous. The International Analytic Society published it in the *International Journal of Psychoanalysis*. But the German review, *Psyche*, did not. It was too provoking for the Germans. **Orme:** What were the provocative issues? **Miller:** That neurosis and psychosis result from repressed feelings that are a reaction to trauma. The child's anger and all the other feelings we don't like are reactions to child abuse.

Today we know that we have a lot of child abuse. It was silenced before. The child must repress the memory of this abuse and deny the pain in order to survive; otherwise he would be killed by the pain.

Orme: Might this happen so early in the child's development that he lacks words, understanding, or permission to express the pain?

Miller: The words have to be found. A good therapy should help the patient evolve from a "silent child" to a "talking child." The child couldn't have found the words if the trauma were too early, or the environment too hostile. But now, in therapy if you have a therapist who is really your advocate, your conscious witness for when you repress your trauma for the first time, then

you become a talking child. Therapy exists to help you find the words to tell your mother or father how you felt at that time when they hurt you or how you felt when you could not talk—even that.

Orme: What do you mean by advocate? **Miller:** One who sides with the child. Always. The therapist must not say the patients were disturbed but well-meaning because he is then siding with the grown-ups. If the child thinks that the parents who behaved so strangely and humiliated him were well-meaning, he cannot feel his pain, and he sympathizes instead with his parents. It is a crime to beat a child because the beating is a damage, and you can never change this reality. A battered child feels humiliated, confused, isolated, and he is made to feel guilty because he is told he is bad. We are afraid to say that child abuse is a crime because we want to protect the parent from his guilt. But we really fail to help them when we support their blindness, because in this way we also betray the child in the parent.

Orme: How do you deal with pain in the healing process?

Miller: Pain is the way to the truth. By denying that you were unloved as a child, you spare yourself some pain, but you are not with your own truth. And throughout your whole life you'll try to avoid love. In therapy avoiding pain causes blockage. "No, nobody can comfort being neglected or hated without feeling guilty." It is my fault that my mother is cruel, he thinks. "I made my mother furious, what can I do to make her loving?" So he will continue trying to make her love him. The guilt is really protection against the terrible realization that you are hated to have a mother who cannot love. This is much more painful than to think, "Oh, she is a good mother. It's only me who's bad." Because then you can try to do something to get love. But it's not true; you cannot earn love. And feeling guilty for what has been done to you only supports your blindness and your neurosis.

There are some treatments where the patients cry a lot—they really suffer—but do not talk. I saw a videocassette where for one hour the patient relived the pain of birth but didn't talk about it. Only later did he report on what he had felt. But in my opinion it is important to speak, to verbalize, during the experience of pain. Even if the patient felt as if he were in the womb he should try to talk to the mother and tell her how he feels. The link between feelings and their verbal expression is crucial to the healing process. But he can't do it without assistance; he has to know someone there who understands how he feels, who supports and confirms him. If a child has been molested and the therapist doesn't deny this fact, many things can open up in the patient. The therapist must not preach forgiveness, or the patient will repress the pain. He won't change, and the repressed rage will look for a scapegoat.

Orme: Do you think the child has no history that a child is born into the world like a tab-



build rasa on which experience ascribes his or her character?

Miller: No, I don't. The child comes from the womb with his or her history as experienced in the world. But he doesn't come with projections. He is born innocent and ready to love. And the child can love—much more than we grown-ups can. This idea of the child as a loving being meets so much resistance because we learned to defend our parents and to blame ourselves for everything they have done.

Owens: In what ways does your style reflect these views?

Miller: I try to reach the child in the readers, allow them to feel. I see my style as asking keys. Everybody can take one so that they can go open their own door to find something. Or they can say no, I don't want to go through this door. I will retain the key. I try to evoke feelings, images. In this way I offer keys to your own experience. You can then go look at your children and learn from them, not from me. Because only from your own experience can you really learn.

In my first studies I was very abstract. I wanted to understand the most abstract ideas—of Kant, Hegel, or Marx. My dissertation in philosophy was very abstract. Now I see that each philosopher had to build a big, big building in order not to feel his pain. Even Freud.

Owens: Why did you decide to become an author and lecturer?

Miller: I want to inform people that there is no one person in the whole world who abuses children without having been abused as a child. I think this finding is crucial and can help to understand a lot of things. As an analyst, I couldn't share my findings with anybody of this profession. It wasn't possible, and I had to understand why not. So I wrote my third book, *Thou Shalt Not Be Aware*. Again I was in the position of the child who seeks so many people admiring the emperor without clothes. I wanted to understand this too, their motive. Why are they not aware?

Then others began showing interest in my work. Ashley Montagu confirmed my view of the child, and I also found confirmation from other writers who wrote about child abuse. Montagu sent me his book *Growing Young*, in which he quoted the famous British psychoanalyst Edward Glover. Glover describes the perfectly normal infant as "egoistic, greedy, dirty, violent in temper, destructive in habit, profoundly egotistical in purpose, aggrandizing in attitude, devoid of all but the most primitive reality sense without conscience of a moral feeling, whose attitude to society as represented by the family is opportunistic, inconsiderate, dominating, and sadistic." So when we compare the normal baby to the criminal type labeled psychopath, the baby for all practical purposes is a born criminal! This view is dangerous to humanity. We pretend to give the child the norms of society to make him into a "human being." This is the Freudian view of the infant. Melanie Klein also saw the infant as a destruc-

tive creature. I once talked to a Kleinian analyst, a nice young woman, and she said, "Haven't you seen destructive babies?" And I said, "What do you mean?" She said, "Small siblings that give you a slap." And I said, "Why are you so appalled by this play?" The baby doesn't understand. But if you believe it's wrong and bad, he will feel wrong and bad, will not understand, and will finally become destructive out of this distress. I think our attitude toward infants will make them either good, loving and trusting or hateful and destructive.

Owens: Do you have reactions from Kleinian analysts to your work?

Miller: A Dutch psychiatrist trained in the Kleinian school once wrote me: "What you have written seemed terrible at first and turned around everything I had learned, and it scared me. But now I am grateful. Every day at the hospital is fascinating. Each patient is a history, and I learn from each of them."

When I say I'd like to open my eyes and

As a child, Hitler had no witness. His father destroyed everything he did. He could never tell anyone the pain he was suffering. He was treated like a dog.

ears to the suffering of the child, it's close to what [Frederick] Leboyer did with the newborn. So many people have witnessed birth, yet nobody saw the child was suffering, crying out in psychic pain. Nobody could feel with the child. They were convinced it was necessary to cry after birth. Leboyer said that this pain was unnecessary. "I can show that the child will smile some minutes after birth," he said. Many mothers know he was right, but not the professionals, who still prevent mothers from making birth a good experience for their newborns. They learned three years ago that it is necessary for the baby to scream and be sparked, and they continue to believe what they learned.

It is the same for my work. To protect what they learned, the professionals ignore what I'm showing them. What Leboyer did for the newborn, I'm trying to do for the older child: to explain his behavior, to bring adults closer to his suffering, which they deny; to explain how he feels and in this way prevent child abuse in the future. As long as we deny the child abuse, we can't stop it. We need child upbringing. I am trying to listen to the child's voice, make

people aware of the child's feelings, feelings that I first faced in myself when I started to paint.

Owens: Do you think painting opened up a lot of feelings for you?

Miller: Because I could begin without theoretical knowledge, without luggage, really as a child. And I had so much fun when I began. I knew something was going to be created, to come out. And it did. The first five years of painting enabled me to write *The Drama* in the unconventional way I was playing with thoughts. And as I experienced creativity in my painting, I became much more critical about what I had learned as theory.

Owens: In *The Drama* you connect repressed feeling with loss of vitality. Was that your experience here?

Miller: Yes, experiencing the pain of my life gave me back my vitality. First pain, then vitality. The price of repressing feelings is depression. I also had to restate the usual way of learning: if you are forced to do something, you cannot have fun. But for me having fun is the first condition of creativity. I learned when I played with color. But I resisted learning about color by reading theories from books. For me painting, clearing, and writing have something in common. I paint as I dream. I have many impulses and associations. I never have a plan, a concept of what I want to do. I do have a concept sometimes, but I cannot realize it because while painting, I start to dream of something else and I forget my plan. In the beginning I had a sort of narrative style. I wanted to tell a story, or a story in myself wanted to be told. Now it's more like needing the color, the form, the line. It's improvisation. I'd say I am painting like a jazz musician.

I don't want to make a masterpiece, or even good pictures. Fortunately, I don't need to sell my paintings. I'm only compelled to work further and further into what is true. Sometimes I destroy my paintings. I change and change them, even though they may have been near before. In the end I'm happy because it's what I wanted to say. I don't care if someone says it's good or not. In painting I feel absolutely free. I have my palette, my white paper, and nobody can tell me what is right or wrong.

Owens: You admire Goya and Turner?

Miller: They are not models for me, but are examples of true and great artists. Both were successful and admired. Then suddenly they absolutely changed their styles. Goya, who had made wonderful portraits, began painting ghosts and his inner world. And Turner began painting light. And when people began to say, "This is not good—you made really good paintings before," he didn't care. Both he and Goya did what they needed to do. So for me they are examples of courage.

Picasso told me so many times: "To go out of what for most people is comforting—to be good, skillful, admired, famous, and then to abandon all this to go your own way—is so very brightening to most peo-

are people on an island of Malaysia called Sarawak who have a nonverbal culture. They talk with their children about dreams each morning. They never have bad dreams. Our culture is so violent because as children we learned not to feel.

Omni: What, in general, are your thoughts about dreams?

Miller: Dreams tell me the story of childhood, but childhood transformed. The problems of the previous day are mixed in. Dreams sometimes reveal repressed trauma, but they also help the dreamer to master them. Dreams are a creative force everybody has each night when the control is lessened.

Omni: Can therapy effect a change?

Miller: Yes, but only if the therapy will come to the pain, which is blocked in our feelings of guilt. The idea "I was guilty for what happened to me" is a blockage. Since I discovered that Freud's drive theory not accidentally but necessarily conceals the reality of child abuse, I have looked for a new form of psychotherapy: an effective therapy to be based on the whole knowledge of child abuse available to us today. I finally found it, and I will describe this concept in my next book. The therapy enables the patient and the therapist to systematically come in touch with their trauma and pain—step by step without suddenly breaking the defenses without moralistic and pedagogical attitudes, and without bringing people into dangerous states where they experience chaotic feelings and are stuck with them.

One can find plenty of irresponsible and harmful techniques and modes of techniques that don't provide a systematic confrontation with the past. Some loose people with different mystical offerings or with their unresolved pain. These patients are victims, lost of child abuse and finally of therapy abuse. And they try to help themselves by taking drugs, joining sects or gurus, or looking for other ways of denying reality and killing pain. Political activity can be one of these ways.

Omni: What advice would you give today to a therapist in training?

Miller: First try to discover your own childhood, then take the experience seriously. Listen to the patient and not to any theory; with your theory you are not free to listen. Forget it. Do not analyze the patient like an object. Try to feel, and help the patient to feel instead of talking to the patient about the feelings of others.

The child needs fantasies to survive; to not suffer. Believe what the patient tells you and don't forget that repressed reality is always worse than a fantasy. No one inverts trauma, because we don't need trauma in order to survive. But neither do we need their denial. Some of us pay with severe symptoms for this denial. Study the history of childhood. Therapy has to open you as well as the patient for feeling in you, whole life. It has to awaken your trauma sleep.

It is tragic to go to therapy and find instead of help confusion. I have a letter from

a seventy-nine-year-old woman saying that for forty years of my life I went to psychoanalysis. I saw eight analysts. But for the first time after reading your book, I didn't feel guilty for what happened to me. I always tried, and the analysts were nice people. They wanted to help me. But they never doubted that my parents were good to me. I am so grateful now that I don't feel guilty since I read your books. I now see how terribly they abused me. It was first my parents and then my analysts who made me feel wrong and guilty. "The night came from a seventy-nine-year-old woman." Then she quoted from the last line of *For Your Own Good*: "For the human spirit is virtually indestructible, and its ability to rise from the ashes remains as long as the body draws breath."

Omni: Does TV violence affect children?

Miller: Children who have really been loved and protected will not be interested in these films and shows and will not be in danger. But the child who was hurt and humili-

Children who have been loved will not be interested in violent TV shows. But the child who has been hurt is looking for material, an object on which to take revenge.

ated—maybe at school, not necessarily by his parents—is looking for outcomes. For material, he is looking for an object to hate and on whom to take revenge. Of course there are people who make a business of the suffering of children. But the violence doesn't come from TV films. Its sources are deeper. Protected and loved children can not become murderers. It is impossible to find one person who was not beaten who beats a child.

Omni: Why does violence beget itself through the generations?

Miller: If you go back you can see that the abuser was always abused. But in most cases you will not hear it from him or her because there is so much denial. If you go to a prison and ask a murderer, "How was your childhood?" he will say "Oh, it was not so bad. My father was severe and he punished me because I was so bad. And my mother was a nice woman." This is the problem. You can't find the truth because the person, the murderer himself, will prevent you from seeing his cruel childhood and actually was. Because he cannot bear that pain, he kills innocent people instead of feeling the pain of his childhood.

Omni: Do you think a child can experience abuse in the womb?

Miller: Of course. Each child has its own experience, some experience real misery. There was a child born with three ulcers. It died. The mother was fifteen years old. She was beaten during pregnancy as well, and she used drugs. Nobody knows what a child, even in the womb, has to go through. We are so ignorant, and we refuse to know.

You heard about the McMartin School in Los Angeles? At this day-care center of more than three hundred children, it was charged that many of them were sexually molested. For seven months attorneys asked the children what happened to them there. This questioning was torture for the children. Some of them reported that they helped kill a baby. The grown-ups found this wasn't true, so they called the children liars. Eventually charges were dropped against five of the seven accused molesters. But obviously this was a symbolic way to say "When I agreed to be sexually abused I killed the child in myself."

I want to show how society reacts to children's reports. Abuse means killing the soul of a child. We cannot understand the child's symbolic language, so we say the child is lying. Then abusing teachers go free, and we think that everything is legally correct. The problem is that children protect the abuser. Sometimes the abuser is exchanged for another person in their reports. They perhaps say "I'm afraid of the man because he was bad to me." And the parents know that the man had no body contact with their child. But behind the "made-up" story lies a father or uncle. The lie functions to protect the loved person but at the same time expresses anxiety. Grown-ups say that these are children who invent stories. But the story is not invented; a real event happened.

Omni: Can society learn to understand the child's language?

Miller: I hope so. Otherwise we will commit a mass suicide with the help of technology. The child's language is often very clear, but we refuse to listen to it. Children can endure terrible abuse and cruelty from the first moment of their lives, thanks to the technology in hospitals. The abuse is stored up in the mind, and it can remain active the whole life. Therefore, a mother mistreating her small baby can repeat exactly what happened to her without having any knowledge, any conscious memories. But the stored-up memories in her body will compel her to repeat the same trauma.

Unless a child receives the warm arms of a person who will console him and tell him with his arms that the shock of birth is over, this child will wait his whole life expecting a repetition of this shock. One of the first lessons is that you are alone in a dangerous place, and nobody sees your pain. But this situation can easily be changed when we acknowledge the newborn as a feeling and highly sensitive person. Very often the child comes into life after

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a struggle and we don't realize that he needs consolation and the arms of a mother. We give him medication, hospital, and high technology instead. And we think it is good for the child—only because we had the same experience years ago and think it is usual. What really happens in the psyche of a newborn is absolutely not interesting to most people. That is why I am giving you this interview.

Ques: What would you like to do now?
Miller: I would like to support people who are confronting child abuse. I received a letter from a child therapist in California. Hewes is a consultant for a school. A girl told him stories of a "hot box," a tiny windowless closet in which the children were locked up as punishment. He believed her investigation, and when he wrote a report about it, was fired. But he kept on investigating and found these hot boxes used in other schools. Newspapers reported about the case, and his voice and experience were noticed. He thanked me because he felt supported by my books. This shows one person can make people aware that methods they never questioned before are in fact damaging. The single advocate of a child can save a life, advocate say a crime is a crime, they don't conceal the truth by calling it ambiguous parents' love. An advocate can help keep a child from becoming a criminal. The child learns from an enlightened witness to recognize cru-

elty to reject it, to defend himself against it, so as not to perpetuate it. Experiments have conclusively proven that no one learns anything by punishment. What you learn is how to avoid punishment by lies and how to punish a child twenty to thirty years later. People continue to believe, however, that punishment can be effective.

Ques: Can you change this belief?

Miller: I hope so, at least partly. My life and work concentrate on the problem of child abuse and on the question of how I can transmit what I have learned about it to professionals, parents, and people responsible for law. It's not easy because most people learned from the beginning of their lives that the child has to be spanked in order to become a good human, honest, tolerant as the teachers, parents, ministers, and others around them believe that they are.

In England, where I've given some radio shows, interviewers often say, "You talk about the serious forms of violence and brutality in families, but there are also other forms—spanking, caning, shouting at a child." The interviewers claim these forms of exercising power are harmless and not serious, and they argue that although they were often spanked as children, they didn't become an Adolf Hitler. I see it as my task to repeat that each kind of beating, caning, and spanking of a child is a humiliation and is a serious damage for his whole life. A

child can avoid becoming a criminal if he has the chance in childhood to meet at least one person who is not cruel to him, who maybe even likes him or understands him. The experience of love, compassion, or sympathy would help him to recognize cruelty for what it is. Children who lack this experience because there is no conscious witness will see cruelty as a normal way of treating children and will continue with this burden. They will become as Hitler. Eichmann [Rudolf] Hoss, and all the millions of their followers who in their childhoods never found anything but cruelty.

Ques: What about the milder forms of cruelty, such as spanking, shouting, and verbal humiliation?
Miller: The tragedy is that people treated this way—even if they don't become like Hitler—pretend that this kind of treatment was necessary. They reserve the right to do the same to their children and are reluctant to pass laws forbidding spanking. In Britain such a law was not passed until 1986, and I see this delay as one of the effects of child abuse there.

The ignorance of our society is the result of child abuse. We were spanked in order to become blind like Oedipus. We have to become seeing in order to give our children the chance to grow up with more responsibility and more awareness than was available for our generation now producing atomic bombs. **OO**

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EARTH

CONTINUED FROM PAGE 31

and holds a Ph.D. in animal behavior. He turned away from traditional science, determined to take another tack—to put the bits and pieces together—in service of the ailing earth. "The fabric of the planet is being unraveled. I'm interested in any and every process that can reverse that."

Todd and his colleagues at the New Alchemy and Ocean Arks Institutes concentrate on creating new ways for people to grow food and earn a living while mending the land at the same time. Desert farming modules, one of Todd's high intelligence biotechnologies, are examples of this strategy. Each module is a miniature world teeming with interdependent life, housed in a six-foot-tall translucent fiberglass tank.

Dense populations of fish are raised in these aquatic vats. The fish take food and oxygen from seaweed, and then their waste provides the seaweed with the carbon dioxide and nutrients it needs. These mini-ecosystems also support commercial-scale, hydroponic agriculture where vegetables grow in a capillary bed of rafts floating on the surface of the modules. The plants extend their roots into the water and feed on the fish' excrement.

Todd predicts that desert farming modules can bring damaged, eroded land back to life. A weekly draining of the nutrient-rich water from the vats irrigates and fertilizes infant trees planted around them. "We aim to create a cross between a forest and an orchard," says Todd. "You need to plant trees of economic value, such as fig or apricot trees, among the indigenous vegetation." This way people can afford to stay on the land and take care of it. Then after three to five years, with a young orchard/forest established, module farmers can transplant the rows of trees to another problem site to begin the restorative cycle all over again. According to Todd, "This bioengineering can re-create the equivalent of hundreds of years' worth of topsoil within a decade or two."

Pending final ratification of contracts by government officials, Todd and his associates are planning to erect major agriculture projects on land destroyed by copper-mine tailings in Arizona, and on a strip of coastal desert in Morocco. In the Moroccan desert, a transparent dome up to 300 feet long called a bioshelter will enclose a cluster of desert farming modules.

At night, when the air is colder than the tank water, moisture will form inside the dome. "In the morning, you drum on it and it rains," watering the vegetables planted inside," says Todd. During the day, the temperature differential is reversed, causing the modules to sweat fresh water, irrigating the trees planted around them. Todd believes these projects will pay for themselves within a year.

Two more visionaries who are using sophisticated biotechnological tools for en-

environmental ends are Corale and James Brierley. After years of studying naturally occurring microorganisms that eat metal substances, they harnessed the microbes to help rid the environment of toxic metals. Both microbiologists, the Brierleys left secure positions at the New Mexico Institute of Mining and Technology to commercialize their process. James refined the technology, while Corale plunged into corporate planning. By manipulating the properties of these metal eaters, they produced a method that decontaminates water and simultaneously recovers the metals for recycling.

Corale Brierley explains, "Microorganisms are charged. If you drop a microorganism into a beaker with metal, it will attract the metal, as a magnet would. We use this characteristic of microorganisms to create a granular substance that, within minutes, globs ninety-nine percent of the heavy metals out of the water. In this process, pumps shoot metal-laden water through a container filled with microbial granules. The granules attract the metal particles and then sink to the bottom."

Poisonous metals foul the water used by at least 25 different types of industry—battery making, electroplating, and the manufacture of transistors, for example—and frequently ooze into groundwater or landfills. Some of the current technologies used to rid water of metals actually create another toxic problem. They purify water—but at the price of collecting the metal particles into masses of gummy, poisonous sludge. This sludge must then be disposed of as hazardous waste. By recovering the metals, says Brierley, our technique reduces by a thousandfold the amount of hazardous waste that would be created by the methods that produce sludge. The Brierleys believe their technology could cleanse millions of gallons of contaminated water a day nationwide at a lower cost than current disposal processes.

Few would claim that technology alone can resolve the world's ponderous ecological problems. "High technology is not a panacea for major environmental problems," cautions David Wilcove, staff ecologist at the Wilderness Society in Washington, DC. "The long-term solution to some of these problems is proper land preservation and management. But as a tool, high tech has an important role to play in particular environmental issues. For instance, Landsat imaging can keep an eye on the disappearing tropical forests while computers keep track of what's there. Radiotelemetry can help figure out the population densities and home range of a particular species so you know which habitats it uses and how much it needs."

Perhaps the most basic environmental need is for humanity to undergo a "qualitative transformation," in the words of Stanford ecologist Paul Ehrlich. Only then might we value the living, breathing organism that is Earth for its own sake, apart from the benefits it gives us. **DO**

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• First Charnas will
put UFO ads in national magazines
Then it will
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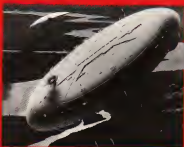
UFO? says Connecticut lawyer Rodolph Blitchman, and the Roddy Genger field of science. If we're being contacted by extraterrestrial intelligence, that intelligence should be a brilliant historic event. Instead, the subject matter is degraded to the point of ridicule.

After 20 years of frustration, Blitchman—who is a consultant for the Mutual UFO Network (MUFON)—finally decided it was time to tackle the UFOs poor public image himself. First he roughed out a legal-ed play designed to enhance the public's perception of UFOs and to force the government to reveal evidence he believes it's hiding. This fall, he began a round of letters to advertising executives who—after all—a professional's advice.

The first few letters Blitchman contacted laughed at his face. But finally executives at Charnas Inc., one of New England's top 20 advertising agencies (clients have included Gillette, Timex, and Polaroid), picked up their ears.

Charnas officials insist they're as straight-faced about the UFO public relations campaign as MUFON is. "We plan to approach the issue intelligently and rationally, in a way that won't poorly reflect poorly on us," says Joyce Silverman, agent in charge of the account. "We'll use the rules of advertising to attack a problem unique in its overtones. That is not to say we won't strike an emotional note in any of our advertising, but we certainly won't be sensational."

Silverman says she's never seen a UFO herself. But I've spoken with people who have—who were shaken by it, and who felt embarrassed to talk about it," she says. "That's not



UFO UPDATE

right. We should help these people find an explanation. A responsible approach to an issue surrounded by too many questions and mysteries is to look over it."

As plans stand, Charnas will kick off the UFO ad campaign with promotional letters to 100,000 people on a target mailing list of Hollywood figures whose interest in UFOs is a matter of public record—Shirley MacLaine, for instance, and Sammy Davis, Jr.—will be contacted first. Contributions from this group will be used to test the ad campaign in regional publications. Once the re-

sults of that are in the media blitz will begin, Charnas will air UFO ads in national magazines like *Drive* and *Esquire*. Then the agency will air commercials on prime-time TV.

I'd like to see someone important involved in these commercials—astronaut Deke Slayton, for instance, who did the HBO UFO documentary and who says he's seen a UFO himself, Blitchman says. "He could say the government made quite a monetary investment in his skills as a trained observer, so why not test him seriously now?"

Whatever form the ads take, Charnas says, their aim will be clear: release of all secret government UFO documents; increased editorial coverage of UFO issues; and new awareness of the scientific and technological advances that UFOs could bring to the inhabitants of Earth.

The campaign will get the message out there, Blitchman contends. "It will reach policymakers and general funds. The more money, the more UFO ads, and the more the home's need gets stirred." —DENNIS STACEY



By David Rose, left, 81

Everyone knows that the great pyramids of Egypt were built by thousands upon thousands of slave laborers condemned to pull eternally on the mullen blocks that made up the huge tombs kept in line and on the job only by the fury of the over-ear's whip.

But now comes British archaeologist Rosalie David to tell us that it isn't slaves, really so. The labor force that

built the pyramids, she believes, was composed of independent craftsmen whose lives were distinctly middle class.

David, an Egyptologist at England's Manchester Museum, reanalyzed artifacts taken from the Egyptian town of Kahun in 1887 by the legendary British archaeologist Flinders Petrie. Kahun it turns out, was a sort of royal company town, an official enclave for the thousands of craftsmen who

helped build the tomb of the pharaoh Sesostris II roughly 4,000 years ago. Among the artifacts in the Petrie collection were legal documents and a family will showing that the inhabitants lived not in slave encampments but in intact family groups. And one papyrus hints at the extent of the pyramid builders' independence: "There was evidently some sort of labor dispute," says David, and it seems at one point that the craftsmen were actually planning to go out on strike.

The most astonishing revelations are yet to come. She had discovered the remains of a number of babies buried between the walls of Kahun's houses. But in the century since their discovery, those remains have been scattered all over the world. David is now trying to trace the whereabouts of the bodies. Then subject them to modern medical analyses so as to get new information on ancient Egyptian diet and diseases. It's very much like detective work," she says. By using scientific techniques, one really can get new information from old collections.

—Bill Lawren

I have lived many lives / I have been a slave and a prince. Many a beloved has sat upon my knee, and I have sat upon the knee of many a beloved. Everything that has been shall be again.

—W. B. Yeats

Beyond the equator every thing is permitted.

—Portuguese proverb



Computer Forensics and Miracles

When Charles Dickens died in 1870, his final book, *The Mystery of Edwin Drood*, was incomplete. A number of eager imitators attempted to finish the manuscript, and several bogus endings found their way into print.

The most flamboyant of these attempts was executed by T.P. James, a young mechanic and psychic living in Vermont. James claimed little familiarity with Dickens or his literary works. He was able to complete



completing two pieces of literature and determine whether they were written by the same person.

Even if the computer puts its stamp of approval on James's piece, can the spirit hypothesis be proved? "I don't think so," Soliven says. "That's not our ultimate goal. What we will demonstrate is that a computer technique can help evaluate psychic information channeled from one person to the next."

Whatever the outcome of the experiment, Dickens fans aren't likely to be convinced. Even the self-proclaimed psychics among them say James's story has been suspect ever since a biographer found a rough draft of an unpublished chapter among Dickens's things. James's version doesn't include this chapter at all.

But Soliven and Coffey are not impressed by this. "It's a weak criticism," Coffey says. "Authors change their minds all the time."

—D. Scott Rogo

When Jesus Appeared Again

One of the strangest chapters in the history of the miraculous began in April 1968. That was the month a shining apparition—widely believed to resemble the Virgin Mary—began appearing nightly atop St. Mary's Coptic Church in Zeitoun, a suburb of Cairo, Egypt. Thousands claimed to see the figure, which didn't disappear until 1971.



But just about a year ago the apparition returned, this time over St. Demiana's, another Coptic church outside of Cairo. At first, according to reports, the figure heralded by a bright light appeared only in the early morning hours. As the weeks went on, it appeared briefly several times per night, attracting large crowds in the streets below.

Other mysterious phenomena have supposedly occurred during the phantom's manifestations, too. Several witnesses report that the dome of the church lights up and that the smell of incense sometimes pervades the entire area. The crowds near the church have grown so large that the Cairo police have been brought in to keep order.

In one instance the apparition "blazed for twenty minutes," says Moustaf Sedik, who has been covering the story for *Waters*, a Cairo-based paper. "Spellbound, the people started to kneel and pray."

But religious miracles don't sit too well with the scientific establishment. According to California physiologist and skeptic Gordon Stein, "Possible explanations include fraud, hallucinations, a natural optical phenomenon or electrical discharges from the roof of the church."

Meanwhile, the Coptic Church has been soliciting eyewitness reports of the manifestations. After evaluating some of these reports, officials declared the visions "blessings to Egypt and blessings to the Church."

—D. Scott Rogo



the novel in 1873, he declared, "only when the surviving spirit of Dickens appeared and showed him how

Interpreted by James's claim, two California researchers plan to use a computer to investigate if further Parapsychologist Jerry Soliven and graduate student Jo Coffey, both of John F. Kennedy University in Orinda, point out that the computer can be programmed to analyze the peculiarities of a writer's style. It can then



Neurological scientists

Does anything unusual occur within the brain when a person receives an ESP message? Two researchers affiliated with the University of Illinois think it does.

Cognitive neuroscientists Charles A. Warren and Norman S. Ton conducted their research with a single subject whose brain activity was monitored by an electroencephalograph. His job was to guess the geometric symbols printed on a series of standard ESP cards. (Each card is printed with either a cross, circle, square, star or wavy line.) When the subject finished carrying out this task, the researchers looked at the brain signals, also known as event-related potentials, or ERPs. These consist of tiny electrical fluctuations that occur milliseconds before or after the reception of any given stimulus. The two researchers specifically looked at the ERPs for predictions

of card images, not guesses. Before and after the subject made his guesses.

As it turned out, the researchers said, their subject guessed correctly close to 50 percent of the time. A score of 50 percent would be expected as a result of chance. When the researchers checked their raw data, they discovered that ERPs often accompanied the correct guesses. In fact, ERP analysis enabled them to distinguish between correct and incorrect guesses at a value of 72.7 percent.

We have several hopes for future work in this area, Warren says. One is that studies using such ERP monitoring will be able to yield even more accurate indications of predictions.

Despite the sophistication of the experiment, the subject—Chicago psychic named Orlan Johnson—has in the past been "dived" in some controversy concerning his ESP abilities.

Johnson may or may not

be a genuine ESPer, says Merjula Taves, sociologist and anomalous expert at Eastern Michigan University in Ypsilanti. It's impossible to tell because no adequately controlled test has yet proved or disproved his psychic abilities.

Either way, Taves adds, the results are intriguing. "This experiment is interesting because it seems to show a difference in brain signals when the subject knows the answer. That's significant whether the answer is obtained psychically or not. In doing one might use such a technique to determine whether a person has merely guessed at the correct answer in any given situation or somehow knows it."

By Scott Rogers

Here human beings peeks its glimmers, and a glimpse of everything is had through the transparent atmosphere. Everything is illuminated and quivers under waves of light projected in space.

Gustave Gheley

I am darkness leaping out of light, leaping out of this.

Harman Melville

Light is an electric wave."

Heinrich Heine



Ten years ago strange things began happening in the Orchard family cottage. First the Orchard boys down and water faucets started flying around. Then a ceiling collapsed, water saturated furniture, and electrical

appliances went awry.

It didn't take long for the family to abandon its home in the village of Adsham in Kent, England, claiming that thousands of dollars' worth of damage had been incurred. Eventually Joe Orchard, a former Royal Navy petty officer, began to blame the disturbances on what he called "electro-osmotic" electricity leaking from a castle. A powerful magnetic field had been created around the cottage, he said, by a malfunction and leaking transformers. The family was able to move back home, he added, only after electric wires had been planted around the house.

When the local utility, the South Eastern Electricity Board, denied responsibility for the happenings, Orchard and his wife started a nine-year legal battle to recover damages. But after a 12-day hearing in London's High Court last year, the judge threw out the claim. Orchard, his wife June, and their twenty-three-year-old son David, he decided, had only themselves to blame. He accused them of being "superstitious" and admitted to an occasion when an electricity expert called at the cottage to find David holding a cup of water. It was for fear the judge declared that David had been splashing the water around the cottage.

When Joe Orchard died just recently at age sixty-five, his wife blamed it on the outcome in court. "We told the truth in court but were crucified first, and that broke his heart," she says. Now it's killed him. Ivor Smullen

CHILDREN

CONTINUED FROM PAGE 53

"No. I don't exactly remember. Maybe a clue?"

But before he could offer her another piece of his mystery, he heard voices.

"Can't talk now, Mrs. Jago."

"Call me Vanessa."

"May I? His face bloomed in the warmth of her beneficence. 'Vanessa.'"

"You will help me?" she said.

"As best I may," he replied. "But if you see me in company—"

"We never met."

"Precisely. Au revoir." He closed the panel in the door and she heard his footsteps vanish down the corridor. When her outburst, an amiable bug called Guillermo, arrived several minutes later bearing a tray of tea, she was all smiles.

Her outburst of the previous day seemed to have borne some fruit. That morning, after breakfast, Mr. Klen called in briefly and told her that she would be allowed out into the grounds of the place (with Guillermo in attendance) so she might enjoy the sun. She was further supplied with a new set of clothes—a little large but a welcome relief from the sweaty garments she had worn for over twenty-four hours. Pleased though she was to be wearing clean underwear, the fact that the clothes had been supplied at all suggested Mr. Klen was not anticipating a prompt release.

How long would it be, she tried to calculate, before the rather abusive manager of her tiny hotel realized that she wasn't coming back, and in that event, what would he do? Perhaps he had already alerted the authorities; perhaps they would find the abandoned car and trace her to his curious fortress. On this last point her hopes were dashed that very morning during her constitutional. The car was parked in the laurel-tree enclosure beside the gate and, to judge by the copious blessings rained upon it by the doves, had been there overnight. Her capers were not fool; she might have to wait until somebody back in England became concerned and attempted to trace her whereabouts, during which time she might well die of boredom.

Others in the place had found diversions to keep them from insanity's door. As she and Guillermo wandered around the grounds that morning she could distinctly hear voices—one of them Gormm's—from a nearby courtyard. They were raised in excitement.

"What's going on?"

"They're playing games," Guillermo replied.

"Can we watch?" she asked casually.

"No—"

"Like games?"

"Do you?" he asked. "Well, play, then, eh?"

This wasn't the response she'd wanted, but pressing the point might have aroused suspicion.

"Why not?" she said. Winning the merits trust could only be to her advantage.

"Poker?" he asked.

"I've never played."

"I'll teach you," he replied. The thought clearly pleased him. In the adjacent courtyard the players now sent up a din of shouts. It sounded like some kind of race to judge by the mingled calls of encouragement and the subsequent deflation as the winning post was achieved. Guillermo caught her listening.

"Frogs," he said. "They're racing frogs." Once her attention focused on the sound of the games, she could not drive the din from her head. It continued through the afternoon, rising and falling. Sometimes laughter would erupt, as often there would be arguments. They were like children. Gormm and his friends, the way they fought over such an inconsequential pursuit as racing frogs. But in lieu of more nourishing diversions, could she blame them? When Gormm's face appeared at the door later

◆She let herself out of the cell, then she hurried along the cloisters, cleaving to the shadows. She found her way into the yard, pausing to work out which way the exit lay◆

that evening, almost the first thing she said was: "I heard you this morning, in one of the courtyards. This afternoon, too. You seemed to be having a good deal of fun."

"On the games," Gormm replied. "It was a busy day. So much to be sorted out."

"Do you think you could persuade them to let me join you? I'm getting so bored."

"Poor Vanessa. I wish I could help. But it's practically impossible. We're so overworked at the moment, especially with Floyd's escape."

Overworked, she thought, racing frogs? Fearing to offend she didn't voice the doubt. "What's going on here?" she said.

"You're not criminals, are you?"

Gormm looked outraged. "Criminals?"

"I'm sorry."

"No. I understand why you asked. It must strike you as odd, our being locked up here. But no, we're not criminals."

"What, then? What's the big secret?" Gormm took a deep breath before replying.

"I'll tell you," he said, "will you help us to get out of here?"

"How?"

"Your car. It's at the front."

"Yes, I saw it."

"If we can get to it, would you drive?"

"How many of you?"

"Four. There's me, there's Ikenya, there's Mottishhead, and Goldberg. Of course, Floyd is probably out there somewhere, but he'll just have to look after himself, won't he?"

"It's a small car," she warned.

"We're small people," Gormm returned. "You shrink with age, you know, like dried fruit. And were old. With Floyd we had three hundred and ninety-eight years between us. All that better experience," he said, "and not one of us wise."

In the yard outside Vanessa's room, shouting suddenly erupted. Gormm disappeared from the door and reappeared again briefly to murmur, "They found him. Oh, my God, they found him." Then he fled.

Vanessa crossed to the window and peered through. She could not see much of the yard below, but what she could see was full of frenzied activity, sisters hithering and thithering. At the center of this commotion she could see a small figure—the runaway Floyd, no doubt—struggling in the grip of two guards. He looked to be much the worse for his days and nights of living rough; his drooping features dripped, his balding pate peeling from an excess of sun. Vanessa heard the voice of Mr. Klen run across the bubble, and he stepped into the scene. He approached Floyd and proceeded to berate him mercilessly. Vanessa could not catch more than one in every ten words, but the verbal assault rapidly reduced the old man to tears. She turned away from the window, silently praying that Klen would choke on his next piece of chocolate.

So far, her time here had brought a curious collection of experiences: one moment pleasant, the next unpalatable. And still she was no nearer understanding what the function of this prison was, why it only had five inmates (six, if she included herself) and all so old—stunk by age, Gormm had said. But after Klen's humiliation of Floyd she was now certain that no secret however pressing would keep her from aiding Gormm in his bid for freedom.

The professor did not come back that evening, which disappointed her. Perhaps Floyd's recapture had meant stricter regulations about the place, she reasoned, though that principle scarcely applied to her. She it seemed, was practically forgotten. Though Guillermo brought her food and drink, he did not stay to teach her poker as they had arranged; nor was she escorted out to take the air. Left in the stuffy room without company, her mind undisturbed by any entertainment but counting her toes, she rapidly became listless and sleepy.

Indeed, she was dozing through the middle of the following afternoon when something hit the wall outside the window. She got up and was crossing to see what the sound was when an object was hurled through the window. It landed with a clunk

on the floor. She went to snatch a glimpse of the sander, but he'd gone.

The tiny parcel was a key wrapped in a note: "WELCOME BE READY YOUNG IN SPECIAL SURVEILLANCE H.Q."

Latin was not her forte; she hoped the final words were an endearment, not an instruction. She tried the key in the door of her cell. It worked. Clearly Gomm didn't intend her to use it now; however, but to wait for some signal, as *Leslie* had written. *Essex* said that done, of course. It was so tempting, with the door open and the passageway out to the sun clear to forget the others and make a break for it. But H.G. had doubtless taken some risk acquiring the key. She owed him her allegiance.

After that, there was no more closing. Every time she heard a footstep in the cloister or a shout in the yard, she was up and ready. But Gomm's call didn't come. The afternoon dragged on into evening. Guilemot appeared with another pizza and a bottle of Coca-Cola for dinner, and before she knew it, night had fallen and another day was gone.

Perhaps they would come by cover of darkness, she thought, but they didn't. The moon rose, its rays striking, and there was still no sign of H.G. or the promised exodus. She began to suspect the worst: that their plan had been discovered and they were all being punished for it. If so, would not Mr. Klein sooner or later rob out her involvement? Though her part had been minor, what sanctions might the chocolate man take out against her? Sometime after midnight she decided that waiting here for the ax to fall was not her style at all and she would be wise to do as Floyd had done and run for it.

She let herself out of the cell and looked behind her, then hurried along the cloisters, cleaving to the shadows as best she could. There was no sign of human presence—but she remembered the watchful Virgin. Nothing was to be trusted here. By stealth and sheer good fortune, she eventually found her way out into the yard in which Floyd had loosed Mr. Klein. There she paused to work out which way the exit lay from here. But clouds had moved across the face of the moon, and in darkness her little sense of direction deserted her completely. Trying to look, she chose one of the exits from the yard and slipped through it, following her nose along a covered walkway that twisted and turned before leading out into yet another courtyard, larger than the first. A light breeze teased the leaves of two entwined laurel trees in the center of the yard; night birds tuned up in the walls. Perceivable as it was, the square offered no promising route she could see, and she was about to go back the way she'd come when the moon shook off its veils and lit the yard from wall to wall. It was empty but for the laurel trees and their shadow, but that shadow fell across an elaborate design that had been painted on the pavement of the yard. She stared at it, too curious to retreat, though she could



It goes in a barrel at Jack Daniel's distillery, where it stays for two

ON JACK DANIEL'S BIRTHDAY most folks like to bake a cake.



Some of our employees gather in the office Mr. Jack built when he started our distillery in 1866. And down at Mary Bobo's boarding House, Margaret Tolley has chocolate cake for everyone at

her table that day. No, we never serve Jack Daniel's Whiskey on these occasions. (Lynchburg, you see, is dry.) But we hope the law is more lenient where you work or live. And that, come March 25th, you'll find time to raise a glass or two.

**SMOOTH SIPPIN'
TENNESSEE WHISKEY**

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make no sense of the thing at first: the pattern seemed to be just this—a pattern. She stalked it along one edge, trying to fathom its significance. Then it dawned on her that she was viewing the entire picture upside down. She moved to the other side of the courtyard, and the design came clear: it was a map of the world, reproduced down to the most insignificant site. All the great cities were marked, and the oceans and continents interspersed with hundreds of lines that marked latitudes, longitudes, and much else besides. Though many of the symbols were idiosyncratic, it was clear that the map was rife with political detail: contested borders, territorial waters, exclusion zones. Many of these had been drawn and redrawn in chalk, as if in response to daily malignance. In some regions where events were particularly tumultuous, the landmarks were all but obscured by scribbles.

Fascination came between her and her safety. She didn't hear the footsteps at the North Pole until her owner was stepping out of hiding and into the moonlight. She was about to make a run for it when she recognized Gomm.

"Don't move," he murmured across the wall.

She did as she was instructed. Glancing around him like a beseeching rabbit until he was certain the yard was deserted, H.G. crossed to where Vanessa stood.

"What are you doing here?" he demanded of her.

"You didn't come," she accused him. "I thought you'd forgotten me."

"Things got difficult. They watch us all the time."

"I couldn't go on waiting. Harvey. This is no place to take a holiday."

"You're right," he said, a picture of dejection. "It's hopeless. You should make your getaway. Forget about us. They'll never let us out. The truth's too terrible."

"What truth?"

He shook his head. "Forget about it. Forget we ever met."

Vanessa took hold of his spindly arm. "I will not," she said. "I have to know what's happening here."

Gomm struggled. "Perhaps you should know. Perhaps the world should know." He took her hand, and they retreated into the relative safety of the cloisters.

"What's the map for?" she asked.

"This is where we play," he replied, staring at the tangle of scrawls on the courtyard floor. He sighed. "Of course it wasn't always games. But systems decay, you know. It's an ineluctable condition common to both matter and ideas. You start off with line markers, and in two decades, two decades," he repeated as if the fact appalled him afresh, "we're playing with logs."

"You're not making much sense, Harvey. Vanessa said. Are you being deliberately obtuse or is the senility?"

He peeked at the accusation, but it did the trick. Gaze still fixed on the map of the

world, he delivered the next words crisply as if he'd rehearsed this confession.

There was a day of sanity back in 1962 in which it occurred to the potentates that they were on the verge of destroying the world. Even to potentates the idea of an Earth only fit for cockroaches was not particularly beguiling. If annihilation was to be prevented, they decided, our better instincts had to prevail. The mighty gathered behind locked doors at a symposium in Geneva. There had never been such a meeting of minds. The leaders of politics and parliaments, congresses, senates—the lords of the earth—in one colossal debate. And it was decided that in the future, world affairs should be overseen by a special committee, made up of great and influential minds like my own—men and women who were not subject to the whims of political favor, who could offer some guiding principles to keep the species from mass suicide. This committee was to be made up of people in many areas of hu-

◆The guard escorted H.G. away, and the captain lingered to murmur, "Who's a good boy?" under his breath, then followed. The courtyard was empty again but for the map of the world◆

man endeavor—the best of the best, an intellectual and moral elite whose collective wisdom would bring a new golden age. That was the theory anyway.

Vanessa listened, without voicing the hundred questions her short speech had so far brought to mind. Gomm went on.

And for a while, it really worked. There were only thirteen of us—to keep some consensus, a Russian, a few of us Europeans, dear Yonyoko of course, a New Zealander, a couple of Americans. A high-powered bunch. Two Nobel prize-winners, myself included—

Now she remembered Gomm, or at least where she'd once seen that face. They had both been much younger. She, a school girl, taught his theories by rote.

—Our brief was to encourage mutual understanding between the powers that be, help shape compassionate economic structures, and develop the cultural identity of emergent nations. All platitudes, of course, but they sounded fine at the time. As it was, amidst from the beginning our theories were tenuous.

Tentative?

Gomm made an expansive gesture, tak-

ing in the map in front of him. "Helping to divide the world up," he said. "Repugnant idea, was so they didn't become big wars keeping datastashes from getting too full of themselves. We became the world's domestics, cleaning up wherever the dirt got too thick. It was a great responsibility, but we shouldered it quite happily. It rather pleased us, at the beginning, to think that we then were shaping the world and that nobody but the highest echelons of government knew that we even existed."

That, thought Vanessa, was the Napoleon syndrome will linger. Gomm was indisputably insane, but what a historic insanity! And it was essentially harmless. Why did they have to lock him up? He surely wasn't capable of doing damage.

"It seems unfair," she said, "that you're locked away in here—"

"Well, that's for our own security of course," Gomm replied. "Imagine the chaos if some anarchist group found out where we operated from, and did away with us. We run the world. It wasn't meant to be that way, but as I said, systems decay. As time went by, the potentates—knowing they had us to make critical decisions for them—concerned themselves more and more with the pleasures of high office and less and less with thinking. Within five years we were no longer advisers but surrogate overlords, juggling nations."

"What fun," Vanessa said.

"For a while, perhaps," Gomm replied. "But the glamour faded very quickly. And after a decade or so, the pressure began to tell. Half of the committee are already dead. Goliatovniko threw himself out of a window. Buchanan—the New Zealander—had syphilis and didn't know it. Old age caught up with dear Yonyoko, and Beemheimer and Sourbuts III! catch up with all of us sooner or later, and Ken keeps promising to provide people to take over when we've gone, but they don't give a damn! We're functionaries, that's all." He was getting quite agitated. "As long as we provide them with judgments, they're happy. Well!"—his voice dropped to a whisper—"were giving it up."

Was this a moment of self-realization? Vanessa wondered. Was the sane man in Gomm's head attempting to throw off the fiction of world domination? If so, perhaps she could aid the process.

"You want to get away?" she said.

Gomm nodded. "I'd like to see my home once more before I die. I've given up so much, Vanessa, for the committee, and it almost drove me mad!"—Ah, she thought, he knows—"Does it sound selfish if I say that my life seems too great a sacrifice to make for global peace?" She smiled at his pretensions to power. "If it does, it does! I'm unimportant. I want out. I want—"

Keep your voice down," she advised. He remembered himself and nodded. "I want a little freedom before I die. We all do. And we thought you could help us, you see." He looked at her. "What's wrong?"

"Wrong?"

The Artist

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I'm calling it
Political Commentary

What do you think?



☆ @ ~ # !!

Subtlety is
not your forte



"Why are you looking at me like that?"
"You're not well, Harvey. I don't think you're dangerous, but—"

"Wait a minute," Gomm said. "What do you think I've been telling you? I go to all this trouble—"

"Harvey, it's a fine story—"

"Story? What do you mean, story? Oh, I see. You don't believe me, do you? That's it! I just told you the greatest secret in the world, and you don't believe me!"

"I'm not saying you're lying—"

"Is that it? You think I'm a lunatic?" Gomm exploded: his voice echoed around the rectangular world. Almost immediately there were voices from several buildings and fast upon those the thunder of feet.

"Now look what you've done," he said. "I've done?"

"We're in trouble."

"Look, H.G., this doesn't mean—"

"Too late for retractions. You stay where you are—I'm going to make a run for it. Distract them."

He was about to depart when he turned back to her, caught hold of her hand, and put it to his lips. "If I'm mad," he said, "you made me that way."

Then he was off! His short legs carrying him at a fair speed across the yard. He did not even reach the laundress, however, before the guards arrived. They shouted for him to stop. When he failed to do so, one of the men fired. Bullets plowed the ocean around Gomm's feet.

"All right," he yelled, coming to a halt and putting his hands in the air. "Maa culpa!"

The firing stopped. The guards parted as their commander stepped through.

"Oh, it's you, Sidney," H.G. said to the captain. The man visibly flinched to be so addressed in front of inferior ranks.

"What are you doing out at this time of night?" Sidney demanded.

"Stargazing," Gomm replied.

"You weren't alone," the captain said. Vanessa's heart sank. There was no route back to her room without crossing the open courtyard, and even now with the alarm raised, Guillermo would probably be checking on her.

"That's true," said Gomm. "I wasn't alone. Had she offended the old man so much he was now going to betray her?" I told the woman you brought in—"

"Where?"

"Climbing over the wall," he said. "Jesus wept!" the captain said, and swung around to order his men in pursuit. "I said to her," Gomm was prattling. "I said, 'You'll break your neck climbing over the wall. You'd be better off waiting until they open the gate—'"

"Open the gate. He wasn't such a lunatic after all." Philipenko, the captain said, escorted Harvey back to his dormitory.

Gomm protested. "I don't need a bedtime story, thank you."

"Go with him."

The guard crossed to H.G. and escorted him away. The captain lingered long



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enough to murmur "Who's a clever boy Sidney?" under his breath, then followed. The courtyard was empty again but for the moonlight and the map of the world.

Vanessa waited until every last sound had died and then slipped out of hiding, taking the route the dispatched guards had followed. It led her, eventually into an area she vaguely recognized from her walk with Guillemot. Encouraged, she turned on along a passageway that led out into the yard with Our Lady of the Electric Eyes. She crept along the wall and ducked beneath the statues' gaze and out. Truly to meet the gates. They were indeed open. As the old man had protested when they first met, security was woefully inadequate, and she thanked God for it.

As she ran toward the gates, she heard the sound of boots and glanced over her shoulder to see the captain rifle in hand, stepping from behind a tree. "Some chocolate, Mrs. Jape?" said Mr. Klein.

"This is a lunatic asylum," he told her when they had escorted her back to the interrogation room. "Nothing more nor less. You've got no right to hold me here."

He ignored her complaints. "You spoke to Gorm," he said, "and he to you."

"What if he did?"
"What did he tell you?"
"I said, 'What if he did?'"
And I said, 'What did he tell you?'" Klein roared. "She would not have guessed him capable of such apoplexy. I want to know Mrs. Jape!"

Much against her will she found herself shaking at his outburst.

"He told me nonsense," she replied. "His insane. I think you're all insane."

"What nonsense did he tell you?"
"It was rubbish."

"I'd like to know, Mrs. Jape," Klein said with fury abating. "Hurry me!"

"He said there was some kind of committee at work here that made decisions about world politics and that he was one of them. That was it for what his worth."

"And?"
"I told him he was out of his mind."

Mr. Klein forged a smile. "Of course this is a complete fiction," he said.

"Of course, Jesus Christ, don't treat me like an imbecile. I'm a grown woman—"

Mr. Gorm—
"He said he was a professor!"

"Another delusion. Mr. Gorm is a paranoid schizophrenic. He can be extremely dangerous, given half a chance. You were pretty lucky."

"And the others?"
"Others?"

"He's not alone. I've heard them. Are they all schizophrenics?"

Klein sighed. "They're all deranged, though their conditions vary. And in their time, unlikely as it may seem, they've all been killers. He possessed to allow this information to sink in. Some of them multiple killers. That's why they have this place to themselves, hidden away. That's why the officers are armed—"

She opened her mouth to ask why they were required to masquerade as nuns, but he wasn't about to give her an opportunity. "Believe me, it's as inconvenient for me as it is troubling for you to be here," he said. "Then let me go."

"When my investigations are complete," he said. "In the meanwhile your cooperation would be appreciated. If Mr. Gorm or any of the other patients tries to co-opt you into some plan or other, please report them to me immediately. Will you do that?"

"I suppose—"
"And please refrain from any further escape attempts. The next could be fatal."

"I wanted to ask—"
"Tomorrow, maybe." Mr. Klein said, glancing at his watch as he stood up. "For now, sleep."

Which she debated with herself when that sleep refused to come, of all the routes to the truth that lay before her was the unlikely path? She had been given several

Which she debated with herself when that sleep refused to come, of all the routes to the truth that lay before her was the unlikely path? She had been given several

●He slid
on the floor and stumbled
against the shower,
yelping as scalding water met
his scalp. His rifle
clattered to the floor. By
the time he righted
himself, it was in her hand ●

alternatives, by Gorm, by Klein, by her own common sense. All of them were terribly improbable. All like the path that had brought her here, unmarked as to their final destination. She had suffered the consequence of her perversity in following that track, of course. Here she was, weary and battered, locked up with little hope of escape. But that perversity was her nature—as Ronald once said, the one indisputable fact about her. It also disregarded that instant now, despite all it had brought her to, she was lost. She lay awake, turning the available alternatives over in her head. By morning she had made up her mind.

She waited all day, hoping Gorm would come, but she wasn't surprised when he failed to show. It was possible that events of the previous evening had landed him in deeper trouble than even he could talk his way out of. She was not left entirely to herself, however. Guillemot came and went with food, with drink, and—in the middle of the afternoon—with playing cards. She picked up the gist of five-card poker quite rapidly, and they passed a contented hour or two playing while the air carried shouts

from the courtyard where the bedlamites were rising frogs.

"Do you think you could arrange for me to have a bath or at least a shower?" she asked him when he came for her dinner tray that evening. "It's getting so that I don't like my own company."

He actually smiled as he responded. "I'll find out for you."

"Would you?" she gushed.
He waited an hour later to tell her that dispensation had been sought and granted, would she like to accompany him to the showers?

"Are you going to scrub my back?" she casually inquired.

Guillemot's eyes flickered with panic at the remark, and his ears flushed beetroot red. "Please follow me," he said. Obeyingly she followed, trying to keep a mental picture of their route should she want to retrace it later, without her custodian.

The facilities he brought her to were far from primitive, and she registered, walking into the mirrored bathroom, that actually washing was not high on her list of priorities. Cleanliness was for another day.

"It'll be outside the door," Guillemot said. "That's reassuring," she replied, offering him a look she trusted he would interpret as promising, and closed the door. Then she ran the shower as hot as it would go until steam began to cloud the room, and went down on her hands and knees to soap the floor. When the bathroom was sufficiently soiled and the floor sufficiently slick, she called Guillemot. She might have been flattered by the speed of his response, but she was too busy soaping behind him as he tumbled in the steam and giving him a hefty push. He slid on the floor and stumbled against the shower, yelping as scalding water met his scalp. His automatic rifle clattered to the floor, and by the time he was righting himself she had it in her hand and pointed at his torso, a substantial target.

Though she was no sharpshooter and her hands were trembling, a blind woman couldn't have missed at such a range. She knew it, and so did Guillemot. He put his hands up.

"Don't shoot."
"If you move a muscle—"
"Please, don't shoot!"

"Now, take me to Mr. Gorm and the others. Quickly and quietly."
"Why?"

"Just take me," she said, gesturing with the rifle that he should lead the way out of the bathroom. And if you try to do anything clever, I'll shoot you in the back," she said.

"I know it's not very merry, but then, I'm not a man. I'm just an unpredictable woman. So treat me very carefully."

"Yes."
He did as he was told, meekly leading her out of the building and through passageways that took them toward the bell tower and the complex clustered about it. She had always assumed this, the heart of the fortress, to be a chapel. She could not have been more wrong. The outer shell

might be tiled roof and whitewashed walls, but that was merely a facade: they stepped over the threshold into a concrete maze more reminiscent of a bunker than a place of worship. It briefly occurred to her that the place had been built to withstand a nuclear attack, an impression reinforced by the fact that the corridors all led down. If this was an asylum, it was built to house some rare lunatics.

What is the place? she asked.
We call it the Boudoir," Guillemot said. "It's where everything happens."

There was little happening at present most of the offices off the corridors were in darkness. In one room a computer calculated the chances of independent thought, unattended in another a fax machine wrote love letters to itself. They descended into the bowels of the place unchallenged until, rounding a corner, they came face-to-face with a woman on her hands and knees, scrubbing the linoleum. The on-counter started both parties, and Guillemot was swift to take the initiative. He knocked Vanessa sideways against the wall and ran for it. Before she had time to get him in her sights, he was gone.

She cursed herself: it would be only moments before alarm bells started to ring and guards came running. She was lost; if she stayed where she was, The three exits from this hallway looked equally uncompromising—so she simply made for the nearest leaving the cleaner to stare after her. The route she took proved to be another adventure. It led her through a series of rooms, one of which was lined with dozens of clocks, all showing different times, the next of which contained upwards of fifty black telephones, the third and largest was lined on every side with television screens. They rose, one upon another, from floor to ceiling. All but one were blank. The exception was showing what she first took to be a mud-wrestling contest, but was in fact a poorly reproduced pornographic film. Sitting watching it, sprawled on a chair with a beer can balanced on his stomach, was a mustachioed man. He stood up as she entered—caught in the act. She pointed the rifle at him. "I'm going to shoot you dead," she told him.

She said:
"Where's Gorm and the others?"
"What?"
"Where are they?" she demanded quickly.

"Down the hall. Turn left and left again," he said. Then added, "I don't want to die. Then sit down and shut up."
Thank God, he said.
"Why don't you?" she told him. As she backed out of the room, he fell down on his knees while the mud wrestlers covered behind him.

Left and left again. The directions were faithful. They led her to a series of rooms. She was just about to knock on one of the doors when the alarm sounded. Throwing caution to the wind, she pushed all the doors open. Voices from within com-

plained at being awakened and asked what the alarm was ringing for. In the third room she found Gorm. He grinned at her.

"Vanessa," he said, bouncing out into the corridor. He was wearing a long vest and nothing else. "You came. Ah? You came?"

The others were appearing from their rooms, bleary-eyed with sleep. Ikeniya, Floyd, Mortenshead, Goldberg. She could believe looking at their tattered faces that they indeed had four hundred years between them.

Wake up, you old buggers," Gorm said. He had found a pair of trousers and was pulling them on.

The alarm's ringing—, one commented. His hair, which was bright white, was almost at his shoulders.

They'll be here soon—, Ikeniya said.
No matter," Gorm replied.
Floyd was already dressed. "I'm ready," he announced.

"But we're outnumbered," Vanessa protested. "We'll never get out alive."

● He revved the car until the engine fairly screeched. Dust was flung up and through the gap where the door had been. A goat fled from the path ahead, avoiding death by seconds. ●

"She's right," said one, squinting at her. It's no use."

"Shut up, Goldberg," Gorm snapped.
"She's got a gun, hasn't she?"

"One," said the white-haired individual. This must be Mortenshead. "One gun against all of them."

"I'm going back to bed," Goldberg said. "This is a chance to escape." Gorm said, "Probably the only one I'll ever get."

"He's right," the woman said.
"And what about the games?" Goldberg reminded them.

"Forget the games," Floyd told the other. "Let them sleep awhile."

"It's too late," said Vanessa. "They're coming. There were shouts from both ends of the corridor. We're trapped."

"Good," said Gorm.
"You are insane," she told him plainly.
"You can still shoot us," he was grinning.
Floyd grunted. "I don't want to get out of here that much," he said.

"Threaten it?" Gorm said. "Tell them if they try anything you'll shoot us all!"

Ikeniya smiled. She had left her teeth in her bedroom. "Sure not just a pretty face," she said to Gorm.

He's right," said Floyd, beaming now. "They wouldn't dare risk us. They'll have to let us go."

"You're out of your minds," Goldberg muttered. "There's nothing out there for us." He returned to his room and slammed the door. Even as he did so, the corridor was blocked off at either end by a mass of guards. Gorm took hold of Vanessa's rifle and raised it to point at his heart.

"Begrudge," he said, and threw her a kiss.
Put down the weapon, Mrs. Japs," said a familiar voice. Mr. Klein had appeared among the throng of guards. "Take it from me. You are completely surrounded."

"I'll kill them all," Vanessa said, a little hesitantly. "Then again, the time with more fooling. I'm warning you. I'm desperate. I'll kill them all before you shoot me."

"I said," said Klein quietly. "And why do you assume I give a damn whether you kill them or not? They're insane. I told you that lunatics kill."

"We both know that isn't true," said Vanessa, gaining confidence from the anxiety on Klein's face. "I want the front gates opened and the key in the ignition of my car. If you try anything stupid, I will systematically shoot these hostages. Now, dress me, your bullies and do as I say."

Mr. Klein hesitated, then signaled a general withdrawal.

Gorm's eyes glittered. "Neatly done," he whispered.

"Why don't you lead the way?" Vanessa suggested. Gorm did as he was instructed, and her small party snaked their way out past the masked clocks and telephones and video screens. Every step they took, Vanessa expected a bullet to find her, but Mr. Klein was clearly too concerned for the ancients to risk calling her bluff. They reached the open air without incident.

The guards were in evidence outside, though attempting to stay out of sight. Vanessa kept the rifle trained on the four captives as they headed through the yards to where her car was parked.

"Gorm," she whispered. "Open the car doors."

Gorm did so. He had said that age shrank them all, and perhaps it was true, but there were five of them to fit into the small vehicle, and it was tightly packed. Vanessa was the last to get in. As she ducked to slide into the driving seat, a shot rang out, and she felt a blow to her shoulder. She dropped the rifle.

"Leave her," somebody piped up in the back, but Gorm was already out of the car and bundling her into the back beside Floyd. He then slid into the driving seat himself and started the engine.

"Can you drive?" Ikeniya demanded.
"Of course I can bloody drive!" he retorted, and the car jerked forward through the gates, the gears grating.

Vanessa had never been shot before and hoped—if she survived this episode—to avoid it happening again. The wound in her shoulder was bleeding badly. Floyd did his best to staunch the wound, but Gorm's

driving made any easily constructive help practically impossible.

"There's a track—" she managed to tell him, "off that way!"

"Which way is that way?" Gormi yelled. "Right! Right!" she yelled back.

Gormi took both hands off the wheel and looked at them.

"Which is right?"
"For Christ's sake!"

Ironya, in the seat beside him, pressed his hands back onto the wheel. The car performed a beautiful Vanessa groined with every bump.

"I see it," said Gormi. "I see the track!" He revved the car up, his foot slammed down on the accelerator.

One of the back doors, which had been inadequately sealed, flipped open, and Vanessa almost fell out. Motter ahead, reaching over Floyd, yanked her back to safety, but before they could close the door, it met the boulder that marked the convergence of the two tracks. The car bucked as the door was torn off its hinges.

"We needed more air in here," said Gormi, and dove on.

There was not the only engine disturbing the Arabian night. There were lights behind them and the sound of hectic pursuit. With Guatemala's rifle left in the convent, they had no sudden death to bargain with, and Kien knew it.

"Stop on it!" Floyd said, grinning from ear to ear. "They're coming after us."

"I'm going as fast as I can," Gormi insisted.

"Turn off the lights," Ironya suggested. "It'll make us less of a target."

"Then I won't be able to see the track Gormi complained over the engine roar.

"So? You're not driving on it anyhow?"

Motterhead laughed, and so—against her better instincts—did Vanessa. Maybe the loss of blood was making her irresponsible, but she couldn't help herself. Four Methuselahs and herself in a three door car driving around in the dark. Only a madman would have taken this seriously. And there was the final and indisputable proof that these people weren't the lunatics Kien had marked them as, for they saw the humor in it, too. Gormi had even taken to singing as he drove, snatches of Verdi and a falsetto rendition of "Over the Rainbow."

And it—as her derided mind had concluded—these were creatures as sane as herself, then what of the tale that Gormi had said? Was that true, too? Was it possible that Amiguedad had been kept at bay by these few giggling geniuses?

"They're glaring on us!" Floyd said. He was on his knees on the blacktop, peering out of the window.

"We're not going to make it!" Motterhead observed, his laughter barely stalling. "We're all going to die."

"There!" Ironya yelled. "There's another track! Try that! Try that!"

Gormi swung the wheel, and the car almost tipped over as it swung off the main track and followed this new route. With the

lights extinguished it was impossible to see more than a glimmer of the road ahead, but Gormi's style was not about to be cramped by such minor considerations. He revved the car until the engine fairly screamed. Dust was flung up and through the gap where the door had been, a ghost fleet, avoiding death by seconds.

"Where are we going?" Vanessa yelled. "Haven't a clue," Gormi returned.

Wherever they were heading, they were going at a fair speed. This track was faster than the one they'd left, and Gormi was taking full advantage of the fact. Again he'd taken to singing.

Motterhead was leaning out of the window on the far side of the car, his hair streaming, watching for their pursuers.

"We're losing them!" he howled triumphantly. "We're losing them!"

A common exhibition seized all the travelers now, and they began to sing along with H.G. They were singing so loudly that Gormi couldn't hear Motterhead inform him that the road ahead seemed to disappear. Indeed, H.G. was not aware that he had driven the car over the cliff until the vehicle took a nose dive and the sea came up to meet them.

"Mrs Jape? Mrs Jape?"

Vanessa woke unwillingly. Her head hurt, her arm hurt. There had been some terrible times recently, though it took her a while to remember the substance of them. Then the memories came back. The car pitching over the cliff, the cold sea rushing in through the open door, the frantic cries around her as the vehicle sank. She had struggled free, only half conscious, vaguely aware that Floyd was floating up beside her. She had said his name, but he had not answered. She said it again now.

"Dead," said Mr Kien. "They're all dead."

"Oh, my God," she murmured. She was looking not at his face but at a chocolate stain on his waistcoat.

"Never mind them now," he insisted. "Never mind?"

"There's more important business, Mrs Jape. You must get up, and quickly."

The urgency in Kien's voice brought Vanessa to her feet. "Is it morning?" she said. There were no windows in the room they occupied. This was the Boudoir, to judge by its contents walls.

"Yes, it's morning. Kien replied impatiently. "Now will you come with me? I have something to show you." He opened the door, and they stepped out into the grim corridor. A little way ahead it sounded as if a major argument was going on, raised voices, imprecations, and pleadings.

"What's happening?"

"They're warming up for the Apocalypse," he replied, and led the way into the room where Vanessa had last seen the mud-washers. Now all the video screens were buzzing, and each displayed a different interior: war rooms and presidential suites, cabinet offices, halls of congress. In every one of them, somebody was shouting.

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"I have been unconscious two full days," Kien told her, as if this went some way to explaining the cacophony. Her head ached. She looked from screen to screen, from Washington to Hamburg to Sydney to Rio de Janeiro. Everywhere around the globe the mighty were waiting for news. But the oracles were dead.

"They're just performers," Kien said, gesturing at the shouting screens. "They couldn't run a three-legged race, never mind the world. They're getting hysterical and their buttonfingers are starting to twitch."

"What am I supposed to do about it?" Vanessa returned. This tour of Babel depressed her. "I'm no strategist."

"Neither were Gomm and the others. They might have been, once upon a time, but things soon fell apart."

"Systems decay," she said.

"Isn't that the truth? By the time I came here, half the committee was already dead. And the rest had lost all interest..."

"But they still provided judgments?"

"Oh, yes."

"They ruled the world?"

"After a fashion," Kien replied.

Kien looked at the screen. His eyes seemed to be on the verge of spilling tears.

"Didn't he explain?" They played games, Miss Jape. When they became bored with sweet reason and the sound of their own voices, they took to flipping coins."

"No."

"And racing frogs, of course. That was always a favorite."

"But the governments—," she protested—surely they didn't just accept—"

"You think they can?" Kien said. "As long as they're in the public eye, what does it matter to them what verbiage they're spouting, or how it was arrived at?"

Her head spun. "All chance?" she said.

"Why not? It has a very respectable tradition. Nations have fallen on decisions derived from the oracles of sheep."

"It's preposterous."

"I agree. But I ask you, in all honesty, is it any more terrifying than leaving the power in their hands?" He pointed to the rows of mine faces. Democrats sweating that the morrow would find them without cause to espouse or applause to win, despots in terror that without instruction their oracles would lose favor and be overturned. One premier seemed to have suffered a bronchial attack and was being supported by two of his aides, another clutched a revolver and was pointing it at the screen demanding satisfaction. Were these the finest fruit of the political tree—babbling, bullying, caving inlets, driven to apoplexy because nobody would tell them which way to jump? There wasn't a man or woman among them Vanessa would have trusted to guide her across the road.

"Better frogs," she murmured, bitter thought that it was.

The light in the courtyard, after the dead illumination of the bunker, was dazzlingly bright, but Vanessa was pleased to be out

of gunshot of the stench within. They would find a new committee very soon. Kien had told her. It would be a matter of weeks, only before equilibrium was restored. In the meanwhile, the earth could be blown to smithereens by the desperate creatures she had just seen. They needed judgments, and quickly.

"Goldberg is still alive," Kien said. "And he will go on with the games, but it takes two to play."

"Why not you?"

"Because he hates me. He hates all of us. He says that he'll only play with you."

Goldberg was sitting under the banyan trees, playing patience. It was a slow business. His shortsightedness required him to bring each card to within three inches of his nose to read it, and by the time he had got to the end of the line he had forgotten those cards at the beginning.

"She's agreed," said Kien. Goldberg didn't look up. "I said, She's agreed."

"I'm blind not deaf," Goldberg said. Kien, still perusing the cards. When he eventually looked up it was to squint at Vanessa. "I told them it would end badly," he said softly, and Vanessa knew that beneath this show of feishen he felt the loss of his companions acutely. "I said from the beginning we were here to stay. No use to escape. He shrugged and returned to the cards. "What to escape to? The world's changed. I know. We changed it."

"It wasn't so bad," Vanessa said.

"The world?"

"The way they died."

"Ah."

"We were enjoying ourselves, until the last minute."

"Gomm was such a sentimentalist," he said. "We never much liked each other."

A large frog jumped into Vanessa's path. The movement caught Goldberg's eye.

"Who is it?" he said.

The creature regarded Vanessa's foot balefully. Just a frog," she replied.

"What does it look like?"

"It's fat, with three claws on its back."

"That's brutal. Don't tread on him."

"Could we have some decisions by now?" Kien bellowed. "Particularly the Gulf situation, and the Mexican dispute—"

"Yes, yes," said Goldberg. "Go away."

"—We could have another Bay of Pigs."

"You're telling me nothing I don't know. Go! You're disturbing the nations. He peered at Vanessa. "Well, are you going to sit down or not?"

She sat.

"It leaves you to it," Kien said, and retreated.

Goldberg had begun to make a sound in his throat—*kek-kek-kek*—imitating a frog. In response, there came a croaking from every corner of the courtyard. Vanessa sat like a smile. Forso, she had told herself once before, had to be played with a straight face, as though you believed every outrageous word. Only tragedy demanded laughter, and that, with the aid of the frogs, they might yet prevent. **DO**

BOOKS

CONTINUED FROM PAGE 24

Research eventually led her to a bare twinkle stone building known as Arthur's Don (Oven). Located in Salingford, it was just south of Stirling Castle. "It was a round domed temple used, like those in Jerusalem, to shelter and display alms and holy relics," Goodrich says. "The so-called Round Table was, in fact, a simple."

"I'm always debunking things, demanding evidence," contends Goodrich. "But when we'd find these places, I'd have feelings that went beyond any evidence. And in this one, it was like puzzle pieces falling into place." Take, for example, her last sighting of Avalon and the Greal Castle. There are houses on either side of the narrow, winding road—King's Vale Royal, on the Isle of Man in the Irish Sea. The road suddenly drops to the ocean level and you spot a gloriously golden beach, beyond which is a milky opaque blue-sapphire water," she says. Offshore, St. Patrick's Isle lies surrounded by black rocks and covered with grassy mounds and vibrant sea urchin flowers. A ray light reflects off the remnants of an old stone tower. The scene fits Some de Namur's description. "I gasped when I saw it, overcome by a feeling of holiness," she recalls. "It was overwhelmingly beautiful and the most awe-inspiring place I had ever seen."

Not all Arthurian scholars, however, are convinced by Goodrich's evidence. Geoffrey Ashe, a prominent British Arthurian expert, claims Goodrich has created a pseudo-history. "She never offers any plain historical testimony clearly free of legend," he says. "She never produces even a reference to Arthur that can be proved to be earlier than the ninth century."

Yet discoveries on St. Patrick's Isle, at least, seem to parallel Goodrich's hypotheses and, for surpassing archaeological expectations. University of Liverpool's David Freke, director of the excavation, describes their find as a "Christian-pagan sandwich." On one level they found a Christian cemetery, beneath it a Viking burial ground. Still deeper is an earlier Christian site dating from the fifth or sixth centuries—the site of Camelot. But, Freke told a local newspaper, this does not yet prove or disprove Goodrich's claims.

More will be learned as Freke and his associates continue their investigation. Evidence of footwalkers, with sand deposits in the ancient site, Goodrich suggests, might coincide with accounts of Avalon. They might also find Guinevere's remains, buried with her sons' head clutched against her bosom, a possibility that excites the archaeologists. Even if their findings give greater credence to her work, though, Goodrich doesn't expect it to quiet her critics. "No matter how much is proved, it's a matter of faith," she says. "And like religious faith, you can't debate it and win. You either believe or you don't." **DO**

START TECH

ACCESSING THE FUTURE

3-D TV

Scientists at the University of Leeds in England have finally designed a viewing system that presents images on computer monitors and TV sets in *Moika 3-D*.

For its developers—Leeds biophysicist Sandy Geddes and his student Mark Harris, now at the University of North Carolina at Chapel Hill—the original challenge was purely scientific: how to produce a coherent image of huge macromolecules whose thousands of atoms render them an incomprehensible blur when represented in two dimensions. They solved the problem by using frame sequential stereoscopy in which images are displayed alternately on the screen, synchronized by a complex monitoring system, then "decoded" by a set of liquid-crystal spectacles worn by the viewer.

So far the system—which retails for about \$3,000—has been sold primarily to pharmaceutical companies for use in drug design and to university research departments. Although the picture flickers under some conditions, marketer Steve Ralph is confident that once TV stations start broadcasting in 3-D, the Leeds system will quickly find its way into peoples' living rooms.

"Technically," he says, "it's all available. Anyone who buys one of these viewers is ready to receive 3-D television broadcasts."

Access: Contact Millennium Ltd., Boulton Road, Shephardham, Hertfordshire, England SG8 4GX.



LIQUID GOLD

In response to the growing drug-testing phenomenon in both government and private industry, a whimsical Austin, Texas, entrepreneur with a flair for inventive promotion has begun selling vials of powdered—guaranteed drug-free—urine in a business where the sky would seem to be the limit.

Jeffrey Nightbyrd, owner of Byrd Laboratories, originally sold his product in liquid form, switching to powder as soon as the manufacturing process was perfected late last year. A freeze-dried version never panned out.

All you do is add water, preferably distilled water, says the Texan, who admits that attaining a temperature close enough to the normal 98.6°F is still a bit of a prob-

lem. The company slogan is "Pee for Pleasure. Not for Employment," and the lab is described as "Purveyors of Fine Urine Products." "Urine gowns were de rigueur last winter at the first Urine Ball to raise money for the Urine Defense Fund."

Nightbyrd, who says he is not interested in whether his customers use his instant urine to best job-application tests or for experimental purposes, has run into no legal problems so far. "We're violating no law," he insists. "We're just a chemical supplier."

George Nobbie, Access: Byrd Laboratories, 507 Timby, Austin, TX 78701. The company charges \$19.95 for enough powder to get you through two tests, and for another \$5 you can get a booklet called *Success in Urine Testing*.

SURGICAL VACATIONS

You left your face in San Francisco. Now you can leave your face in Geneva. Because of soaring surgery costs in the United States, a West German company called Meditrans offers "surgical vacations" for people who want to save money on face-lifts, hip replacements, and radical new treatments for cancer—and see the world at the same time.

Former company spokesman John Christensen says the total cost of flying to Europe, staying in a hotel for a week, and having surgery is considerably less than the cost of surgery alone in the United States.

Say you want a face lift. "We will fly patients first class to Switzerland or Germany," says Christensen, "provide transportation to and from the airport, put you up in a hotel for a week, and throw in a continental breakfast when you arrive." All for a mere \$5,500.

Compare that with the average price for a complete face-lift in America—\$8,500—and you're still got pocket change for a little postoperative shopping.

—Michael DeLo

Access: Don't pack your bags yet. Meditrans is still negotiating with U.S. air carriers, which are concerned about liability for botched surgeries, and whether or not insurance companies will go along with such a plan. For more information, contact Wolfgang Bost, Meditrans, Naumburgerstrasse 42, 5000 Munich 50, West Germany.

STARTECH



TRANSMITTERS FOR THE ELDERLY

Astronaut-tracking technology used during spacewalks will soon be adopted to track the elderly some of whom wander away from their homes or the institutions in which they live.

At the request of five federal agencies involved with the problems of the elderly the Research Triangle Institute in North Carolina is studying the efficacy of attaching small transmitters to chronic wanderers. Some 750,000 Americans are chronic wanderers. Many of these people are victims of memory impairments caused by Alzheimer's disease or by the medications some of them are required to take, according to Doris Rouse, director of the Triangle Research Institute team.

The transmitters would alert nursing home personnel when their charges wander beyond a certain distance or into a dangerous area, like

a stairway. There's a tremendous need for this," says Rouse. —George Nobbe
Approx. Early 1989 at a projected cost of about \$250



HIGH-TECH RACEHORSE INVESTING

Want to invest in a racehorse? Now you can increase your odds of picking a winner by studying six generations of the animal's ancestors and relatives—around 9,000 horses—thanks to a computerized data bank and evaluation system recently created by Tulsa-based Genetic Technology Inc. (GTI).

GTI's formula looks at trends to see what genes are being pooled for speed endurance—whatever makes a horse successful," says University of Tulsa cell biologist Staffen Rogers, who serves on GTI's advisory board. It has a ninety-five percent accuracy rate.

GTI is joining forces with Rogers and other scientists to research another innovation in the horse industry—clones. "We want to clone identical animals and use them to study the effects of different environments versus genetics," biologist Rogers explains.

Although the technology is available to clone racehorses now, Rogers doesn't expect that clones will be racing against each other anytime soon. "Horse breeders are afraid cloning will produce too many good animals and drive prices down. Actually, we think it would improve the breed." —Sherry Baker

Approx. GTI's horse evaluation system is available for under \$100 for a single horse. For

more information, contact GTI: 4500 South Garnett, Suite 211, Tulsa, OK 74146. Phone: (918) 627-6322.

SHIPS WITH WINGS

The notion of "hybrid vigor"—improving something by crossbreeding it with something else—is just as valid in technology as it is in animal husbandry. A recent case in point is the Wingair, an ingenious piece of hybrid aviation that uses airplane hardware to enhance the performance of boats.

The brainchild of British engineer John Walker, the Wingair is simply itself: a modified airplane wing and tail mounted vertically on the



mast of a ship (see above). The wings act much like sails, catching prevailing winds and converting them to forward thrust. Heading neither ropes nor rigging, the Wingairs are controlled by a set of computers, so virtually all a skipper has to do is tell the system to stop or go.

In operation since last summer aboard the British

freighter *M. V. Ashington*, the *Wingsail* has sped up the boat an average of two knots while cutting her fuel consumption by 20 percent. Her most grueling test came when she was caught in the Bay of Biscay by Hurricane Chatter. While one nearby ship sank and others slowed to a safe crawl, the *Wingsail*-driven *Ashington* actually sped up from three knots to eight, passing everything in the water and cutting 12 hours off the Tunis-to-Scotland run.

Walker now plans to adapt the *Wingsail* to the yacht market for about \$175,000 (for a 42-foot trimaran). "It's a marvelous way to go sailing," Walker says, "because you don't have to have a crew of athletes onboard. All you need is your brain and your fingertips." —Bill Lawren

Access: Contact Walker Wingsail PLC, Hambro Lane, Hambro, Southampton, England SO3 6JR.

JUMBO PRINTER

The world's biggest computer printer has just rolled off the line from Matsushita of Japan. Called the Jumbo Facsimile, the printer is hardly desk top—in fact, it is almost 70 feet long and 8 feet high, and weighs

in at a hefty 14 tons. More remarkable yet, it is capable of printing out whole billboards—four color sheets up to 50 feet wide—in a single stroke.

The Jumbo works by optically scanning the image and converting the elements into a digital code. The computer then displays the image on a color television screen so operators can play with the colors and shapes until they have the image just the way they want it, at which point they can instruct the computer to spray-paint it onto a huge sheet of paper wrapped around the Jumbo's roller drum.

To make a printer this big, Matsushita had to sacrifice quite a bit in the way of speed. The Jumbo's fastest time for a single sheet is about one and one-half hours. But when you compare that with the average time for a conventional hand-painted billboard—some two weeks—the Jumbo begins to look very quick indeed. —Bill Lawren

Access: Call Marvin Schmidt, Computer Image Systems, at (213) 538-0742.



IBM'S SECRET ... ON DISK

IBM has long been held up as one of the marvels of modern management. One of the reasons may be the Mobley Matrix, a system of financial planning developed by Lou Mobley, creator and former director of IBM's executive school. Long held secret by IBM, the Matrix is now being made available to the public by Mobley in

the form of a computer software program.

Using the Matrix, executives can project cash needs to fund growth, present financial justification for obtaining bank loans or venture capital, and analyze the competition by means of a technique IBM has employed for years. The Matrix calculates the impact of financial decisions in less than three seconds. Normally, such pro forma analyses take several weeks to prepare.

According to Mobley, accountants produce fragmented information for company outsiders, like bankers and investors, not for executives who need management information. The Matrix, on the other hand, produces information for insiders—especially chief executive officers—to help them gain control over strategic finance, which they typically find frustrating and mystifying. —Dick Richards

Access: The \$995 package runs on an IBM PC. Phone 1-800-772-1990.



GRAND ILLUSIONS

CONTINUED FROM PAGE 45

or a disappearing Leerjet, or floating across the Grand Canyon—you couldn't imagine these things being done twenty years ago because no one would want to spend a half million dollars on a production." With the thought of huge sums of money to spend in the future, Gardner has clearly had fun thinking of "some crazy ideas" for magic in the twenty-first century.

Included in his heavily financed, futuristic magic show are the following miracles: stopping the earth from rotating, walking across Lake Michigan, floating a hippopotamus across the English Channel, cutting and then restoring a cable on the Brooklyn Bridge, changing the color of the sky, raising the Titanic, turning the Washington Monument upside down, sawing Manhattan in half, parting the Red Sea or making the moon disappear.

John Gaughan—probably the world's leading designer of custom illusions for magicians like Doug Henning, Copperfield, Blackstone, and Siegfried and Roy—is intrigued by the dichotomy between the past and future in the magic he is asked to create. Often in the same act, occasionally within the same effect, he will be called upon to combine high-tech futuristic elements with almost antique torture devices. Sawing a woman in half with a laser

beam—an illusion he built for Copperfield some eight years ago—is a specific example. "In another effect a woman is strapped to a table and Siegfried and Roy approach her, each holding a three-foot-square glass shield. Each shield is equipped with five spike-shaped projections that fire ruby laser beams to vaporize various objects in their path. Eventually the woman is subjected to a double bed of nails as both spiked shields mesh, apparently crushing her. Gaughan sees this peculiar trend continuing in the future."

According to James Rand, the MacArthur award-winning magician and investigator of claims of the paranormal, "In the year 2000 the very art of magic will have of necessity to keep pace with the times. I think that if Harry Houdini greeted that he was, were to reappear among us, he would have a very difficult time catching up with what is happening in the modern-day magic scene." Expanse alone, Rand surmises, would prohibit the magician's overt use of new technologies. And he thinks it is unlikely that a magician can best new technology to the market. "It is entirely possible," he says, "that someone will grasp some piece of technology and apply it in such a way that it is not evident it is being used behind the scenes."

An example of just such a device is the sophisticated hearing aid and transmitter Rand recently exposed in the faith-healing prayer meetings of the Reverend Peter

Popov. In a modern version on the Talking Teakettle, Popov's wife would relay the information to the reverend through his hearing aid, and Popov would repeat it to the rebounded participants. If such devices are used by magicians or mentalists of the future instead of looking up their sleeves, they might have to walk through an airport security X-ray machine or undergo the equivalent of a criminal strip search to assure their audience that no sophisticated transmitters were being employed.

Jim Stoenmeyer, the remarkable young inventor of stage illusions and consultant to Doug Henning and other leading magicians, believes that presentation rather than technology is the key to magic in the future. "No contemporary magic technology is beyond peoples' understanding," he says, "but many of us do not understand how a Xerox machine or a bar-coded grocery product works." As children, we are fascinated by a leaf turning colors. It seems we are witnessing a miracle until we are told that when the leaf loses chlorophyll, it changes colors and dies. We are taught not to be fascinated by such things. "What magicians do," Stoenmeyer says, "is remind you that there is something in the world beyond your understanding. They give you insight into everyday things that you think you are familiar with but then realize you are not."

Conjurators use recurrent classical romantic and other fairy tale themes because they appeal to our emotions. "Floating a lady is magical; levitating a robot is not," says Stoenmeyer.

Penn and Teller, whose very successful New York theater show has poked fun at the conventional magicians' craft, think today's sophisticated audiences will demand a new approach to magic in the future. So the duo performs effects with computers, copy machines and TV sets.

"A television is a genuinely mysterious object," Teller says. "Consequently it is a good subject for magic." On both their PBS special and a forthcoming home video entitled *Cruel Tricks for Dear Friends* (available this summer), they have specifically demanded an interaction between the normally passive at-home viewer and the television screen. In the video, Penn and Teller will teach people how to perform tricks for their friends using the VCR and the TV. Such interaction may provide an interesting new blend in conjuring in the years to come.

Siegfried and Roy, best known for their spectacular Las Vegas illusions with exotic animals, were among the first magicians to employ a high-tech look, including the use of laser tunnels and pyrotechnics.

Computers and videos, they feel, are shortening the attention spans of live audiences, so they use "scientific dressing" to move their production along at a brisk pace. "We use technology to enhance, not to dominate," says Roy.

"When I started in magic," says Siegfried, "people gave me two hundred dol-



sons not to perform—people don't care about magic because of technology because people can fly to the moon." The remarkable success of the duo has proved this untrue. They believe that new scientific discoveries will enhance the thinking of the audience as well as of the magician. As technology increases, they warn, "magicians may become an endangered species. Those who survive will have to rely on basics: skill and personality." They think that television and video are "emotionless" and that "when magicians perform with expertise and emotion the public will realize how special they are. Then they will be given even more respect from they are now if we stimulate people's fantasies." Segfried says, "pathos something great technologically may develop."

It may surprise readers that the most radical theories about the future of magic are held by the most well-known contemporary star, Doug Henning. "The magic of today is the science of tomorrow," he says.

According to Henning, there are two distinct types of magic. "Illusory magic, which is a seemingly impossible occurrence caused by a law of nature that is understood and is common knowledge in the scientific world and real magic, a seemingly impossible occurrence caused by a law of nature that science hasn't discovered yet." Henning believes both illusory and real magic exist in the world now, and before the year 2050 he envisions computers performing real magic.

In a view markedly different from that of the vast majority of magicians—who, based on their knowledge of deception, are skeptical of paranormal effects—Henning believes that telepathic communication or the ability of the mind to move inanimate objects will be possible in the near future.

"Science says that we use only ten percent of our brain," he says. "If we used more I believe that in the next five to ten years we could actually control matter and do psychokinesis and levitate the body on-stage through real magic. Performers [will be] doing things that Us Oller claims he did for real using illusory magic. 'You're going to see [magicians] doing real magic.'"

Even the physical look of Henning's show would differ greatly from those of his contemporaries. "Currently our senses are bombarded with high-tech looks, lights, and sounds," Henning says. He imagines a return to simpler, more natural themes. For instance, in one sequence, he imagines a celestial forest with shimmering bees as the background. An overcast flower with transparent petals would open and bloom. "Henning says: 'The flower would begin to glow as if there were a light from inside. Eventually a woman would emerge wearing gossamer butterfly wings. She would float out of the flower and around the stage, suddenly vanishing in midair.'"

If Henning is correct, effects with holograms, computer chips, aeroptics, and lasers will seem like child's play to magicians of the future. □

SPACE

CONTINUED FROM PAGE 39

composite materials would not.

Because asteroids may be valuable sources of metals like nickel and iron and such elements as carbon and nitrogen, the institute has funded studies on the feasibility of finding and retrieving those wandering planetary bodies that are captured by Earth's gravity. Scientists are also planning to recycle the shuttle's massive external tanks, usually discarded after each launch, as components of space habitats.

The Space Studies Institute is studying large-scale projects: solar-power satellites—mammoth wings of silicon that would collect sunlight and beam it to receptors on Earth as microwaves—and space manufacturing by remote control. We won't need a permanent crew of people on the moon to operate the factories. Supervisors on Earth could monitor whole fleets of lunar robots and direct their activities by television hookups. Every now and then a skeleton crew of humans might shuttle up to make needed repairs and adjustments.

The institute hosts a space-manufacturing conference every two years to discuss new ideas and to disseminate information. (The next one will be held in Princeton from May 6 through May 9.) For more information write to the Space Studies Institute at 285 Rosedale Road, Box 82, Princeton, NJ 08540. Space science experts from around the world will descend on the town to suggest and discuss various agendas for commercializing space.

At least one discussion will center on a low-cost lunar-pole probe, an orbiter that would be sent over the top and bottom of the moon to find out whether there's water at the lunar poles. Because water's two constituents, hydrogen and oxygen, are the primary ingredients of rocket fuel, such a discovery would be like finding a new oil field on Earth.

The institute and the biannual conferences are the result of Gerard K. O'Neill's reaction to the frustrations of doing research work for NASA. "Every year some new party line would come down from headquarters, and I was having to spend far too much of my time thinking up new ways to justify the same research program over and over again," he recalls. So in 1977 he decided to take his case to the people, to get their support directly. Today the institute has some 4,000 dues-paying members, many of them skilled researchers in space sciences.

Not everyone supports the institute's goals, which have sometimes been criticized as unrealistic, too expensive, or even dangerous. Jesse W. Pfitzner, NASA's manager of long-range planning, has said O'Neill's goal of orbiting space colonies would cost at least \$220 billion, making it financially impossible. To attempt such a thing, he says, would bankrupt the space program. And in a *Worldwatch* Institute re-

port, researcher Daniel Daudney found the romantic ideal of large space colonies oversold. "Life in space for the foreseeable future will be like that in a submarine, on an offshore oil platform, or in an Antarctic mining camp—dangerous, cramped, isolated and uneventful," he said. He criticized the idea of building a huge solar-power station in Earth orbit as being environmentally risky, since it would be beaming megawatts of electricity to Earth in the form of microwaves. Daudney went so far as to characterize the solar-power satellite as a "shot-in-the-dark experiment with the earth's atmosphere."

You may wonder if SSI members are perhaps throwing their hard-earned money at some pie-in-the-sky fantasy. But consider O'Neill's other recent venture, Geostar, a satellite-based navigation and communications system. O'Neill patented the basic apparatus in 1982 and formed a corporation to market it in 1983, selling the founding stock to friends and associates for a penny a share. On March 28, 1988, the first space-based component of the system was placed in orbit by an Ariane rocket. By the end of the year, shares of the stock were \$32 each, a 300% to-earth achievement for a wild-eyed dreamer.

O'Neill has dreamed of building orbiting space colonies and has written and lectured extensively on the subject. But he is enough of a realist to know that before you get colonies, you have to provide people with an incentive to leave Earth. He is convinced that one small, successful enterprise will launch the human migration out into the solar system. "When that first breakout occurs," he says, "the others will follow inevitably. Then there's just no stopping it. Once it begins, then the dispersal of human civilization is bound to go on and out, as it always has done in the process of settling new frontiers." □

Editors note: Anyone wishing for more information about SSI and other space-advocacy groups might be interested in a book on the pro-space movement. *Reaching for the High Frontier* by Michael A. G. Michael is available from Praeger Publishers, c/o Greenwood Press, 88 Post Road West, c/o Greenwood Westport, CT 06881. Price: \$77.95.

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An ancient shell game,
balancing eggs to celebrate the spring

GAMES

By Scott Morris

What are you doing on March 20 at 10:52 p.m. EST? Well, be trying to balance eggs on their ends, and so will Donna Humes, who will also celebrate her twelfth annual observance of the vernal equinox—the moment when the sun crosses the equator and ushers in spring for the Northern Hemisphere. At that precise moment, day and night are of equal length all over the earth. Then and only then, the legend goes, you can balance an egg on its fat end.

I don't know why it works, Humes told us, but it does. Maybe it's because for a time surrounding the exact moment of the equinox, the sun is directly over the equator and the earth is balanced within the universe.

It's a phenomenon that has both delighted and mystified people since antiquity. Someone in China discovered it thousands of years ago. According to an ancient Chinese book, *Know What Heaven Knows*, on the day called Li Chun (spring begins) "winter ends. And for a few minutes just before and just after the seasons change, eggs will stand on end."

In 1945 a report appeared in *Life* about how everyone in Chungking, China, was relieving the terrors of war by trying to balance eggs on the first day of spring. Walter Runcie of the United Press decided to try it for himself. The skeptical journalist was amazed to discover that he was able to stand several eggs, and he wrote a story about the event.

The news got back to



China the next day that Albert Einstein, after reading Runcie's story, had been dubious about egg balancing "a Chinese trick." Because the legend holds that eggs will stand for only two hours each year, however, there seemed to be little to do about it.

The controversy heightened as some Americans claimed that it was an old magic trick. Shake an egg until the yolk breaks and it will stand on end. Or you could do it the way Christopher Columbus supposedly did it, by cracking the bottom of the shell slightly. But Runcie was offended by the suggestion that someone had pulled a trick on him, and the local Chinese press—resentful of Einstein's slight—launched an attack on the hard-boiled scientist.

At the next weekly press conference held in Chungking, Chinese authorities deplored postwar planning, currency stabilization, and

the Communist problem, then moved out to the yard to stand up eggs. Several people, including Wang Wen-hao, head of the Chinese War Production Board and minister of economic affairs, were successful. The plan had been to spell out the Chinese suits to convince an egg. The *Life* correspondent reported, however, that "there were some who thought this undignified." The demonstration was canceled.

This event did not take place during the equinox, so by balancing eggs all of those Chinese officials were demonstrating an incorrigible tendency in the line. Even so, the legend continues to have a strong appeal.

Most lively time of the year has nothing to do with it, indeed, we expect that you can balance eggs on any day. But mindful of the legend, you try harder when you do it on the first moment of spring. You are more patient



perhaps more in tune with your muscles, and able to make the fine adjustments necessary to find the balancing point. Yet we have tried it and successfully balanced eggs on glass in December.

We called James Randi, the magician and arch skeptic, for his opinion. "It doesn't seem to occur to people to try it on other days," Randi says. "The fact is you can balance an egg today or a week from next Tuesday. All it depends on are the qualifications of the egg, the nature of the surface, and perhaps the sobriety of the balancer."



Games expert and science journalist Martin Gardner adds that the surface of the egg itself is critical: if you sandpaper the bottom of an egg to eliminate all the small bumps, for instance, you can try forever and never balance the egg on a *For nica* surface. So doctoring an egg can certainly affect its ability to stand.

On the other hand, David Ehrenkrantz, a contributing editor at *Modern Photography* who is a consultant in scientific and technical photography, is a believer. "I'm under the impression that it does work better just before or after the equinox," he says.

"For many years my wife has balanced a dozen or more eggs on our front porch. She has also done them on a plate and on a sheet of glass. I have no valid excuse or serious explanation for it: day-night cycles, sun pull moon pull, hah. I don't know if I tried today, I could



stand maybe one or two eggs. But on the first day of spring I might be able to do two dozen."

A local expert, Dr. Wang, a graduate of the Munich Technological Institute, offered his own theory back in 1945. Egg balancing was all a matter of cold weather and liquidity. In the cold, an egg contracts and lowers its center of gravity, he explained. He predicted that on the hottest summer day, an egg would stand if first chilled in a refrigerator. This particular experiment," he noted, "will have to be done in America, where there are refrigerators."

Well, the experiment has been conducted. "I first thought I would have to use organic eggs at room temperature," Donna Henes says. "But that's not the case at all. I've had friends tell me that you can use any eggs, even ones that hatch come right out of the

hedge. They don't even have to be room temperature."

For the last 11 years Henes has been celebrating the vernal equinox by balancing exactly 360 eggs—the symbolic division of the circle. In 1984 the critical moment occurred during the lunch hour, and Henes gathered her biggest crowd ever—about 5,000 people—at the plaza of the World Trade Center in Manhattan.

Henes describes herself as an "artist and ritual maker" committed to international harmony. In 1983 she held her ceremony at Ralph Bunche Park, across the street from the United Nations (this page, top left). A reporter who covered the event for *The New Yorker* (April 4, 1983) was able to balance an egg in about 15 seconds. Fascinated, he went back to the same place a week later to see if he could do it again. He tried for 20 minutes before giving up. He might have tried again in six months because the balancing feat also works, Henes says, on the fall equinox (September 21).

But spring is when Henes chooses to celebrate the event, which she calls Eggs on End. Standing on Corn-mony (Several of these demonstrations are shown atop these pages.) Springtime seems an appropriate choice. The egg is a symbol of fertility and rebirth. Indeed, celebration of the first day of spring dates back to the pagan worship of Eostre, goddess of spring. "The events and rituals I create are sort of like silly science lessons or nondirected play—

certainly more kindergarten than avant-garde," she says.

Well, we plan to try it March 20, at 10:52 PM EST, just as the sun crosses the equator. In Los Angeles it will occur at 7:52. We invite our readers to participate in this shell game as well.

We will also try it on Li Chun—February 4—the first day of spring according to the Chinese calendar. This is the one little problem with the ancient tradition—for all these years eggs have been balancing in China about a month and a half before the vernal equinox. But we'll put that discrepancy out of our minds as we contemplate the unity of the universe and try to balance our eggs on March 20.

COMING IN APRIL

An Omni experience. Learn how to control your dreams. Build a paper version of Voyager: the superlight aircraft that circled the globe on just one tank of gas. In a special insert—16 pages packed with hands-on experiments for the adventurous reader—Omni will tell you where to get a color map of your brain and where to find a computer system that will let you create drawings of music you compose yourself. You'll also get to explore your powers of detection in a genuine Turing test. Were the lines "To down to be slow has" "To be fast miserably written by a computer or a human?" Only Omni knows for sure, but so can you when you pick up the April issue and read "The Omni Experience." A magazine within a magazine. **Omni**

J&B PRESENTS THE TELEPHONE CRYPT II

ADVERTISEMENT

Code. The very word is intriguing, it conjures up mystery, concealment. It speaks in a language known only to the sender and to those rare individuals privy to the secret.

To make the meaning perfectly clear, the translation unambiguous, usually each letter is represented by one specific symbol in decoding. The 26 letters in the alphabet translate to 26 different letters in the code. But it is possible to use far fewer symbols in the code and still get the meaning across in context.

In the code below, the message was spelled out on a telephone dial, with each number standing for one of three letters.

2=ABC	8=MNO
3=DEF	7=PRS
4=GHI	8=TUV
5=JKL	9=WXY

For our purposes we'll use the numeral "1" to indicate punctuation marks and "0" for spaces between words. Now, the message has some built-in ambiguity. The number "8" could stand for a T, a U, or a V. The "4" could be a G, an H, or an I.

Does that ambiguity make the message indecipherable? Not at all. Because of the regu-

larity (predictability) of English in context, there is only one solution.

1242722837047088730

327459053780

84280732683733110

18488270724630

4373170880

727302427228371

Look for the solution to this puzzle next month in *Omni*.





LAST WORD

By William C. McElroy

● **Mental hospitals all over the country are filling up because of Dr. Fritz Smudge. He revolutionized psychiatry by discovering that there are definite answers to the Rorschach test.** ●

One afternoon, 852 people will be declared legally insane. They'll live in Zurich, Amos, the Country, Home, Africa, and Redwood—the employing and mental hospitals are filling up, all because of one more Dr. Fritz Smudge. Smudge has revolutionized psychiatry by discovering there are definite answers to the Rorschach test—the positive personality test pioneered in 1922 by the eminent Dr. Hermann Rorschach.

Most commonly known as the inkblot test, Rorschach's test asks a person to describe the images that come to mind when he views various of strange, symmetrical ink patterns. Until recently, psychiatrists interpreted the patient's responses without any concept as to whether the series of inkblots had specific meanings.

Now, thanks to Smudge, they have definitive answers, all recorded in a set of six "positive" notebooks by Rorschach, called *The Art of Answer Book*. Smudge claims he happened upon the inkblot notebooks while on a skiing trip.

"They were cheap. I found them in a local bookstore in Switzerland," Smudge told *Newsday*. "And I was able to write off my vacation as a business expense."

After reading the importance of his find, he turned the weather notebooks over to the agents at the American Rorschach Society (ARS). They were stunned by what was there. In addition to answers for the ten tests in common use, the notebooks contained 8,376 never-before-seen tests, plus detailed instructions on how to make new ones.

"I was incredible," Smudge revealed. "They even told you how to hold the pencil without getting ink on your finger."

After having spent eight and a half months deciphering Rorschach's posthumous findings, the ARS finally unveiled the new improved Rorschach test in Ohio last month. It comes in two versions: one for patients, one for doctors, which lists the answers in the back.

It appears we need all kinds of ARS spokespersons to interpret. "Psychiatry is an exact science. Now a patient has to give us a definite answer in five minutes, too. Maybe we'll look him up. It's kind of like qualitative analysis," Dr. McElroy.

Already a majority of the world's psychiatric practitioners rely on the 3,376 new patterns in their diagnostic workshops, and many hospitals are packed. Under the new Rorschach test rules, a patient is not to correctly identify 90 percent of the tests to be declared sane. So far, that has proved difficult for most people.

"One test?" "Everyone's crazy!" growled Smudge. "It's the Christ test!"

According to the notebooks, Dr. Hermann Rorschach made his test so hard was to weed out "all those people who are

looking about the behind my back."

While it is admittedly difficult, the new Rorschach test has brought with it the same advances. Not only can psychiatrists make a more precise diagnosis, they can do it more quickly. A patient who used to require weeks of elaborate examinations and interviews can now be tested and labeled up within an hour.

But Smudge and the ARS are still not satisfied. "It's not fast enough," Smudge said, saying "There are so many cases out there and so few tests."

He thinks the answer to the problem lies in the test of the Rorschach notebooks, which is simply called *The Big Book*. In it is Rorschach's master plan for "unlocking the mysteries." He envisioned having groups of people viewing various inkblots on paper measuring eight-and-one-half by eleven kilometers. One inkblot alone would require thousands of gallons of ink. But obviously Rorschach was forced to abandon his dream. "Not enough time people to help me."

Smudge considered trying it himself, but the scale of the project was intimidating. "I could read three thousand miles away to do the thing, and it would take a week to do the ink to dry."

Inspired by Rorschach's vision, however, Smudge is busy working on his own version of the megabooks.

"We'll put them up along highways and in malls, like bookends, and need not direct-read questionnaires to everyone in the vicinity," he said. "It will be a colossal book test."

When asked how he would prevent someone from looking up the answers and cheating, Smudge answered, "Surprise. We plan to use the honor system. In fact, we hope to make the book system a federal law. Violators of the law would be punishable by death. No one would dare cheat."

Even without all those blots, the long-term effects of Rorschach's notebooks are clear. As long as we have ink and paper, we'll have crazy people.

But just how did Hermann Rorschach hit upon the idea of using those funny blots of ink? The answer was found in one of the test notebooks.

It seems Rorschach was struggling to devise a true-or-false insanity test when he accidentally knocked over a bottle of ink, watching how the blot looked like a face during the accident showed it to some friends.

"That's not a bunny," a girl challenged. "That's an elephant!"

"That's crazy!" Rorschach shouted. And there it is, history. □

William C. McElroy is a freelance writer from Chicago who has been unfairly institutionalized for the past 15 years.