PARAPSYCHOLOGY LAB AT PRINCETON

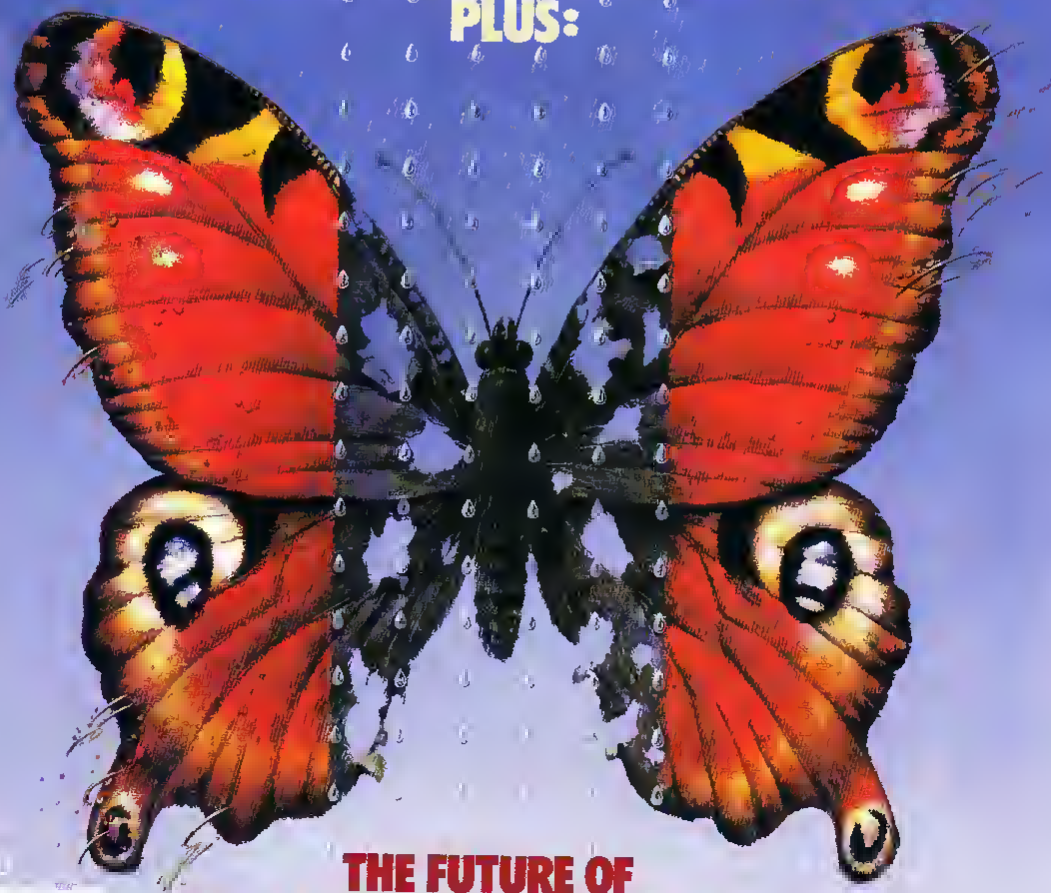
OMNI

SEPTEMBER 1991

DOOMED

THE LAST 10 PARADISES ON EARTH

PLUS:



THE FUTURE OF ORGAN TRANSPLANTS • JAPAN'S SPACE HOTEL 2020 • AND THE TRAVEL PHOBIAS OF DAVID BRENNER

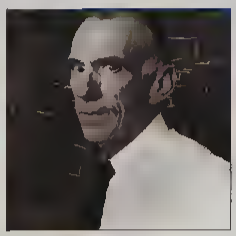
09
02484
0 778845 1

VOL 12 NO. 12 SEPTEMBER 1990

Cover art Acid raindrops keep falling on our heads A glorious butterfly flutters among the forest foliage collecting the last drops of a spring shower But the acid rain is deadly and burns right through the insect s wings in this acrylic painting by Polish artist Rafal Olbinski

OMNI (ISSN 0149-8711) is published monthly in the United States and Canada by Omni Publications International Ltd 1965 Broadway New York NY 10023-5965 Second class postage paid at New York NY and at additional mailing offices POSTMASTER Send address changes to Omni Magazine Post Office Box 3041 Harlan IA 51537 3041 Volume 12 Number 12

OMNI



FIRST WORD

By Edward O Wilson

If all mankind were to disappear, the world would regenerate back to the rich state of equilibrium that existed 10,000 years ago If insects were to vanish, the environment would collapse into chaos

The question I am asked most frequently as an entomologist is whether insects will take over the world if the human race extinguishes itself Insects already dominate the earth They were among the first animals to evolve on the land nearly 400 million years ago By Carboniferous times 100 million years later, insects had developed into forms nearly as diverse as those existing today; and they have dominated terrestrial and freshwater habitats around the world ever since (for some reason not yet fully explained, insects never penetrated the sea) The human race is a newcomer, less than 1 million years old and our grip on the planet is tenuous

Living insects number about 1 billion billion This amounts to a trillion kilograms of living matter, roughly the same as humanity The total number of known species—in other words, those given a formal name (such as *Musca domestica* for the housefly)—is slightly in excess of 750,000 The true number is far greater however As many as 30 million species are alive today, mostly in tropical forests

Insects comprise more species than all other organisms combined—including plants, animals, and microorganisms And the small band of entomologists who specialize in classifying insects are deluged continuously with forms previously unknown to science As one of those entomologists I am currently studying a group of ants with more than 300 species lacking names Every time I make a field trip I turn up still more new species often within hours.

The immense protoplasmic bulk and diversity of insects place them among the little things that run the earth up there with bacteria, algae, and copepods (minute sea crustaceans) Consequently, humans depend on the vast variety of insects for survival, but they have little use for us If all mankind were to disappear tomorrow, it is unlikely that a single insect would go extinct except for three kinds of body lice—and even then there would still be gorilla lice, closely related to the human parasites In two or three centuries, the ecosystems of the world would regenerate back to the rich state of equilibrium that existed 10 000 years ago

But if insects were to vanish the terrestrial environment would collapse into chaos Most of the flowering plants, lacking pollinators, would soon perish The great majority of mammals, birds, and other land vertebrates losing the specialized foliage, fruits, and insect prey on which they feed, would follow the plants into oblivion The soil would remain unturned because insects—not earthworms—are the principal burrowers and renewers of the earth Wind pollinated grasses would spread across a deforested, impoverished world Humanity would suffer terribly pushed to the edge of extinction

Insects run the terrestrial world with such efficiency that most people take no notice of our close dependency upon them Humans think of most insects as ugly even repellent This 'yucky' factor is an adaptive response' instinctively we stay clear of venomous and disease-carrying species Fortunately, ecosystems are not endangered by our squashing an occasional wasp or spider

Most urban dwellers however are largely unaware of the minute fraction of insect species classified as our enemies, and the terrible damage such species can cause Few know that malaria carried by *Anopheles* mosquitoes, is on the rise again throughout the tropics In Africa alone it kills 1 million children under the age of five each year Elephantiasis a crippling condition spread by mosquitoes and biting flies now afflicts 400 million people around the tropics

Agricultural pests also continue to prosper and multiply, causing billions of dollars in damage around the world each year Many of the insects have developed genetic resistance to pesticides so that the damage to crops in the United States has actually risen from 7 percent in the Forties to 13 percent at the present time There have been some dramatic successes in the control of individual pest species but just as many expensive failures Humans have worsened the outbreaks by the careless management of agricultural environments, causing the loss of natural parasites and predators that keep the pest species in check

For millions of years, life on the land was locked into place and kept humming along by a partnership between insects the most diverse of the animals, and flowering plants, the most diverse members of the plant kingdom Humanity then joined the partnership, with looming disaster for itself and the remainder of life There are too many of us, and we still know too little about the living world to coexist with other species harmoniously We are destroying the habitats in which most kinds of organisms live, threatening thousands of plant and millions of insect species—more than perished at the end of the Age of Dinosaurs We have not learned how to protect ourselves from the tiny minority of insects that harm us, at the same time preserving and making better use of the vast majority that sustain us Indeed, the future task of entomology in the years ahead is one of the most important and complex challenges in all of science

Edward O Wilson Baird Professor of Science at Harvard University is the recipient of both the National Medal of Science and the Pulitzer prize

OMNIBUS

WHAT THEY DID FOR LOVE

One writer plunged into New York's cold waters, another chased a doctor around Pittsburgh

Few people appreciated the pristine beauty of Alaska's Prince William Sound—until an oil spill compromised it last year. Concerned that we too often take the wilderness for granted, *Omni* editor Patrice Adcroft suggested we focus on those areas that may seem safe now but could quickly succumb to human folly.

Omni research editor Beth Howard and freelance writer Bob Berger ("Lost Horizons?" page 34) then scoured the world for the areas that face the most immediate threat. "The ten we spotlight are just ten of the hundreds of endangered places," Howard says. "It's ironic that attempts to harness geothermal energy in Hawaii threaten the rain forest, while studies indicate that geothermal energy might not be a *renewable* alternative to fossil fuels."

Howard and Berger also debunk the common misconception that only nonhuman species in the wilderness are endangered. "You don't think of wilderness and people in the same context," says musician Berger, who won the 1988 O'Neill award for his play *Gas*. "Many indigenous people and cultures, however, are connected to the ecosystems and are equally threatened."

While interviewing Princeton's Robert Jahn, writer Steve Fishman ("Dean of Psi," page 42) took one of Jahn's standard tests to assess his own psychic ability. "My results deviated from probability, and I figured at that point I *did* have powers I wasn't tapping, so I don't drive anymore. I just mentally transport myself places," he jokes. Author of *A Bomb in the Brain* (Avon), Fishman has written for *Rolling Stone, The New York Times Magazine* and *In Health*.

The so-called dean of organ transplants, Thomas Starzl, "is basically an insomniac who runs twenty-four hours a day," says Mark Dowie (Interview, page 66). "If you want to talk with him, you have to catch him for five minutes here, five minutes there. I spent days in Pittsburgh just to get a handshake with him." Dowie, author of *We Have a Donor: The Bold New World of Organ Transplanting* (St. Martin's), is working on a book titled *Spin Control: The Triumph of Public Relations*.

A British expatriate living in Hong Kong, Garry Kilworth ("In the Country of Tattooed Men," page 58) has written several novels, including *The Foxes of Firstdark*, published by Doubleday. *Witchwater Country*, Kilworth's memoir of growing up near the marshes of Essex, was nominated for the 1986 Booker prize.

An inveterate sailor, Janet Bladow has often pondered being lost at sea. To research this month's Mind column (page 20), she plunged into New York City's waters under the watch of the U.S. Coast Guard. "The survival experts were the hunkiest, cutest Coast Guard guys you ever saw," jokes Bladow, who serves as features editor of *Star* magazine when land-bound. "If I'm ever lost at sea, that's the way to go."

After spending some time on Native American reservations in upstate New York, Dean Kuipers (Explorations, page 22) decided that the white man does owe a debt to Native Americans. "If you've ripped someone off, it doesn't matter if you did it two hundred years ago or today. They deserve to get something back," says Kuipers, who has written for *The Village Voice, High Times, Spin* and *The Nation*.

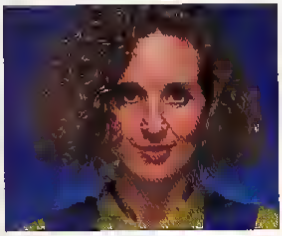
Despite all the brouhaha over computer piracy, Jeff Goldberg (Artificial Intelligence, page 18) says he believes the real threat to computer security comes from company employees. A source advised him never to spend more than $10,000 to protect a system. "That's how much it would cost to bribe a secretary," says Goldberg, author of *The Anatomy of Scientific Discovery* (Bantam Books, 1989).

California-based T.A. Heppenheimer (Stars, page 16) has been published in *Science Digest* and *Discover*. OO

Clockwise from bottom: Jeff Goldberg, Mark Dowie, Steve Fishmen, Dean Kuipers, T. A Heppenheimer, Beth Howard.








COMMUNICATIONS

READERS' WRITES

From the USA to the USSR, readers discuss Keck, memory, and glasnost

Where to Find Tomorrow, Today

I've been a faithful reader for more than ten years and have come to the conclusion that *Omni* is tops in futuristic ideas. Each month I look forward to stretching the limits of my imagination in the format that makes your magazine distinct from the publishing milieu. Thank you for providing inspiration for the many people like me who work in research and development and continue to dream the future with you.

Richard Keller
Claremont, CA

On Foreign Assignment

Your science-fiction pieces are magnificent! As a linguist and teacher of English as a second language, I have often enjoyed assigning the science-fiction stories that you publish. My students enjoy being challenged by the quality writing. Their vocabulary, reading comprehension, and writing skills improve throughout the semester because they become actively involved in the learning process. They have wonderful insight and come up with alternative endings for the stories. It makes teaching and learning a mutually rewarding task.

Susana M. Sotillo
Montclair State College
Montclair, NJ

Mirror, Mirror in the Sky...

I enjoyed your recent interview of astronomer Sandra Faber [July 1990]. I am certain that the Keck Observatory that she is helping to build in Hawaii will become very important to the scientific community. Keck has increased in importance now that the Hubble telescope has been found to contain a flawed mirror, which will delay its visible spectrum research until a repair crew can get up in space to fix it.

Jesse James
Highland, NY

The Darker Side of Genetic Cures

My respect for James D. Watson as a renowned geneticist was by no means diminished as I read his First Word [June 1990], but a vexatious thought surfaced. I'm wondering if great geneticists have considered the staggering negative effects that could result from seemingly grand discoveries, such as a cure for Alzheimer's disease or cancer. The population would skyrocket. The single greatest problem our world faces today is the problem of overpopulation. There comes a time when the longevity of one's life span must be limited. We just cannot keep everyone alive forever. If we keep finding cures for fatal diseases, the overpopulation that would result would be a problem that would overshadow all of the diseases combined, many times over. That time is now!

Jeff St. Laurent
Sanford, ME

Is Anybody Out There?

In a very interesting Space column Mitch Berman [July 1990] created a scenario in which a Martian lander searches the Cydonia area of Mars for signs of life. This subject has been taboo for many years among "mainstream" scientists. It is high time this very distinct possibility received serious treatment, and I applaud you for your efforts in that area.

David Myers
San Francisco

Blind Dating

Not all computer types are as pessimistic about the coming of the year 2000 as Bill Schoen [Continuum June 1990]. Mr. Schoen believes that trying to handle dates beyond the twentieth century will be "the biggest technical screwup in history" and says he "can't imagine how to fix it." For Pete's sake, if he can't imagine how to fix it, he doesn't belong in the computer profession. How does he think a bank computer handles it now when a customer has a 30-year mortgage that matures in the year 2019? You answered the question yourself by stating that the computer remembers only the last two digits of the year. The fix is quite simply to modify the programs to handle the additional two digits required to identify the century.

Jay L. Keller
Winter Park, FL

CONTINUED ON PAGE 56

EDUCATION

THE LIBERTY SCIENCE CENTER
Freedom from scientific illiteracy may be on the horizon

Liberty State Park sits largely unnoticed on the New Jersey waterfront. In the mostly industrial area surrounding the undeveloped park (about the size of New York City's Central Park), a vague smell of sulfur hangs in the air.

The quadrennial battle for the White House often begins in Liberty State Park because candidates can be photographed and videotaped with the New York City skyline in the distance and the Statue of Liberty, situated on an island one quarter of a mile away, framed behind them along with the breathtaking panorama of New York Harbor.

Yet in the not too distant future it won't be just media events that bring traveling Americans to the New Jersey state park. Rising from the park's marshland today is the Liberty Science Center, where within two years, the center's backers hope, thousands of Americans daily will experience scientific awakening along with patriotic pride.

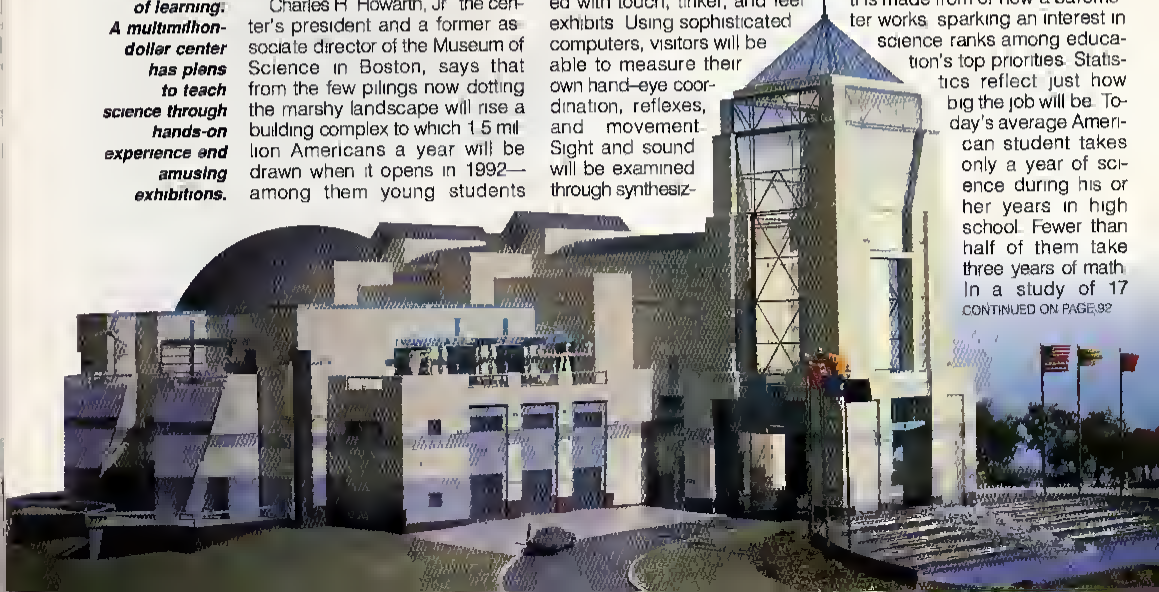
Charles H. Howarth, Jr., the center's president and a former associate director of the Museum of Science in Boston, says that from the few pilings now dotting the marshy landscape will rise a building complex to which 1.5 million Americans a year will be drawn when it opens in 1992—among them young students whose imagination will be opened to the scientific world. "If I were to describe the center's purpose in one word, it would be motivation—to motivate young people's interest in science and technology and to advance science literacy among the general public," Howarth says.

Adults often forget the primary impetus behind scientific inquiry is simply curiosity. For the Liberty Science Center, however, conjuring and sustaining curiosity, especially among kids in their "wonder years," is the primary goal. "When finished, the center will change the psychology of teaching," says Howarth, a former teacher. "If the audience is voluntary and they can get up and leave anytime they don't like what you're doing, it actually makes it much easier to teach. It's a very natural like of sharing. It's a compatible way to teach." As in science centers in Los Angeles, Chicago and Atlanta, 'teaching' hides behind a mantle of fun. The science center will be packed with touch, tinker, and feel exhibits. Using sophisticated computers, visitors will be able to measure their own hand–eye coordination, reflexes, and movement. Sight and sound will be examined through synthesizers. The environmental exhibits will include a fully equipped weather station, complete with radar and satellite links.

Exhibits dedicated to the environment, inventions, and health each occupy a floor of the center, a 300-seat auditorium, classrooms for computer education, a science library, a museum, a career center, and an Omnimax theater are also strategically placed to lure visitors. (Howarth says 4,000 people at a time will easily fit inside the building when the center is completed.) New Jersey and New York are both cooperating to make the center more accessible. A ferry service will link the park with lower Manhattan, and New Jersey is considering adding a Liberty State Park exit to its turnpike system. Once the center is up and running, it will serve as a self-sustaining, nonprofit institution with admission fees, students and classroom field trips will receive discounts.

In a day and age when most people don't know what spaghetti is made from or how a barometer works, sparking an interest in science ranks among education's top priorities. Statistics reflect just how big the job will be. Today's average American student takes only a year of science during his or her years in high school. Fewer than half of them take three years of math. In a study of 17

CONTINUED ON PAGE 92



The model way of learning: A multimillion-dollar center has plans to teach science through hands-on experience and amusing exhibitions.

STARS

THE INCREDIBLE SHRINKING BLACK HOLE.
Are they all-consuming villains or pregnant entities with surprises in store?

If Alan Guth's career were made into a movie, it might be called *The Incredible Expanding Man*. Eleven years ago the unknown physicist skyrocketed to fame with his model of the inflationary universe, a re-creation of what may have happened in the first few moments after the Big Bang (see Interview, November 1988). Now at the Massachusetts Institute of Technology, Guth continues to fine-tune his scenario. "If you say the universe sprang from something that was once a million times smaller than a proton," says Guth, "it's only natural to ask if you can reproduce this." Following this line of thinking, Guth has constructed a startling speculation. Dying black holes may, in fact, give birth to new universes.

Imagine a black hole: the collapsed remains of a star. In its former days, that star may have been 1 million miles in diameter, in its black hole state of evolution, it is no more than a few miles across. Portrayed as cosmic Darth Vaders that consume anything that comes close, even light, black holes are in fact finite entities, albeit with enormous longevity. About 10^{66} years after a star becomes a black hole, nearly all of its energy has been dissipated into space. An hour before its extinction, the dying black hole becomes a superenergy entity releasing as much energy as the combined stockpile of the world's nuclear weapons—*every second*. With one second of life to go, there is a sudden flash and it's gone—gone, at least, in our universe. At this point, says Guth, some weird distortions may take place that ultimately give birth to a new universe.

Zen master of the universe: MIT's Alan Guth continues to plumb the mysteries of the cosmos. "Space can bend, fold, or twist," he says. "It's not fixed and rigid."

"This is all speculative," says Guth in a mild disclaimer that accompanies almost every new scientific idea, "but it's what would happen if the conditions were right. A second before it winks out of our universe," says Guth, a black hole shrinks to about the size of an atomic nucleus, still boasting enormous raw energy. That energy translates into heat, around 10^{27}°F. Next a tiny sector of space, nearly a trillion times smaller than an atomic nucleus, becomes ultrahot, forming what Guth calls a "bubble." With such an enormous amount of energy compressed into such a small space, the bubble behaves like a hot coal on ice. It tunnels through the fabric of space to emerge "somewhere else."

Where is this "somewhere else"? At this point, physicists sound like Zen masters asking a student to describe the sound of one hand clapping. "It's not in our space," says Leonard Susskind of Stanford University. "It doesn't make sense to ask where in space it is. It doesn't make sense to speak about distance, either. In a sense, it's infinitely far away." Guth himself is a little more specific. "It literally creates its own space," he says. "Space can bend, fold, or twist. It's not fixed and rigid." Once the energy has created its own space, it begins expanding, virtually duplicating the processes of the Big Bang that created our own universe in the distant past.

After 15 billion years of expansion, the new universe, says Guth, resembles our own universe with its three dimensions plus the dimension of time. It would have its own stars that collapse, forming black holes that shrink and die, seeding more new universes. "Once the process has begun," says Guth, "it seems like it goes on forever, continually spinning off new universes." Does this mean that every star with the potential to become a black hole also has the potential to spawn a new universe? "Yeah," replies Guth. "But it does take ten to the sixty-sixth years. The universe is in no hurry."—T. A. Heppenheimer

ARTIFICIAL INTELLIGENCE

COMPUTERIZED BREAKING AND ENTERING. When a kid worms into a computer network, the system must fish or cut bait

A Syracuse New York jury brought law and order to computing last January when it convicted Robert Tappan Morris His offense launching a 'worm —a rogue program that replicates among computers—on Internet, a network linking about 60,000 university industry and government computers across the country

The twenty-five-year-old former Cornell University graduate student crashed about 6 000 machines and cost network managers between $150,000 and $200 million in man-hours to deworm their systems Nationwide, computer crimes now cost machine owners as much as $1 billion according to a study from the National Center for Computer Crime Data in Santa Cruz, California

How Morris fouled up Internet illustrates the modus operandi of hacking The programmer took advantage of a UNIX operating system bug a secret trapdoor in its SENDMAIL command (which lets you send electronic mail to someone else) The software's designers had used this passage to ship programs from remote machines on the network and then execute them They should have removed it from the system—but had not Morris exploited this option to ship his worm to computers on the network

To combat this type of activity, software vendors now offer enhanced security products such as *Trusted Zenix*, from Trusted Information Systems Inc in Glenwood, Maryland; the *Security Module Package* developed by SecureWare in Atlanta, and AT&T's *Multilevel Security Package*

SecureWare's product works by inserting so-called hooks into the UNIX central processing routine—the heart of the operating system—to connect utilities that perform advanced auditing and access control These can lock out a terminal or user after a predefined number of unsuccessful log-in attempts Moreover to prevent hackers from stealing and decoding passwords one of SecureWare's packages encrypts them in a protected database

AT&T's V/MLS software goes a step further It not only monitors log-ins but also creates security labels, access privileges, and classifications for all parts of the system—data files, directories devices such as terminals or applications programs themselves That way, for example, an individual logged in with a low-security user number can't execute a program to gain entry to more restricted system files such as the password database

This enhanced protection also creates its own set of problems—sluggish response diminished performance, and overall user unfriendliness Keith Bostic, a member of the team combating Morris's Internet worm at the Computer Systems Research Group in Berkeley, California, explains "Because our systems were designed for ease of communication and sharing, absolute security means absolute unusability"

Instead of this ultrasecure approach, argues Richard Stallman, president of the Free Software Foundation in Cambridge, Massachusetts, high-school and college students should have access to computers without security, and instructors should socialize them to live with the technology in a "constructive, civilized" way Bostic agrees "It's human nature to solve puzzles, which is what a protected system is to some," he says "A lot of people believe one way to get rid of hacking might be to eliminate computer security With no reason to figure something out, there's no temptation to break in "—Jeff Goldberg

Man versus machine Tomorrow's computer education may stress good behavior by users as much as enhanced programming safeguards.

mind

SWEPT AWAY·

Castaways may need more than food and shelter to endure a life-threatening situation

I roll with the rhythm of the waves, hearing only their lapping against my thermal insulated survival suit. I feel only the soft kiss of nature's breath on my face. I stare at the thin line where the gray-blue sky meets the darker blue gray sea. Although I've been floating alone for 20 minutes, I know that Chief Petty Officer Ron Roberts of the United States Coast Guard, a survival expert and his team of rescue swimmers are nearby. Roberts wants me to imagine bobbing along like this for hours, then days. He asks me to feel the water growing colder, the sky darkening, the loneliness settling in around me. I'm having trouble with his experiment, but I try.

Soul survivor: Is there a personality type or mind-set that makes one person better at handling the elements, fear, or loneliness?

We saw a shark earlier (the swimmers tried to tell me it was a dolphin, but I *knew* better), and I picture a school of them circling, watching, and waiting. I imagine myself in a wet T-shirt and shorts, shivering. I picture cold, bleak nights with gale-force winds, companions either lost in the murky darkness or dead. I think: *What if no one knows where I am?* Then, a more horrifying thought: *What if no one is even looking for me?*

I'm in the ocean to research this state of mind. What happens psychologically when lost at sea? Why does one person survive while another perishes? Is there a personality type or mind-set that makes one person better at handling the elements, fear, and loneliness? Alfred Hitchcock's classic film *Lifeboat* captured the emotional drama of being lost at sea. And the best seller *Adrift: Seventy-six Days Lost at Sea* by Steven Callahan recounted in painful detail the story of one man's plight. Until recently, however, science has been completely in the dark about what makes a survivor. Now experts are intensifying their search to demystify the psychology of survival, analyzing personality traits among people who triumph over life-threatening crises—and those who succumb.

In a life-threatening situation the brain immediately triggers a state of shock, sending alarms throughout the body, says Dr. Reed Moskowitz, founder and director of the Stress Disorders Medical Services of New York University Medical Center in Manhattan. "Your emergency response system shifts into gear," he says. Blood pressure rises, muscles tense, adrenaline pumps. "If you survive initially you shift mental gears to longer-term planning—whatever you have to do to hang in. Next you go into the resistance phase, a chronic coping state, in which the body tries to maintain balance in the face of threat, danger, and deprivation."

Later one of two things happens. You enter an exhaustion phase, in which the coping mechanisms are overwhelmed, you lose strength, and die—as often happens—or you persevere long enough and get rescued or escape the situation. Who hangs in, it turns out, isn't determined by age, physical stamina, or experience. Although one would expect people who are fitter and more seaworthy to be the best candidates to make it back alive, the mind, that great trickster, isn't ruled by logic.

Last summer, for example, two sailboats sank: a 38-foot sloop with a retired couple, William and Simone Butler, onboard, and a boat sailed by Nicholas Abbott, who often transported pleasure boats from the Caribbean to New York. With him was his friend, Janet Culver, a reserved woman, a nonrisk-taker, making her first long-distance cruise. If you worked for an insurance agency, you'd bet Abbott would be the one of these four to return alive. Yet he's the only one who died.

After ten days adrift in a tiny rubber dinghy, battling 16-foot waves and thundershowers, the bearded seaman—hungry, thirsty, and delirious—said he was going to swim home, jumped overboard, and drowned. Culver, covered with sun blisters and too

CONTINUED ON PAGE 56

EXPLORATIONS

RETURN OF THE NATIVE

As Native Americans wage legal battles to regain their land, property owners go on the warpath

Tekamiatarekwen, a gray-haired Mohawk historian, sits at a card table in the shade of a white oak. A hot summer breeze blows through the field of waist-high grass and tangled brush in Akwesasne, the Mohawks' name for their St. Regis reservation. "I feel sorry for the landowners who were tricked by the white government," he says, seemingly contemplating the earth beneath his feet. "Their government lied to them, like it lied to us, and we can now prove that all of upstate New York is Six Nations land. The Oneida Nation just won a Supreme Court decision, and that means we can battle the bad treaties that took our land." He squints into the setting sun and, half smiling, adds, 'Paybacks are a bitch."

Mended arrows: New York's treaties stripped Native Americans of their lands. After 100 years, legal precedents are rectifying a miscarriage of justice.

Both the New York and the Canadian branches of the St. Regis Mohawks have filed sizable claims for strategic locations along the St. Lawrence River, including land occupied by the New York Power Authority as well as private industries. The Mohawks aren't alone. The other five members of the Six Nations of the Iroquois Confederacy—the Oneida, Cayuga, Onondaga, Seneca, and Tuscarora—all have land claims. Most of the disputed land includes public as well as private property—from the 250,000-acre Oneida claim to the Seneca's 54-acre area that includes part of Cuba Lake, a former reservoir whose shores are dotted with vacation homes and year-round residences. As negotiators scramble to identify potential land to give back, property owners prepare to battle court decisions that may affect land they may no longer legally own.

Following the American Revolutionary War, a series of treaties stripped the Six Nations of the Iroquois Confederacy of their homelands. For more than 100 years, the nations have struggled to regain the lands, but the courts have largely considered the claims to be meaningless. Yet nothing prevents the federal government from reviewing and possibly renegotiating treaties that are agreements between sovereign nations.

"A lot of claims were never pursued because there just weren't the lawyers to do it, and the tribes couldn't afford those willing to take the cases," says Curtis Berkey, a staff attorney at the Indian Law Resource Center. "But with the founding of the Native American Rights Fund in 1970 and the Indian Law Resource Center in 1978, tribes have been able to obtain legal counsel. And more and more native people are graduating from college and returning home to work for the tribes."

These tribal advisers and legal counselors have been diligently researching claims. Even during the Revolutionary War, Indian land transactions were considered a national concern that should be regulated by Congress. That became law in 1790 with the Trade and Intercourse Act, or the "Nonintercourse Act." Among its stipulations, Congress had to ratify all Native American land concessions. "Most of the erosion of the Six Nations land base came about as a result of New York's violations of the Nonintercourse Act up through the mid-1800's," Berkey says.

There are cases up and down the Eastern seaboard involving violations of the Nonintercourse Act. But the Six Nations of the Iroquois Confederacy were encouraged by two court decisions in the last decade. In 1980 three tribal territories in Maine were defined by the occupation of the land since time immemorial rather than the terms of treaties signed after enactment of the Nonintercourse Act. And in 1985 the U.S. Supreme Court ruled that the treaty between New York and the Oneida Indians violated the Nonintercourse Act.

Acknowledgment of the Nonintercourse Act has inspired a growing number of Indian land claims in New York. "With the number of treaties that New York cut with the Six Nations, we're likely to discover that some of them were not ratified by Congress," says Bob Batson, New York governor Mario Cuomo's liaison for Native American affairs.

Lawyers for the Cayuga Indian Nation have already established a violation of the Nonintercourse Act and are seeking the return of 64,000 acres of land in New York's Cayuga and Seneca counties. The case, moreover, has clar-

CONTINUED ON PAGE 96

CONTINUUM

ASPECTS OF LAUGHTER

Norman Cousins may be well-known for his books and articles but he is even more famous for getting sick and then getting well again. In 1964 Cousins, then an editor at *Saturday Review*, came down with ankylosing spondylitis, a degenerative disease that attacks the body's connective tissue. He survived due to some combination of luck, positive attitude, huge doses of vitamin C, and self administered humor therapy. It was the last of these factors that attracted the most attention, particularly when Cousins wrote in *The New England Journal of Medicine* in 1976 (and in a subsequent book) that "ten minutes of genuine belly laughter had an anesthetic effect and would give me at least two hours of pain-free sleep."

Such reports gave rise to a widespread assumption that laughter is literally the best medicine—an assumption that is not yet supported by good evidence. Even Cousins himself, though still intrigued by the possibility of howling one's way to health, was moved to write last year that he was "disturbed by the impression these accounts created that I thought laughter was a substitute for authentic medical care."

Laughter feels good, but does it really have a quantifiable effect on disease? Here we need large, well-controlled studies—a single case history like Cousins's does not really prove very much—and here, as the psychologist David McClelland says, "the publicity given to this field has gotten way ahead of the facts." Those large, well-controlled studies don't yet exist, all we have are some intriguing findings that are both indirect and inconclusive.

Kathleen Dillon and her colleagues, for example, showed that the concentration of certain natural antibodies that defend against respiratory infections went up when people watched a Richard Pryor movie but not when they watched a boring instructional film. Dillon and her associates, however, had to admit that their study did not directly demonstrate "what these changes in immunity mean in terms of disease resistance." This qualification is particularly important since antibody levels went right back down after a few minutes, and also because only nine subjects were tested in their study.

Lee Berk and other researchers at Loma Linda University Medical Center, meanwhile, have been looking at two other chemical substances in the body, cortisol and epinephrine. In a 1989 study, watching a funny video caused the level of these substances to decline, which is advantageous because they can interfere with the body's ability to defend itself from illness. Again, though, the connection to health is rather roundabout, the study very small, and the subjects may have been different from each other in any number of ways, meaning that we don't know for sure that it was their laughter that had an effect. A close reading shows that Berk and his colleagues actually got mixed results: Cortisol levels dropped for the viewers of both tapes, not just the funny one.

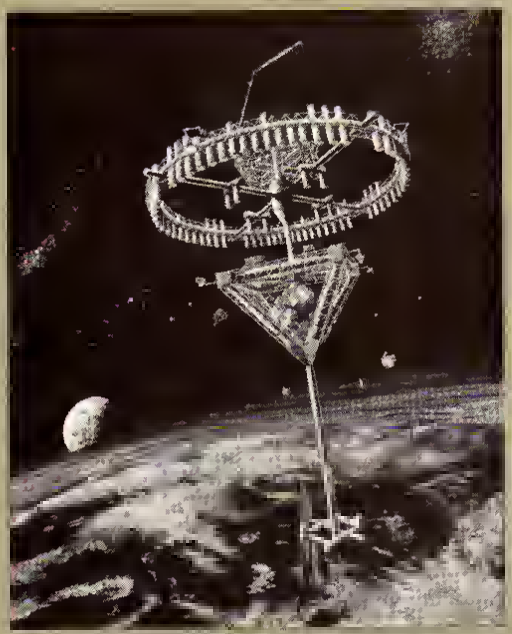
Finally, three sets of studies have looked into the consequences of When Bad Things Happen to Funny People—that is, whether someone with a good sense of humor is less likely to get depressed when unpleasant things occur. One study said no, another study said yes, and the third study found the higher humor scores meant less depression in general but no advantage in coping with stressful events—and no effect on physical illness.

So what does all this mean? William Fry, a longtime investigator of the physical effects of laughter, asserts, "We're at the cutting edge of a significant development in medical science." After all, it's only recently that many physicians have grudgingly admitted that *any* psychological and social factors can affect the immune system, and some of those connections now seem pretty hard to deny. The fact that there's little research to prove a therapeutic effect of laughter may say more about the state of medical research than it does about laughter.

But Jeffrey Goldstein, a Temple University psychologist who has specialized in the study of humor, is more concerned about how claims concerning the healing power of laughter are resting precariously on a slim body of data. "It's not clear that humor affects our health more than other things do. I don't want to denigrate humor because it probably helps people to get through life with a little less stress. But neither do I want to attribute to it powers it doesn't have."—*ALFIE KOHN*

Excerpted from You Know What They Say -- The Truth About Popular Beliefs *(Harper & Row 1990)*.

CONTINUUM



Lodged in space: A zero-g playpen orbiting the earth for those who are young at heart and rich to boot

DWELLING OF THE HIGH ONES

Vacations are meant to relieve tension, but in the next 30 years the hot spot for holidaymakers could be more than they bargained for. A year's salary will get you a bed and bath for a night, and (appropriately) there's even a room to induce nausea. The surprise is the concept designers expect a flourishing business.

Tokyo-based Shimizu Corporation, the world's largest construction company, is planning an orbiting 64-room hotel, designed to accommodate 100 guests 270 miles above the planet. To reach the facility, scheduled for the year 2020, vacationers will travel by a yet-to-be-built spaceplane launched from a spaceport that the company hopes to establish somewhere in the Pacific basin. The cost, based on a two-night stay, will be $140,000 a night. A bit high, perhaps, but Junichi Yagi, vice-president of S. Technology Center America, predicts plenty of people will fork out the cash for this "once-in-a lifetime opportunity." For some, he says, "that'll probably be only a year's salary in 2020 dollars."

What can you expect to get for this small fortune? The current design plans call for a large rotating ring (producing artificial gravity) where individual rooms with showers and baths will be located. And what about recreation up there? Planned for the ring's center is a "zero-gravity playroom," where, says Yagi, guests can experience all aspects of a zero-gravity environment, including spacesickness. The corporation foresees visitors whiling away the hours space-walking, flying around in Jetson-like scooters, and playing as-of-yet undeveloped space sports.—Steve Nadis

"Ours is the age of substitutes. Instead of language we have jargon; instead of principles, slogans; and instead of genuine ideas, bright suggestions."

—Eric Bentley

WE LOVE YOU TOMORROW

Are you convinced that the near future will resemble the dog-eat-dog world portrayed in the movie *Road Warrior*? If so, don't even think about competing for the half-million-dollar jackpot that will go to the winner of the Turner Tomorrow Award.

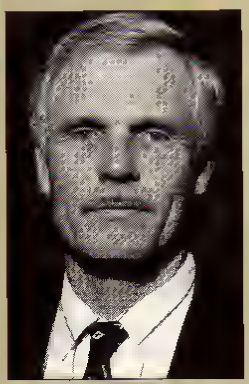
"Ted Turner cares very deeply about the declining standards on this planet and the degradation of the environment," says Tom Guinzburg, managing director of the award. "So he thought that if we asked the dreamers of the world for solutions, then maybe solutions would show up."

The broadcasting mogul is looking for unpublished fiction stories from 50,000 to 100,000 words long that convey how to ensure the survival and prosperity of all life on Earth. The first prize-winner will receive $500,000, while four runners-up will collect $50,000 each.

Out of the more than 10,000 people who have written for writer's guidelines, several disgruntled scientists have questioned the award's fiction requirement. "We're looking for a great story that can inspire things to happen," explains Michael Reagan, vice-president and publisher of Turner Publishing, Inc. "In the end, that's what the award will be judged on—a great story."—Sherry Baker

"Our dreams are tales told in a dim Eden."

—Walter de la Mare



Ted Turner: Who made you the sheriff of planetary prosperity?

SPACE CANNONS

Forget about esoteric rocket fuels and those fiery Cape Canaveral launches. Scientists at the Sandia National Laboratories in New Mexico are working on prototypes of a 1,800-foot-long cannon that will literally shoot small payloads into orbit, using electromagnetic force as the propellant.

The device is called a coil gun because the thrust comes from power generated by a series of closely spaced electric coils encased in a long gun barrellike flyway. Each set of coils delivers current in pulses, which combine to create a single, strong magnetic wave behind the launch vehicle on its trip down the flyway. This field hurls the missile forward with ever-increasing speed until it reaches 2.8 miles *per second*, enough to escape Earth's atmosphere. Prototypes have already been fired this way successfully, launching 11-pound missiles that reach Mach 1, or about 1,000 feet per second, before slamming into a mountainside on a test range to the south of Albuquerque.

Cowan estimates that a single coil gun could cost as much as $2 billion, a figure offset by its reusable nature. The gun could be fired 10,000 times once scientists find ways to reduce the wear and tear on its barrel.

—George Nobbe

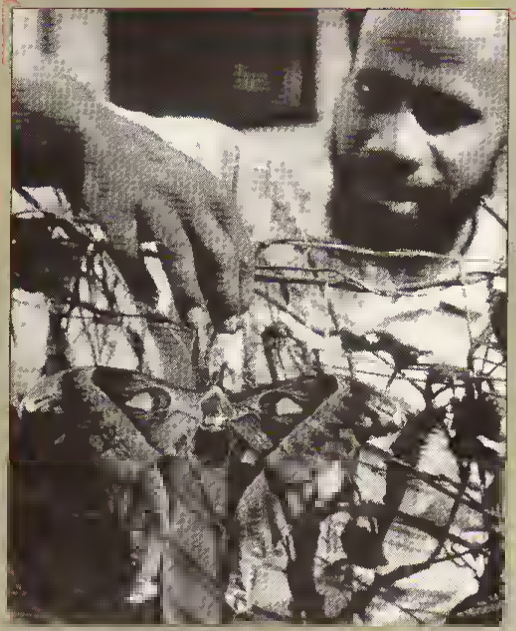
"No matter which direction you start, it's always against the wind coming back."

—Alfred Andrews

The big boom. As Jules Verne predicted in the nineteenth century, spacemen may make their way skyward from the barrel of a gun.

BUTTERFLY FARMING

We all know the story—lumbering, mining, and farming hewing away the rain forests, threatening these fragile ecosystems with extinction. But in the remote highlands of Papua New Guinea, Peter Clark teaches native peoples how to make a profit from the rain forest without destroying it.



Power to the pupae. Rain forest residents are learning how to turn a profit without burning and slashing.

For the past 12 years Clark and his staff at the Insect Farming and Trading Agency have coached and encouraged islanders in the art of raising and harvesting tropical insects (including beetles, spiders, and grasshoppers) prized by collectors. Raising insects can increase the average islander's income from about $50 a year to between $1,000 and $3,000 a year.

"The economic value of insects is commonly a negative one, because they destroy crops," says Clark. "But in the rain forest they can make us good money."

Agency staffers teach farmers to plant nectar-bearing flowers near the edge of their plots to attract wild adult butterflies, while placing vines at the center to encourage adults to lay eggs. Farmers then coax the eggs through the stages to adulthood. About 70 percent of the butterflies are collected, preserved, and shipped to Clark for sale, the remaining 30 percent are returned to the wild.

—Thomas Hanscom

CONTINUUM

YUMMY, YUMMY, YUMMY, I'VE GOT BUGS IN MY TUMMY

Gourmands and nutrition freaks, brace yourselves. A pound of white ants or termites is one of the highest sources of energy known to mankind. And when cooked properly, ants and termites are quite tasty, says Gene DeFoliart, professor of entomology at the University of Wisconsin–Madison.

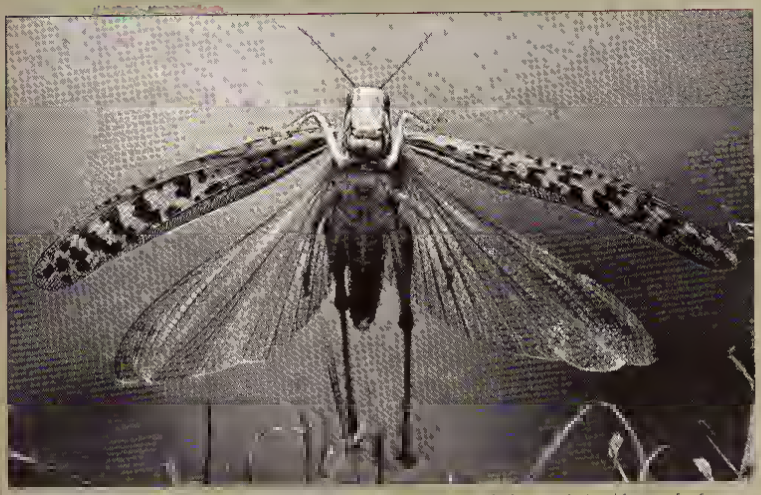
"There's an entire kingdom of edible organisms that we have bypassed for no good reason," says DeFoliart. "We should judge these as we do other plant and animal foods."

To encourage people who might otherwise balk at a handful of crisp fried ants, DeFoliart edits *The Food Insects Newsletter* (circulation: 450). Each issue includes letters, articles, and recipes for insect-based treats such as Cajun Crickets or Grasshopper Fritters. To make the fritters, pluck wings and legs from grasshoppers, dip them into an egg batter, deep-fry, sprinkle with salt, and serve. Other popular recipes include honeybee pupae and tortillas made with ground termite flour.

Humm, humm, good. Grasshopper Fritters, anyone?

Given insects' importance as a food source in many Asian and African countries, DeFoliart finds American disdain toward entomophagy (the eating of insects) unfounded. "Americans need to become aware of the fact that insects are an important source of nutrition in the Third World and, with scientific input, might make a significantly greater contribution toward helping solve problems of human malnutrition."—Oliver Fultz

"Extinct is forever."
—Kurt Benirschke



Daze of the locusts: Africa's flying plague eats everything in its path, leaving behind famine for farmers. Can high technology imported from the USA and the Soviet Union provide a solution?

BUT IF YOU CAN'T EAT THEM, NUKE 'EM

What will happen to all those high-powered lasers if star wars never goes online? If University of Arizona optical sciences professor Peter Franken has things his way, they'll be employed as giant bug zappers.

"Let's treat Africa's locust control problem as a military problem," suggests Franken. "Search, find, and destroy." The Soviet Union agrees with the suggestion. Researchers from the USSR Academy of Sciences and the United States are cooperating in the development of a battle plan.

The battle plan: A joint U.S.–Soviet locust strike force would start by scanning reconnaissance photos from satellites, looking for telltale patchy vegetation patterns that signal the presence of pillaging locusts. Once the strike force confirms the sighting, laser-armed attack helicopters may be dispatched to the scene.

Before locusts launch their massive air raids, they cluster on the ground and march on foot in dense swarms. This is when they must be attacked, says Franken, because once they are airborne, the armored insects can take a lot more punishment from the lasers.

"I have fried, I have roasted, I have nuked the rascals," says Franken, "and I can only tell you they are tough."

Should the laser attack fail, the strike force might fall back on plan B: saturation-bombing the swarms with

fuel–air explosives Even such strong-arm tactics, says Franken, are actually gentler on the environment than the traditional chemical control approach and cheaper, too The United States and the Soviet Union drop about half a billion dollars on insecticides for locusts every year with little effect

The Soviets are especially eager to adapt sword technology to a plowshare problem, says Franken Yevgeny P Velikhov, Mikhail Gorbachev s science adviser, has called the campaign "an important, timely, and original plan

—Greg Pope

THE LITTLE ASTRONOMER WHO COULD

Astronomy, while one of the most highly technical branches of science, is nevertheless one of the few scientific disciplines where the little guy—or in this case, the dedicated amateur—can still one-up the pros Recently, armed with only a pair of binoculars mounted on pipes optical technician Don Machholz discovered what may be one of the most unusual comets known, long before professional astronomers noticed it

Among its oddities, Comet Machholz, as it is now called, has an unusually short orbit around the sun—a mere 5 3 years as compared with 76 years for Halley's Comet But the biggest anomaly is that while other comets maintain an even, steady orbit, Comet Machholz comes closer to the sun with every orbit, spiraling steadily inward

Mark Yates, a professional astronomer at the University of California, Berkeley, says that both of these phenomena can be explained by the advanced age of Comet Machholz "As comets age they are pulled progressively closer to the sun and their orbits decay," he explains —Mark Sunlin

Comet Machholz The old man of the cosmos gets pegged

BLOOD BATH

Imagine heading into the hospital for a routine operation requiring a blood transfusion and going home with AIDS Each year more than 1,000 people contract AIDS this way Another 16,000 transfusion recipients become infected with one of five different strains of the hepatitis virus Health officials are understandably eager to assure patients that their blood transfusions are indeed "clean," a problem that has prompted University of Iowa biochemist Joseph Walder to develop a virus free blood substitute

He wants to drink your blood—but only if it is free from infectious diseases Enter University of Iowa biochemist Joseph Walder

Walder produces his "pure" blood substitute by extracting purified hemoglobin from donated blood In the past, purified hemoglobin was an unsuitable blood substitute because it hoarded its oxygen, causing a host of medical problems Walder sidesteps that problem by modifying the chemical structure of hemoglobin so that it freely passes its oxygen to the body Then he heats the blood substitute to temperatures above 160° F, killing any microscopic viruses that may be lurking.

The blood substitute, says Walder, should have a shelf life of about one year Regular blood, by comparison, stays "fresh" for less than a month Furthermore, the process eliminates the fine chemical distinctions between different blood types, making it possible to use the treated blood for anyone, no matter what his or her blood type.

The biochemist's blood substitute is now undergoing trials at Baxter Healthcare Corporation in Illinois and should be available for limited use in hospitals within the next five years

—Rebecca Norris

"What a waste it must be to lose one's mind."

—Dan Quayle

CONTINUUM

Led zeppelins "The dinosaurs of the air" may return from their aerial extinction As floating watchtowers, they would keep a sharp lookout on international borders for drug running

THE BLIMP THAT LOOKS LIKE A CLOUD

The $1 billion stealth bomber has received national attention, but there's another stealth aircraft that few people know exists It's the stealth blimp

The 60-foot-long, ground-operated helium airship, fitted with super-zoom cameras, can float right past radar without detection. Cruising at more than a mile high, the cloud-colored ship is virtually invisible to the naked eye These features, says engineer Carter Ward, make it perfect for fighting the drug war over the Mexico–U S border, spying on smugglers' ships, and keeping an eye on low-flying aircraft. "Even if someone shot it, it wouldn't explode," says Ward, head of the Department of Defense's stealth blimp design team in Port Hueneme, California "The pressure inside the blimp is too low At best it would develop a slow leak and we'd still have an hour to return it to base"

How can a klutzy blimp avoid radar detection? "We used a spongy type of rubber that came out of the stealth bomber research that absorbs radar," Ward says "Plus we used plastic, and that's harder to pick up on radar than metal."

If the stealth bomber costs billions, the stealth blimp must cost at least a couple of million, right? Wrong, says Ward. The prototype cost less than $120,000 to build, and he estimates the airships can be made for around $25,000 each.—Sherry Baker

MATH PASSION

What has oily hair and a sallow face, is awkward, and carries a pen holder in his pocket? If you answered, 'A budding math expert," you've made a grave miscalculation, says Michael Shaughnessy of Eastern New Mexico University.

After probing the personalities of 21 "math whiz" high school students in Portales, New Mexico, Shaughnessy concluded that our stereotype of kids who excel in math is all wrong "High-achieving math people are somewhat more outgoing than the average person," says Shaughnessy "In fact, they are solid, confident, well-adjusted people"

Intelligence, Shaughnessy found, had little to do with excellent math performance "Most were, surprisingly, of average intelligence or slightly above average," he says. What sets them apart from their peers? "If they get stuck on a problem, they don't give up They stick with it without becoming frustrated, using logic and organizational skills until they come up with the correct answer"

Unfortunately, the satisfaction they receive from their distinction is usually solitary While math masters are far from being losers, as a group they are treated as such, "and that's got to change," asserts Shaughnessy "A losing football team gets more reinforcement than kids with perfect scores on the ACTs."

—Vincent Bozzi

SKULLS IN ORBIT

A lot of strange objects have made their way into space—pieces of a Wright brothers biplane, golf balls, and a rubber shark among them. Now chalk up one more—a human skull.

The skull, formerly the property of a woman who donated her body to science, has gone into orbit three times, most recently on the shuttle flight that launched the Hubble Space Telescope. Its purpose, says NASA spokesperson Pamela Alloway, is to act as a radiation measurement device. A plastic-covered skull is sliced into ten layers, each simulating human soft tissue. The layers are then speckled with tiny detectors that measure the doses of space radiation at different levels, from the skin down to the brain itself.

Alloway says these types of plastic-encased skulls have been used to test doses of radiation in medical research since the Fifties, but this space experiment may lead to new space suits and helmets. "That could be one of the spinoffs," says Alloway. "The data could help engineers working on space suit design."

It's possible that a plastic-layered torso, complete with pseudo-organs, will be launched. There's no word yet whether the skull and torso would be coupled and registered as a crew member, but, like the head, the torso may be bagged in a fire-retardant pouch and strapped to the shuttle's bulkhead. —Devera Pine

Ahead of the pack: NASA's plastic skull does a thankless job.

"A stupid man stays awake all night pondering his problems, he's all worn out when morning comes, and whatever was, still is."
—Viking proverb

"Never go to a doctor whose office plants have died."
—Erma Bombeck

BUG OVEN

Termites and cockroaches have a way of making a homeowner's life miserable. But there is hope. A new procedure can purge walls, floors, and joists of insects by baking them out.

For more than 60 years, scientists have known that termites and roaches will die at temperatures over 120°F. That's why Walter Ebling, a retired UCLA entomologist, and the late Charles Forbes, former earth scientist at California State University, Dominguez Hills, dreamed up the idea of sealing a home in what amounts to a giant nylon bag and pumping in hot air. Their procedure uses propane heaters to flood 140° to 150°F air into a sealed house via collapsible Mylar ducts, killing pests in the egg, larval, or adult stages. Thermal pest eradication, as the process is called, doesn't use toxic chemicals—which has been a big selling point with the pest control firms that have leased the gear.

Jedd Bennett, vice-president of Isothermics, the Anaheim, California, licenser of the technique, says that it takes five to six hours to debug an average house. Pest control operators vary their prices to meet local conditions, but one treatment is roughly on a par with standard fumigation, which frequently forces the human residents out of their homes for up to 48 hours.

Since most housing timbers are kiln cured at 180°F, there is no danger of fire. True, you do have to remove pianos and low-melting-point items like candy and candles, and electrical equipment has to be shielded, but these are relatively minor inconveniences. Like most types of conventional fumigation, the current treatment exterminates bugs but provides no safeguard against reinfestation.

—George Nobbe

Baby, it's warm inside: American Indians made huts to sweat out evil spirits. The same approach works for bug-infested houses.

CONTINUUM

EARTHWORM NERVES

A neurobiologist at the University of Texas at Austin has developed a promising technique that could enable surgeons to rejoin severed nerves, and he's done it by experimenting on spineless, lowly earthworms.

George Bittner, a zoology and pharmacology professor, began working with earthworms because their nerves, like those of humans, are surrounded by a fatty substance that forms a membrane sheath around nerve fibers. Bittner has already successfully reconnected both ends of the worm's severed nerves by dipping them in a chemical substance called polyethylene glycol. "That causes the cells of the membrane to fuse together at the point of contact," says Bittner.

If the process is successful with rats, Bittner says it could be used to repair human nerve damage within two years. He's more cautious about its use in cases of paralysis caused by severed spinal cord nerves. "It's a *very* long range possibility," he says. —George Nobbe

DON JUANS OF THE DEEP

Remember the bottle-nosed dolphin Flipper from the like-named Sixties TV show? Flipper was bold, friendly, loyal, and smart. And yet members of his species are something else that no viewer would have suspected: horny enough to try mating with humans.

That's the word from swim parks in Florida and Hawaii, where humans pay $50 for a half-hour swim with captive dolphins. Georgia Cranmore, an ecologist with the National Oceanic and Atmospheric Administration's National Marine Fisheries Service, says that occasionally the fun turns sexual.

"Dolphins are very sexual animals," says Cranmore. "Sex is an integral part of their social life. They do it quite often in the wild."

Cranmore says she's not certain what triggers a captive dolphin's sexual desire for certain female swimmers but adds that it is not a mystical experience. "Dolphins are not that discriminatory" about their sexual partners, says Cranmore. "They'll get it on with just about anything, and it doesn't have to be alive. People may think it's an honor, but actually they'll do it with a drainpipe."

While no one has reported actual intercourse, the foreplay can get rough. Adult male bottle-noses, weighing up to 800 pounds, may ram their snouts into their sweet hearts, rake needlelike teeth across human flesh, and even flip swimmers out of the pool with their tails while brandishing an 18 inch-long, three-inch wide erection. Unless they enjoy this sort of bludgeoning, swimmers would be wise to get out of the water. —Peggy Noonan

Yucky sticky stuff. What does a lowly earthworm have in common with human beings? Fatty nerve sheaths, of course.

"Some truths are best left unsaid."

—Russell M. Nelson

CAN ROACHES SAVE MANKIND?

If every cockroach on the planet were suddenly banished to the great roach motel in the sky, few of us would miss them—except, perhaps, Ivan Huber.

Huber, an entomologist and biology professor at Fairleigh Dickinson University in Madison, New Jersey, says cockroaches could take the place of mammals in some biomedical research. "Their nerves are very similar in structure to our own," he says. "They transfer nerve impulses across synapses in a way that's identical to our own. They also use many of the same neurotransmitters. And they have a structure that's analogous to our pituitary gland."

The bugs also breed quickly, are cheap to feed, and can be anesthetized for hours at a time. Despite these advantages, however, Huber suspects that the use of cockroaches in biomedical research will catch on very slowly. "Some people might be squeamish, especially if a roach runs up your arm," he admits. "But after a while, you get over it."

You might expect animal rights activists to support the use of cockroaches in research, but a spokesperson from People for the Ethical Treatment of Animals (PETA) says, "We oppose the use of any living creature in medical research." To this Huber counters, "If we use more cockroaches, we could use fewer bunnies."

—Maura Christopher

Paramount Pictures
Presents the Official

STAR TREK®
CHESS SET

Playing board shown smaller than actual size of 16" × 16" × 3"

The greatest space saga of all time is now the greatest chess set ever. It's the official STAR TREK CHESS SET. Authorized by Paramount Pictures and authenticated by Gene Roddenberry, the creator of STAR TREK.

With this game, Kirk, Spock, "Bones" McCoy and the other members of the *U.S.S. Enterprise*™ face the forces that would oppose the Federation—the Romulans, the Klingons™, even the mighty Kahn himself.

Each piece is an intricate sculpture revealing all the detail of the original characters. And each piece is crafted of 24-karat gold electroplate or sterling silver electroplate on solid pewter and set on a crystal base. The playing board is crafted of aluminum and glass, depicting a dimensional star map.

It's the only chess set of its kind. And it's unlike anything else in the entire universe. Exclusively from The Franklin Mint.

The Franklin Mint
Franklin Center, Pennsylvania 19091
Earth, Sol System

Yes! Send me The Official STAR TREK Chess Set. I need send no payment now for my imported chess set. I will receive two new playing pieces every other month, and will be billed for just one chess piece per month, at $29.50* each, beginning prior to my first shipment. I will also receive the custom-designed chessboard at no additional charge.

Plus my state sales tax and $.75 per piece for shipping and handling.

A Paramount Communications Company

Please mail by Stardate 9030.09 (September 30, 1990).

SIGNATURE _____
ALL ORDERS ARE SUBJECT TO ACCEPTANCE

MR/MRS/MISS _____
PLEASE PRINT CLEARLY

ADDRESS _____

CITY/STATE/ZIP _____

12026-5

ARTICLE

From Burma's teak forests to the Arctic's frozen tundra, paradises still exist. But will they endure?

LOST HORIZONS?

BY BETH HOWARD AND BOB BERGER

The planet is under siege. Agreed. By now the statement is hardly a news flash. In fact, we've been bombarded so often with the gruesome diagnosis of Mother Earth's critical condition, we may be getting calloused, a bit numb, draping ourselves psychologically in protective gear. But there are natural habitats, pieces of paradise strewn about the globe, that have been spared the devastating effects of our technological prowess, so we dare not lose a sense of urgency. We just can't allow ourselves the luxury of denial or lapse easily into forgetting.

about these large tracts on the planet: lush forests teeming with wildlife, or pristine wilderness areas overflowing with diverse plants—herbs and shrubs, bloodroot and fireweed, hemp and ginseng, henna and witch hazel.

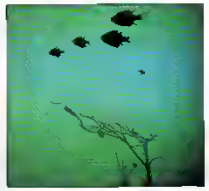
These sanctuaries are still "intact," as the biologists say. In the face of politically vested interest groups such as the oil lobbies or the economic needs that drive the

engines of governments like those of Japan and Ecuador to make lousy ecological decisions. We need these outposts of civilization where our fellow tribespeople live in harmony with the wild things. What can we do? Begin by identifying the last remaining preserves and make sure we don't ruin them.

Omni reporters asked conservationists at 25 environmental organizations—from the Natural Resources Defense Council, the Sierra Club, Friends of the Earth, Worldwatch, and the National Wildlife Federation to Earthwatch, the World Wildlife Fund, Ancient Forests International, the Earth Island Institute, the Rainforest Action Network, and the International Union for the Conservation of Nature—to cite paradises in peril. What they have to say is very serious—these hinterlands are actual locations, not alternate universes in a science-fiction story—and the threats to each of them—oil spills, clear-cut logging, industrial explosions—are real.

The final top ten lineup spans the globe: the Tatshenshini River in British Columbia, the Soviet Union's Lake Baikal, the Puna rain forest in Hawaii, Ecuador's Yasuni Park, the Sudd wetlands in the Sudan, the Shiraho coral reef in Japan's Ryukyu islands, the U.S. trust territory Palau, the teak forests of Burma, the Arctic National Wildlife Refuge in northern Alaska, and Antarctica.

Almost without exception, concerned advocates warned us that by the time this article is in print, these "hot spots," as unspoiled as the Garden of Eden was in its time, may already be history. On a government's whim, they said, today's protected territories may, by tomorrow, be stripped bare or smothered with sticky black crude. Saving these reserves—enclaves as pure as Prince William Sound once was, crystal lakes, lavender coral reefs, forests rich with tapir and tigers—may be the first step toward saving ourselves.



ANTARCTICA: THE WASTELAND

Antarctica—a desolate, icy outpost, dark for six months of the year, frigid weather with temperatures plummeting to 120° below zero on some days. Who would be drawn to such a place? Scientists—and lots of them.

Each year 2,000 researchers from at least 20 countries leave the comforts and security of lab life to travel to Antarctica, where they test ancient fossils, analyze meteorites, and monitor the worrisome ozone hole. They come to study a habitat that houses the greatest populations of wildlife left on the planet, a complex food chain extending from the sea-dwelling phytoplankton and shrimplike krill to seals, whales, and vast colonies of penguins.

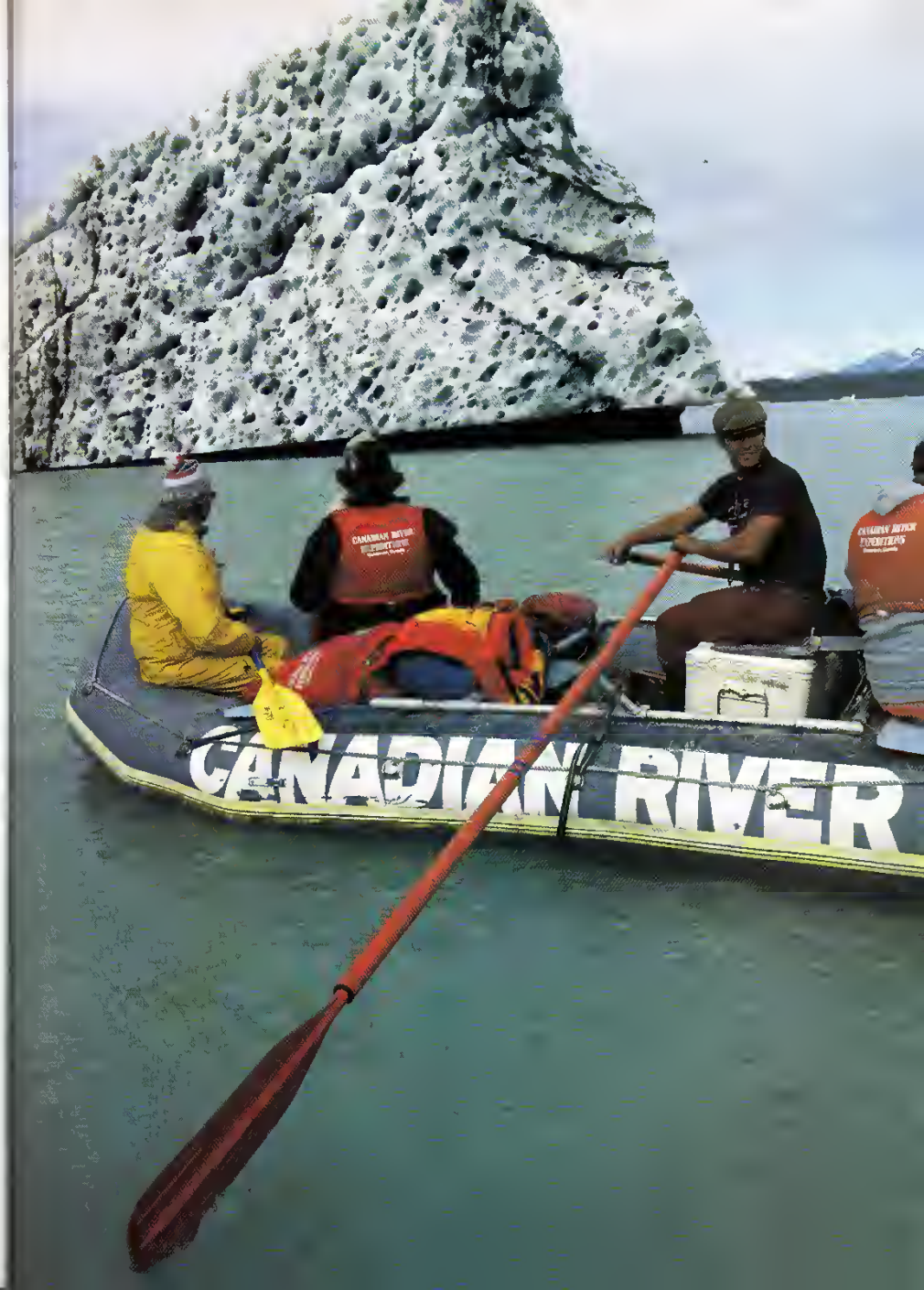
In fact, scientists have found the continent to be a nifty gauge of climatic change. For one thing, the ocean surrounding Antarctica, which generates cold, deep water masses spreading throughout the world's oceans, is a major factor in Earth's climate and a prime indicator of environmental change, according to the National Science Foundation (NSF), which administers U.S. science exploration in Antarctica. "Antarctica is a kind of thermometer, a canary in the coal mine for the planet," says Guy Guthridge, manager of the NSF's Polar Information Program.

Ironically, Antarctica's research stations are also its enemies, assaulting the environment by dumping raw sewage, failing to control leakage from fuel tanks, and burying garbage in shallow landfills. Due to the extreme cold, organic materials have been known to take as long as 100 years to decompose. While possible oil and mineral exploitation, the subject of intense debate, may threaten Antarctica in the future, says Bruce Manheim, attorney and scientist with the Environmental Defense Fund (EDF), the continent currently faces a more immediate menace: garbage, produced primarily by the very people who want to protect this pristine wilderness area—the scientists themselves.

Investigations by the EDF and Greenpeace in the past two years have turned up a trail of transgressions leaving old or useless equipment to de-

Previous pages: A seal lounges on an icy Antarctic beach (right) while a humpback whale shows off its flukes (left). Clockwise from right: The glaciers of the St. Elias Mountains frame the Tatshenshini River, a prime spot for rafting in British Columbia; a black-billed toucan perches in Ecuador's Yasuni Park; a kid from Hawaii protests a proposed geothermal plant in the Puna rain forest; oil developers threaten Arctic polar bear habitats; peacekeeper Palau—future military base in the Pacific?

"The once-crystalline Antarctic waters adjacent to the United States' McMurdo Station now harbor deadly PCBs, contaminating waste oils, and diesel-fuel additives."



cay on the ice burning solid waste in open pits, running power generators with improper pollution controls, and dumping toxic materials. Last year the French carelessly blasted seven small islets, part of a penguin rookery, to build a landing strip for their Dumont d'Urville base. In the process they killed 2,000 penguins, says Manheim. A population of chinstrap penguins has declined by almost 25 percent annually near Chile's Teniente Marsh Station since the base dumped its waste in a small melt lake on King George Island. Once numbering in the thousands, the colony now hovers around 100. And visitors to the industrial complex of the United States' own McMurdo Station—one of the primary offenders, according to Manheim—find bonfires of garbage. McMurdo Bay is also polluted with PCBs and other heavy metals, says Susan Sabelle, Antarctica campaigner for Greenpeace.

For many researchers, however, the benefits of scientific inquiry outweigh the concomitant "science trashing" that goes on. "If man is going to operate in that kind of environment, there's going to be some level of environmental degradation," says Robert Rutford, president of the University of Texas at Dallas, who has conducted research in Antarctica for three decades. Even so, says Guthridge, "Antarctica is still the cleanest place on Earth."

Environmentalists such as Manheim view Antarctica's waste woes as a function of the continent's general anarchy—the lack of sovereign government. Signatories of the 1961 Antarctica Treaty declared the continent a kind of global commons, and although the nations engaged in research agreed to set aside protected areas, they have looked away when offenses occurred inside them, such as the establishment of Chilean and Soviet research bases. The lack of government controls bodes greater ill for the future of Antarctica when and if nations decide to open up the continent to oil and mineral exploitation. Viewing that scenario as inevitable, the United States and the United Kingdom favor ratifying CRAMRA, the Convention on the Regulation of Antarctica Mineral Resources Activities, an agreement that would provide controls on future development, while others, namely France and Australia, reject exploration outright, proposing that Antarctica be named a protected world park.

Indeed, oil spills in Antarctica's icy waters are an environmentalist's worst nightmare, says Amy Stolls, editor of the *Oil Spill Intelligence Report*. "Most of our cleanup equipment does not work in extreme cold or heat," says Stolls. Antarctica suffered four serious oil spills in 1989, the worst from the *Bahia Paraiso*, which ran aground en route to supplying an Argentine base with fuel. It has leaked some 180,000 of 250,000 gallons of oil. Submerged, the ship continues to pour oil into Antarctic waters, according to the U.S. Coast Guard.

A taste of things to come? If oil spills are a problem now it's not hard to imagine the potential for disaster with heavy tanker traffic in the region. Pollution from Antarctica's science stations is bad enough, but the possibility of other human activities on the coldest continent makes environmentalists like Manheim uneasy, to say the least. "If scientists won't protect Antarctica," he says, "what can we expect from people who go there to exploit oil and gas?"

BURMA: THE TEAK WARS

"On the road to Mandalay,/ Where the flyin' fishes play/ An' the dawn comes up like thunder outer China 'cross the Bay!" In Kipling's time—the late nineteenth century—Burma was an ecological paradise, a lush wilderness untouched by man. Within forests of sandalwood and teak, tapir, tigers, clouded leopards, and Asian elephants freely roamed, drinking from clear streams, foraging, or stalking their prey, free from the current threat of industrial expansion. Today, however, the Burmese government seems intent on cutting down what Eric Dinerstein, Asia program scientist for the World Wildlife Fund, calls "the last real wilderness in Asia."

The problem is cash. Senator Daniel Patrick Moynihan

Clockwise from left: Antigeothermal protesters leave offerings to the goddess Pele on a gate barring people from the rein forest; a test geothermal drill rig sits in the Puna forest; a native i'e'i'e' in bloom in the Puna; an Arctic tern in flight; a steamer drifts down the Nile in the Sudd.

"Dinka warriors in the Sudan blew up a digging machine, leaving the Jonglei Canal 93 kilometers from completion and strewn with debris."

(D-New York) has stated in the *Congressional Record* that the repressive 28-year-long tenure of Burma's dictator/president General Ne Win, has remade Southeast Asia's wealthiest nation into one of the world's poorest (the ninth poorest, according to the 1988 *World Development Report*). A protracted 40-year war with insurgents, most of them members of the Karen tribe who live in the teak forests, has emptied the once-overflowing coffers of this former economic powerhouse of Southeast Asia.

The Burmese government's solution to its debt is to exploit "all that Burma has left to sell," says Moynihan, meaning its storehouse of teak. Burma grows 70 to 80 percent of the world's teak, much of it in a 40,000-square-mile forest along the Thai border.

Teak resists rot and so is perfect for outfitting sailing vessels—it once helped build the British Royal Navy. Now it's used primarily for pleasure yachts and fancy dining room sets. The wood is expensive, selling for an average of $7.49 a board foot.

A teak tree takes 120 years to mature. The Karen, following sound British practice, cut only one thirtieth of the forest each year. They also use elephants, not road-building machines like bulldozers, to haul the logs, thus preserving the forest and ensuring a teak-harvesting future.

With a much more immediate future in mind, the Burmese government currently allows logging companies from Thailand to clear roads through the jungle and bulldoze over the stands of teak. On the newly laid roads, the Burmese military pursues the Karen while the government pays for the campaign with the teak concessions sold to the Thai. Neat package, neat deal?

Except for the ruin left behind. Not only will the exotic species that make the rain forest their home—the slow loris, the crab-eating macaque, and the rare Sumatran rhinoceros—disappear, but so will the teak. Manfred Winkler, a naturalist living in Bangkok, says the supplies of teak will be depleted in fewer than 20 years.

A bill banning all teak imports from Thailand and Burma, sponsored by Senator Moynihan, passed the Senate in April by a vote of 92 to 0. (It's now in a joint congressional conference.) Yet teak continues to be sold to Japan and Europe to finance the Burmese government's private war.

Brian Beker, who recently made a film documentary titled *Lines of Fire* in the area, says, "I was looking for a 'before' shot and never found one. Sadly, the place looks as if there might have been a forest there." According to Bruce Bunting, vice-president of the World Wildlife Fund, Asia and Pacific region, documenting the flora and fauna must be done "before there's nothing left to document."

THE SUDD, SUDAN: EGYPT'S WATERLOO

Between the great dunes of the Sahara and the Imatong Mountains lies a swamp the size of Belgium. With temperatures around 85°F and a resident army of disease-carrying mosquitoes and poisonous snakes, the Sudd seems an unlikely candidate for paradise. Yet Jonathan Jenness, land use planning adviser to the United Nations from 1980 to 1984, calls the Sudd (meaning "barrier" in Arabic) "still the great wilderness of the world." Robert O. Collins, author of *The Waters of the Nile*, believes it to be "the final refuge for truly free-roaming herds," with large numbers of grazing elephants and hippos using it in the dry season, the rare tiang antelope has its primary residence there. The Sudd's inhospitality has protected it against poachers, tourists, developers, and scientists alike.

Until recently. The problem is water. Egypt, to the north, needs it desperately. As a result of the ten-year Ethiopian drought, the water in the Nile is at its lowest level in years, and Egypt, as Herodotus said, "is the gift of the Nile." It drinks from the Nile, is irrigated by the Nile—it lives by the Nile.

Bad news for the Sudd. On its way to Cairo, the Nile snakes its way through the Sudd, and in the heat of the enormous swamp, a lot of the water Cairo hopes to drink evaporates. To solve this problem of evaporation Egypt and the Sudan in 1974 contracted with a French company, Compagnie Constructions Internationales, to build a canal 360 kilometers long, 100 meters wide, and more than 10 meters deep.

The dream of diverting 700 million cubic feet of water each day from the swamp, however, has not been fulfilled. Three million indigent African cattle herders, including the Dinka tribe, consider the Sudd their home. Because they lack sufficient political clout, according to Jenness, their demands for bridges to herd their cattle over the canal were ignored. They responded by forming the Sudan People's Liberation Army in 1983. With Dinka warriors leading the guerrilla movement, they blew up the six-story-high digging machine, owned by Compagnie Constructions, leaving the canal 93 kilometers from completion and filled with debris. "It's a worst-case scenario," says Jenness, "a huge hole in the ground with no water in it, no way for migrating animals to cross it, and a war going on."

But the project from the very beginning has had its detractors. "Completing the Jonglei Canal as is would be terribly harmful," says an anonymous former senior United Nations adviser in

CONTINUED ON PAGE 76

To some kids this is a new source of electricity.

To most kids it's a lime.

But to kids and teachers in Bell Atlantic-sponsored school science programs, its chemical content and caloric values can produce electrical energy.

At Bell Atlantic, we believe in giving kids new ways to look at the world.

Which is why our employees volunteer in school science programs. And why the Bell Atlantic Charitable Foundation and Bell Atlantic companies partner with organizations like the American Association for the Advancement of Science to sponsor science programs for both kids and their teachers.

We believe if we spark their interest in science today, our children will be able to create a better world for tomorrow.

Bell Atlantic
We're More Than Just Talk.

ARTICLE

THE DEAN OF PSI

BY STEVE FISHMAN

A celebrated Princeton engineer says his lab has clear-cut evidence of psychic phenomena from telekinesis to clairvoyance

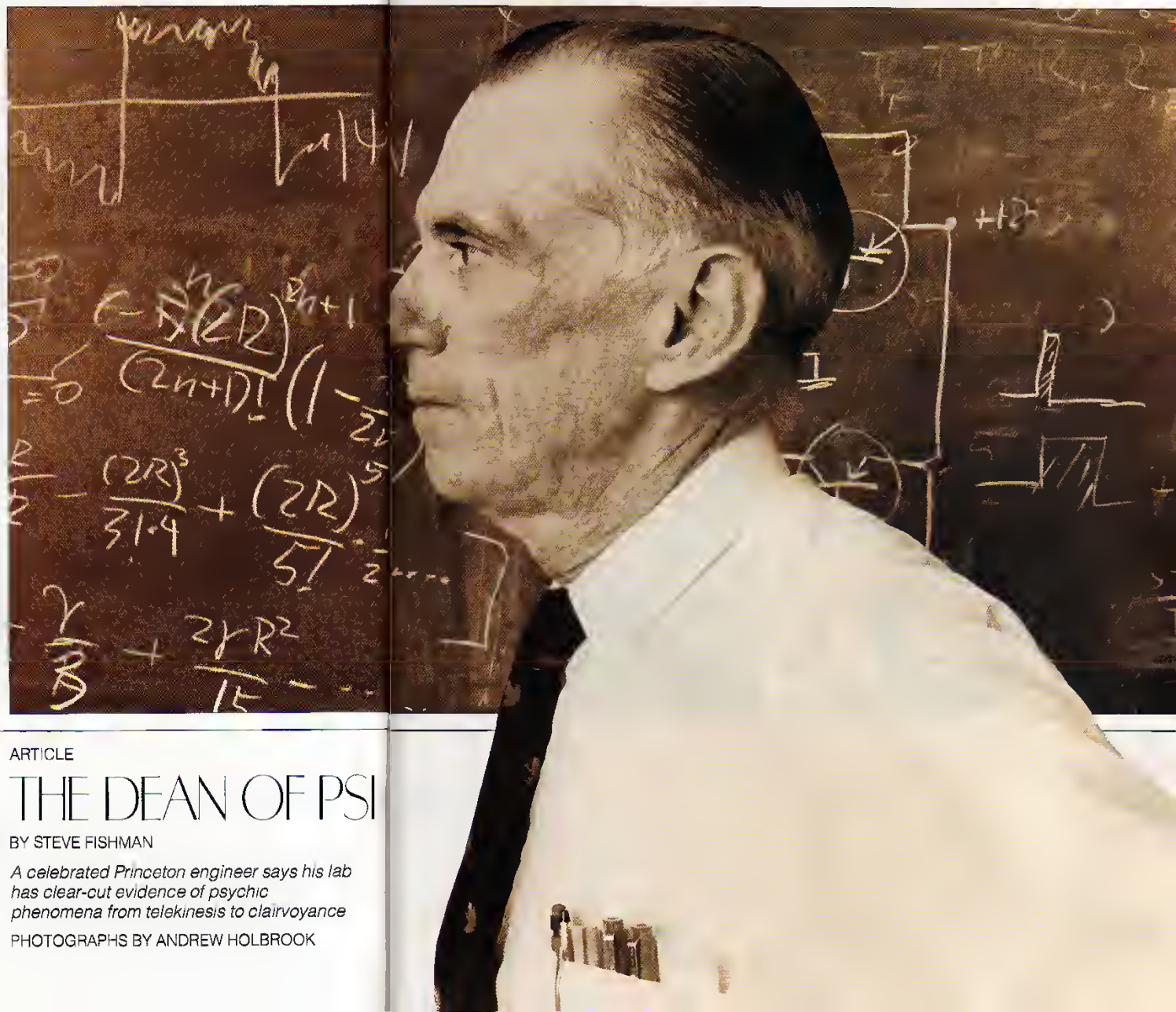
PHOTOGRAPHS BY ANDREW HOLBROOK

From his bed, Robert Jahn tried to sense the sights, sounds, and smells perceived by a colleague in Paris. *Let your mind expand and let it come in,* Jahn told himself, though what exactly "it" was he couldn't quite say. All he knew was that the scientist's logic, which had served him so well, wasn't going to work in bed. *Let go the logical underpinnings; let go the analytical traffic. Give the mind freedom,* Jahn thought. Freedom for what? For exploring space and time, or however one might say it. Jahn wasn't sure how to say it. After all, he was more accustomed to measuring space than transcending it. But then something began to happen, a picture began to assemble in his mind. *Explore but don't construct,* Jahn told himself. *Don't fall into the trap of believing if there are trees, there must also be birds.*

First a Paris street scene drifted in the window. Traffic, people, cafés with awnings. No surprises there. Anyone might have *guessed* that. Then this silly image: a man in a suit of armor. The logical Jahn—who happened to be the dean of engineering at Princeton University and a leading researcher in NASA's deep space propulsion program—wanted to exclude this image. And yet, it would turn out, armor was a telling detail. The colleague sat at a café across the street from statues of warriors, one in medieval armor.

Jahn, straight, respected, Establishment, had just spied on a guy sipping café au lait across the Atlantic Ocean. There are few times when a scientist steps back and thinks what Jahn thought as he pondered these results: *Holy cow! What do I do now?* A lot of researchers as well regarded as Jahn would have rolled over and gone back to sleep, not risking time or reputation in a field more often associated with palm reading than legitimate science. Instead, Robert Jahn horse-traded for a basement storeroom and founded the Princeton Engineering Anomalies Research, or PEAR, lab. PEAR's thrust: to perform experiments on what Jahn calls "engineering anomalies," a phrase invented as a substitute for terms like *psychic phenomena* or *psi, extrasensory perception* or *ESP, telekinesis, clairvoyance,* and *telepathy.*

By 1989, the tenth anniversary of PEAR, Jahn had emerged from the basement lab with the news—spelled out in *The Margins of Reality,* a fascinating book coauthored by lab manager Brenda Dunne—that psychic phenomena in small but measurable quantities really do exist. People can gather information to

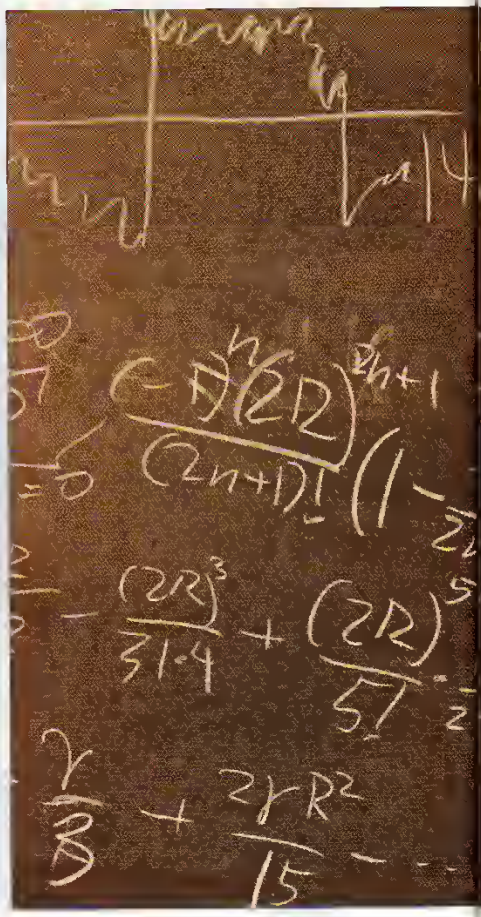


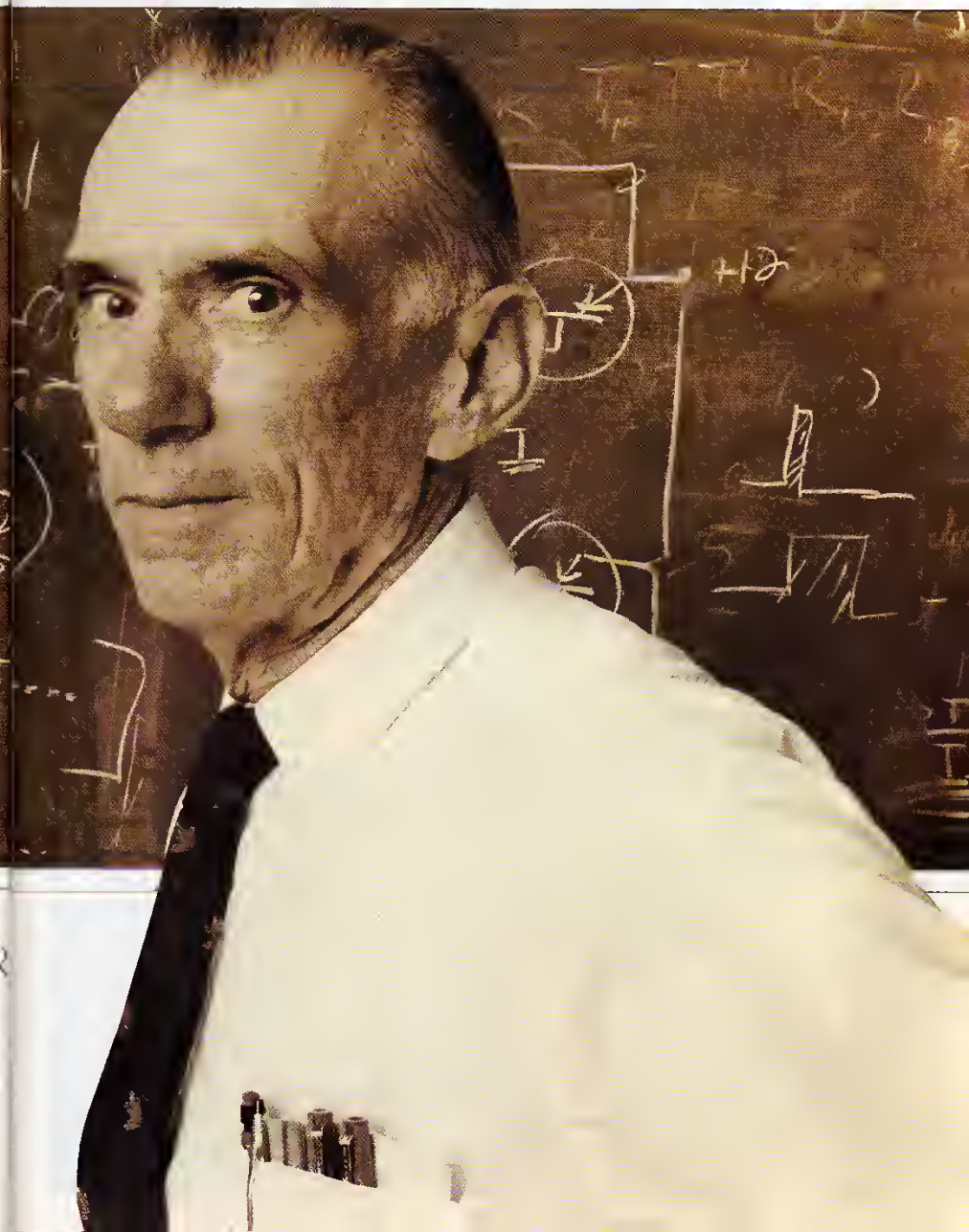
which the five senses don't give them access. Jahn declared. Moreover, he claimed, human consciousness can influence how objects perform in the physical world. In other words, the mind can influence the behavior of particles and the functioning of machines.

"It's disturbing, it's uncomfortable," says Dunne about Jahn's transatlantic perception of Paris. "It's not as reliable as using the telephone, but to the best of our ability to analyze it, to study it, to make sure we're not deluding ourselves, the phenomenon is real." It should be noted at the outset that plenty of people think Jahn and Dunne are wrong, or worse. "If the effect existed, hundreds of people would be beating the bank at Las Vegas," offers one of Princeton's two Nobel laureates in physics, Philip Anderson. Furthermore, Anderson notes, "there is a tremendous internal bias that makes people in these fields cheat, either consciously or unconsciously."

Specifically, critics charge that Jahn has misinterpreted his data to support the results he wants. And even these "massaged" data, they add, reveal an effect so small they seem to have no meaning—certainly no psychic or paranormal meaning—at all. Other detractors contend that Jahn's remote perception experiments are flawed because the "perceiver" and the "sender" generally know each other, thus increasing the ease with which they may supposedly "read" each other's minds. And not only do critics call Jahn's science unsound; they complain that just being interested in the paranormal lends the field undeserved credibility. To use the words of one blunt administrator, "Plenty of people think Bob Jahn is a fool."

At first glance, Robert Jahn does appear, well





THESE RESULTS CAN KEEP YOU UP NIGHTS. EITHER YOU IGNORE THEM OR QUESTION YOUR IDEA OF SPACE AND TIME.

quirky. His office is crammed with stuffed animals, mainly Princeton tigers, and pictures of a childhood favorite, giraffes. On one wall he's mounted a plastic Felix the Cat clock. The toy cat's oversize eyes rock eerily back and forth with its pendulum tail. When Jahn hurries off to a meeting for one of the half dozen corporations, foundations, or universities he's affiliated with, he often snaps on a Princeton baseball cap.

Yet nothing in his academic background or intellectual disposition is eccentric. "He is a very cautious, penetrating analyst of high intellect and integrity," says Princeton alumnus Norman R. Augustine, chairman and CEO of Martin Marietta Corporation.

"Jahn is considered by most to be the premier scientific mind in his field," says Earl Van Landingham, a deputy director at NASA's office of space technology, the principal funder of Jahn's work on deep space transport systems. (Jahn continues to run a highly regarded, $750,000-a-year lab that is trying to figure out the best way to send a spaceship to Mars.)

And despite his quirks, Jahn himself is strikingly down-to-earth, serious, at times almost dull—almost a caricature of an engineering professor, with socks falling around his ankles and a dozen pens and pencils fighting for a spot in a chest pocket. He's thin to the point of gauntness, with a narrow face and sunken cheeks, testimony perhaps to the fact that he has spent his entire adult life standing in front of blackboards at universities. In conversation—even about a topic as wild as the mind's ability to control matter—he is serious and even-toned. He is intimidatingly articulate. He has a preference for the findings, the evidence.

In fact, Jahn seems more surprised than anyone at the direction of his career. Before he jumped into this questionable field, he had never even set foot in the arena of parapsychology—never, he likes to say, even had an aunt with a prescient dream. Why not tend to his own academic turf (electric propulsion, a field in which his book is still the accepted text) and continue along established lines, bringing honor to a university he loves (a university to which he's sent all four of his children) instead of dragging it into "intellectual disrepute," as has been claimed? Indeed, why, if Jahn is not flamboyant, not apparently reckless or nutty or unscientific, would he invest his academic capital, so carefully built up throughout an outstanding career, in such a risky venture?

To Jahn, the answer is clear. He was merely led, as a good scientist ought to be, by experimental results. But in this case it is also true that the good scientist was emotionally open to unconventional beliefs and results. Jahn puts it this way: "I'd been a traditional faculty member, teaching graduate courses in aerospace engineering, doing research for NASA and the Department of Defense until twelve years ago. Then I began to ask myself, *Is this all there is? Is there nothing else with excitement? With a new horizon?* And then this came along. I didn't seek it. It found me."

The field of engineering anomalies found him in the form of an undergrad who one day wandered into his office and wouldn't leave until she got what she wanted. No faculty member would oversee her project on psychic phenomena, she complained. And Dean Jahn wasn't interested either. *Who needs one more complication in an area you haven't any interest or background in?* he thought. But the student persisted. Dean Jahn had made a promise, she reminded him. Anyone who earned good grades could do an independent project. Hadn't he meant it? the student asked. Okay, give it a shot, Jahn told her and agreed to look over her shoulder. The student was interested in psychokinesis—the ability of the mind to affect, or even move, objects in the material world. To test this skill, the student (who got an A for her work) used a random number generator—in her case, a computer that rapidly and randomly flipped electronic models of coins. The program she used could, in effect, flip 200 coins at once. Under ordinary circumstances, the laws of probability dictated that 100 of those 200 flips should land heads up. Her experiments were unsophisticated but their results were startling. If a person seated in front of the machine was told to "think high," then over many trials, slightly more than 100 heads would appear. If the person was told to "think low," slightly fewer than 100 would turn up.

"It would have been great if we had a nice, closed-out, little senior thesis and off it went," says Jahn. Instead Jahn was confronted with evidence, crude though it was, that violated fundamental laws of science. Practically, the evidence suggested that sensitive microelectronic gear—like that used in aircraft guidance or information processing systems—might be affected by what its operators were thinking.

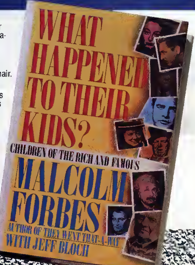
Do I close this down, Jahn asked himself, *or is there an obligation to take a more substantial look?* Past researchers in parapsychology had come up with some provocative results, but none Jahn felt constituted scientific proof, mainly because their experiments could not be reproduced. Time and again, a range of paranormal phenomena would seem to be documented in one set of studies, only to be disproved the next time around. Jahn decided he

CONTINUED ON PAGE 88

RASPUTIN'S DAUGHTER JOINED THE CIRCUS.

- John D. Rockefeller's daughter believed she was the reincarnation of King Tut's bride.
- Marlon Brando's son put out the fire in Michael Jackson's hair.
- Al Capone's son quit his job as a used car salesman when his boss wanted him to turn back the odometers.
- Benjamin Franklin's son was arrested as a British spy.
- Mozart's son used Salieri as a job reference.

Available now at your local bookstore . . . $18.95



In writing this surprising and entertaining new book, bestselling author Malcolm Forbes looked beyond the surface fame into the private lives of some of the world's most celebrated rulers, tycoons, stars, artists, and criminals —and their not-so-famous progeny.

WHAT HAPPENED TO THEIR KIDS? unearths a richly varied collection of human stories, by turns amusing, alarming, illuminating, and sometimes deeply moving.

SIMON AND SCHUSTER
A PARAMOUNT COMMUNICATIONS COMPANY

THE GARDENER OF EDEN: PORTRAITS IN PARADISE

Botanical Illustrations by Basilius Besler

Draw closer, my buttercups, my sweet peas, my petunias, and I shall tell you a bedtime tale, a story of a magical garden conjured up by one man. Loose your roots to this earth and imagine a faraway land in a faraway time—seventeenth-century Germany.

There the peaceful Altmühl River flows through a valley to the small city of Eichstätt. Atop a craggy hill overlooking the city and the tranquil river below dwelled a man of great power, a bishop and prince who desired more than anything else to create the most beautiful garden in the world. As befitted an episcopal eminence, Johann Konrad von Gemmingen resided in a spacious palace. While many clerics of his time found religious inspiration in the Church, Konrad believed God flourished in the wonders of the botanical kingdom, and he envisioned his estate as a cathedral. But Konrad had neither time nor skill to fulfill his ambition. So he unearthed a budding horticulturist in Basilius Besler.

Trained in the medical sciences, the young Herr Besler decided to turn over a new leaf and became

a "philiater" and apothecary, a natural healer who used plant derivatives as his drugs.

The good Herr Besler had a certain style about him, he understood which herbs could be used for healing. He knew, for instance, that monkshood (page 55, bottom left) can treat neurological spasms if given in the correct dosage; otherwise this herb can be lethal. And he knew how to extract a tasty food from the cardoon (page 52)—an edible ancestor of the artichoke—and where the saucy cranberry (page 50, inset) is likely to turn up.

Besler rose to the occasion of establishing a garden worthy of God. From the garden stemmed plants never before seen in Germany. The green dragon (page 54) of Corsica thrived there, as did the slender sunflower (page 51), which hailed from Peru. More than 12 tropical species

Konrad's garden grew in reputation, but it distressed the esteemed prince that not all would have a chance to appreciate the beauty that surrounded him daily.

Besler rose to the occasion of establishing a garden worthy of God. From the ground stemmed plants never before seen in Germany.

took root in Eichstatt, along with such less exotic cousins as the Spanish iris (page 55) and the grape hyacinth (page 53, left).

In five years Konrad's garden grew in reputation, but it distressed the esteemed prince that not all would have an opportunity to appreciate the beauty that surrounded him daily. When Besler discovered the thorn in his friend's side, he branched out from gardening to embark on a new career—art. For years he and a staff of engravers and typographers strained to produce a garden that would never lie barren—a florilegium, or catalog, of Konrad's fields. Within this literary Garden of Eden, the flamboyant peony (page 50) and the delicate meadow sage (page 53) leapt to eternal life. The only pestilence that threatened was bookworms. Not every story can have a happy ending, though. Konrad never lived to see the final stage of his vision brought to fruition. Even more tragically, the garden lives today only in Besler's glorious watercolors. And so, my daffodils, tomorrow I will tell another flowery tale. Time now for sleep, you mustn't be too impatiens. —Shari Rudavsky ∞

MIND

CONTINUED FROM PAGE 20

weak to sit, would not give up. "Each day I stayed alive was another chance to be rescued," she told me. 'Something deep inside told me to hang on one more day." The Butlers were highly organized and had everything they needed to survive when their sloop was rammed by whales.

'Even sailors with many years of experience do not know how to survive," says Roberts, who heads a special rescue team at the Coast Guard's Floyd Bennett Field in New York. 'After the first few days you start thinking, *No one's going to save me. I'm hopelessly adrift.* To survive after that takes sheer mind power.' While Abbott let his depression get the best of him, Culver evaluated her situation in small, manageable increments. She kept her mind open. The Butlers remained mentally active, dwelling on positive things. "Don't give up," says Dr. Martin Nemiroff, chief of health services at the Coast Guard Training Center in Petaluma, California. "Divert your thoughts to things that make you happy. Have fantasies." In other words, play games with your mind. Don't let it play tricks on you, which experts say it does.

"After denying that they may die," says Nemiroff, "people indulge in a lot of bargaining (*if I get out of here alive, I'll...*). The mind goes kaleidoscopically from hope for rescue, to isolation, to depression. These feelings come, go and vary in order. You have a better chance of survival with other people there. Just being able to say, 'I'm not going to do what he's doing,' helps handle negative thinking." Highly destructive, he says, is the "last chance" phenomenon. Rescue is visible, but they don't see you. You start thinking, *That was my only chance; they won't be back again!* Then you feel doomed.

At the end, long-term exposure causes delirium. You start drinking salt water, which causes more delusions. 'In the cold," Nemiroff continues, "people sometimes start shedding garments. In our searches, we'll come upon a trail of clothes, and you can be sure that at the end will be somebody nude or dead and nude. Paradoxically, these people interpret their coldness as warmth. That's very likely what happened to the sea captain."

Researchers studying people who triumph over life-threatening crises are finding survivors share common personality traits: high self-esteem and optimism. 'Often the difference in mental, rather than physical, toughness determines who will endure," says Dr. William Zlevorinik, chief of psychiatry at Providence Medical Center in Portland, Oregon. "Survivors have a strong belief system outside themselves, in family and religion. Once you give in to a sense of abandonment, you give up." Survivors tend to be tenacious in a self-preserving way. "They do the right things under pressure," says Moskowitz. "Consider the sea captain and his lady. Even though Culver was technically less skilled at sea, she didn't lose her head. Abbott panicked, left the safest position, and exposed himself to death."

The Coast Guard's Nemiroff also attributes this fighting spirit to an immeasurable factor. "Of course we try to elevate this survival factor to a high degree of science," he says, "determined by age, fitness, diet, behavior, survival equipment. Of all possible factors the hardest to quantify turns out to be the most important. We can measure weight, age, sex, swimming ability, flotation, quality of clothing—finite things. But we can't measure the will to live."

Nemiroff participated in several rescues off the Alaskan coast. In one, 520 mostly elderly people had to abandon a cruise ship quickly. It took more than 72 hours to find everybody. 'We'd have predicted a high mortality rate,' he says. "But we had a one hundred percent survival. Why? We gave them the message 'You are a survivor.' In another situation off Alaska, Nemiroff recalls, 11 people jumped overboard. Two men clung together in the dark and tossing sea. 'One well-muscled, athletic swimmer just told the other guy, 'I'm gonna die.' The other man, about one hundred forty-five pounds, scrawny type, pulled his arms and legs into a fetal ball inside his survival suit and drifted until he hit landfall twenty-four hours later. He climbed out of the crashing surf, scaled a cliff, burrowed into a hole, covered himself with moss, and was found alive the next day.

"The human body has a neuropathology that can turn us off," he continues, citing the phenomenon known as voodoo death. Somebody thinks he's going to die and does. 'I think it's possible that when people no longer have the will to live, it's very easy for them to die, and most go ahead and do so."

Demonstrating the existence of a will to live is difficult at best. David Phillips, a professor of sociology at the University of California, San Diego, believes he has come close. Studying the mortality rate of Jews around Passover, an important religious holiday that moves around the calendar, he found repeatedly that the number of deaths dropped before—and increased after—the holiday. "The evidence indicates that it makes a difference whether you do or don't try to hang on to life," he says. "Your mental attitude appears to be related to your longevity. There's been lots of anecdotal evidence of the will to live, but this was the first statistical proof." —Janel Bladow

COMMUNICATIONS

CONTINUED FROM PAGE 12

Making Friends in Faraway Places

Your efforts to establish a relationship with the Russian scientific community are not only commendable but I think will set a pattern for many years to come. For nearly 40 years the American scientific community has virtually ignored the contribution of the Russian scientist. In the coming era of *glasnost* I think that will change. It is clear that the Russians can benefit from American technological development, but in addition I think we have a great deal to learn from them. While much of our scientific development has been driven by the need for bigger and better hardware, the Russians, on the other hand, seem to have made a great deal out of very little. I would hope that part of your endeavor in establishing a bridge with the Soviet scientific community might be the eventual exchange of scientists, with an opportunity for both to learn not only the nature of our current technology but also to gain a greater sense of the reality of the Soviet and American people.

Stephen Grebe
Associate professor of biology
The American University
Washington, DC

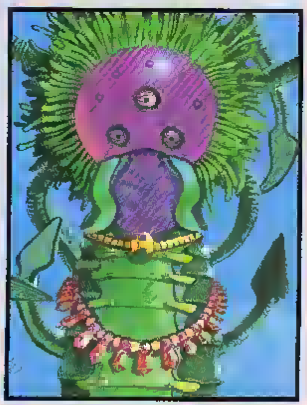
Total Recall

I read *Omni* regularly, particularly the Russian supplement. Two articles—"Speed Learning" by Keith Harary and "Instant Recall" by Ellen Kunes—covered a timely subject, but the Americans do not demonstrate the most effective methods, particularly the "initiative thinking" method, which is provided on videocassettes. I hope the supplement continues to include articles on fundamental theoretical problems as well as more practical stories.

A. S. Molchanov
Ufa, USSR

I would like to inform you about a mistake in the Russian supplement to *Omni* (volume 1, number 8, 1990) in the article "Instant Recall." The mistake occurred when you translated the article from English into Russian. The article read: "While research into Hydergine and other agents continues, you should keep in mind that a number of medications *can help you*. These include beta blockers, antidepressants, sleeping pills and relaxants such as diazepam (Valium), barbiturates, and alcohol." The English version informs the reader that these "medications actually interfere with recall."

V. A. Loshakov
Senior research worker
Burdenko Neurosurgery Institute
USSR Academy of Medical Sciences
Moscow

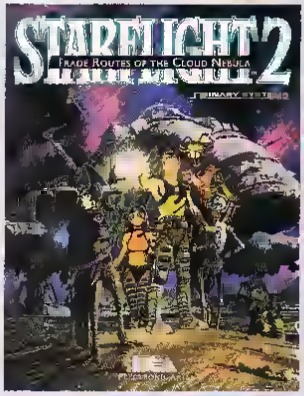


BEAUTY IS ONLY SKIN DEEP, BUT SPACE GOES ON FOREVER.

This is the bumper sticker I slapped on my starship. But I'm the captain, so who says I can't make a statement to my fellow merchants? Besides, it's true. In the vastness of space, there's plenty of room for genuine ugliness. I run into *lots* of aliens—spineless blobs like the Spemin, bizarro mystic broccoli like the Tandelou—that make me shudder and reach for the nearest can of industrial-strength pesticide.

So why do I do it? So I can cop an intellectual toaster and slice and dice some phantom in the nebula? Do I give a flying fungus?

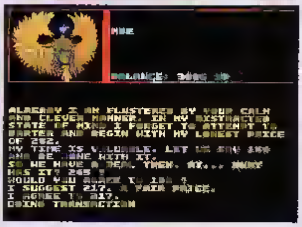
I guess I really do. The planet Arth needs fuel and technology to withstand a Spemin *blob literation*. So rather than vegetate before the TV, I talk to vegatables in space and trade with bug-eyed aliens that resemble the hairy mold growing in the shower. And I remind myself: Life is no beauty pageant.



Starflight™ 2 combines the complexity and humor of the smash hit Starflight with new features, aliens, plots and locations. Talk and trade with 29 new alien species, each with individual cultures and personalities. Explore over 500 worlds in search of new weapons and technology: Blasto Pods, System Scanners, Psychic Probes, Mineral Drones, and more.

No original Starflight™ experience necessary. Includes security decoder and authentic Humna Humna map device.

"The world of Starflight 2 is one of the most colorful worlds ever crammed into a computer. It's a great sequel to a great game." —*Computer Gaming World*



BOLDLY GO WHERE NO SALESMAN HAS GONE BEFORE.
Trade with aliens for fun and profit.

FACES ONLY A MOTHER COULD LOVE.
Secrets only an ally can discover.

WHERE DOES THIS "HOLE IN SPACE" LEAD?
To oblivion? Or to the heart of the Spemin mystery?

HOW TO ORDER
Visit your retailer or phone with VISA/MC USA or Canada: 800-245-4525, Mon-Fri, 8am-5pm Pacific Time. Screen shots represent IBM version. IBM is a registered trademark of International Business Machines Corporation.

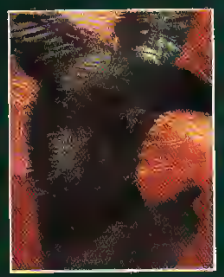
For your own "Beauty is only skin deep, but space goes on forever" bumper sticker, send $1.00 and a Nid Berry to Electronic Arts. Attn: Nid Berry Clerk, 1820 Gateway Dr., San Mateo, CA 94404.

ELECTRONIC ARTS®

FICTION

For one Vietnam vet the war never ends but transforms him into a harbinger of the future

BY GARRY KILWORTH



IN THE COUNTRY OF TATTOOED MEN

The letter was sent on to me at my home in California by the publishers of my war photograph books. It suggested we meet at his apartment in New York, since it was not possible for him to travel at that time. It stated that he was undergoing a strange experience, that I should record these "changes" for the future. What I hoped for was a good story—if there was any truth to it. He would not be the first Nam vet to go crazy. At first I was inclined to ignore the letter, but if Asia does nothing else for you, it permanently primes your curiosity. I took a flight to the East Coast the following Wednesday.

I checked in at The Roosevelt, which has an old-world colonial charm about it that makes an expatriate Englishman like myself feel a

PAINTINGS BY MARSHALL ARISMAN

little more at home in otherwise intimidating New York architecture. I feel swallowed in New York, as I move beneath giant buildings that seem to touch each other at their peaks, closing off the sky.

The Roosevelt's decor has a European feel, with ornate brass bedside lamps bearing leaf-glass shades, and marble-topped cabinets. I feel more confident with such furnishings around me.

"I'm *really* gonna look after this for you, sir," said the man who took my dirty laundry away to be cleaned. He paused in the doorway until I recognized the hidden language and gave him the two dollars.

When the door had closed, I picked up the copy of *The New York Times* that lay on my bed. A front-page story concerned the killing of a rapist in Central Park. It appeared to be a vigilante thing, and though the rest of the street

gang had witnessed their leader's death, none of them were quite sure what they had seen. The woman who was being assaulted also denied that she had seen the killer though quite understandably she blessed his intervention. Neither of these statements would have been surprising had the rapist been shot by a high-powered rifle or even a handgun. He had, however, been strangled. The police pathologist stated that from the bruise on the dead man's throat, it could be deduced that the perpetrator had used a nylon cord or wire garrote. Beneath this article was a smaller one dealing with the newly elected President's statement about the need to send military advisers to Asia to assist a certain country in its war against a neighboring aggressor. Only in the Western world would a story about a vigilante take precedence over the possibility of America involving itself in another Asian war.

The first tattoo appeared one morning at the end of summer. He had been out the night before, celebrating in one of his favorite bars. There had been a lot of "celebrating" in the past few years. The first excuse was his safe return from Vietnam, then Phil's death, then his own divorce, then any good or bad news, big or small. He was good at celebrating. The symbol, for that was what it was, rather than a picture or word, was not even in a conventional place on his anatomy. Not for an American, anyway. It was just below his left armpit and if anything resembled a Sanskrit character or perhaps Chinese. *Japanese?* No, not even like any of those. It was simply a symbol, a whorl ending in a sharp, angled line that went back in on itself to create a tiny maze. When he studied it in the mirror he was astounded at the fine detail, the artistry involved. The tattoo was like a world itself, the world of a closely inspected flower or leaf.

MOST OF THE DEAD MAN'S SKIN HAD GONE, AND THE FEW BITS LEFT WERE COVERED WITH TATTOOS.

"What in Jesus' how the *hell* did I ever get that!" he said, looking round his poorly furnished apartment, hoping to find evidence of the previous evening's movements. Where had he been the night before? He remembered Stacey's Bar, then the nightclub on—what street was it? But a tattoo parlor? They used to have them in Chinatown, but he read somewhere that they had all been closed down. Lucky it was in a place only his intimates would get to see. Lucky it wasn't something crass, like a copy of last month's *Playboy* centerfold. Lucky, lucky, lucky. He slammed his fist into the wall above his mirror. Someone shouted a complaint from the next apartment, and he yelled back "Go to hell!" before washing his hurt knuckles under cold running water. Outside, the Brooklyn traffic was just reaching its nine o'clock crescendo. He pulled his slacks on over his shorts. He should have been at work an hour ago.

Three days later, after his next binge, the second tattoo appeared. This time it was on his elbow. He called his ex-wife and spoke to her for a while, not telling her but gaining a little strength from the sound of her voice. Then he called his son and talked about football and vacations. Jamie told his father he missed him and that the three of them should get together soon, once college was over. Jamie was a romantic, always matchmaking, hoping that his parents would get together again, even remarry. By the time he put down the phone, he was feeling better. He made a vow not to drink for a week.

Twenty-four hours later, there was a third symbol.

"I'm sleepwalking," he said to himself. "I'm in some sort of trance. Some bastard's got to me." He studied his eyes in the mirror and saw fear in them. He touched his sallow cheek and his hand shook. "Some bastard's getting to me." He couldn't have been more afraid if the tattoos were not just colored symbols but bodily disfigurations indicating that some deadly disease had found its way into his blood.

He was as scared as he had ever been, even in Nam. In fact, he thought, it was the *same* scared. He recognized the fear the way other people recognize the smell or taste of an unusual spice. There were various types of terror, and this was definitely the jungle-death fear. It was because there was something very Asian about the tattoos: something Oriental in the design. Suddenly the nights seemed even more hollow than before. Out there, in the dark, something was getting at him. He was back in Vietnam, looking at a wall of jungle. Inside that wall and walking beneath giant trees, whose roots had to be climbed like hills. He was an insignificant mortal in a place of no understanding. He began starting at shadows again, swallowing fear faster than the booze. The jungle had followed him back, into the streets of New York. The little men who you never saw were hiding in the alleys. His fright was getting him up late in the night, sending him down to the bars to get some of the stuff that would rid him of his fear and add to it at the same time. He was caught in an ugly paradox that was driving him as crazy as he had once thought he was.

"What the fuck's happening?" he cried, as he stood on the sidewalk outside a bar, the neon splashing over him. "Someone tell me what the fuck's happening." But the passersby if they glanced at him at all, were not prepared to discuss philosophical questions with nuts, vets, or drunks. Especially not with a man who seemed to be all three.

I left The Roosevelt and took a cab to Central Park. There I wandered around looking at the map in the *Times*, trying to locate the position where the killing had taken place. When I thought I had it, I took a few pictures. I don't know why I bothered; they didn't show anything. I just like to have something on a new roll of film, to

SUNTORY

DRAFT BEER

A taste of another culture.

get me started. In Vietnam, first thing after waking up, I used to reach for my camera and take a shot of the other end of my body: toes, feet, knees. Just to get me started. I suppose I was a pretty weird kid in those days anyway. I had left home at the age of seventeen, hiked across Europe with a Pentax in my rucksack, bound for the East. There was a determination in me to become a war photographer. I set out to photograph the Arab–Israeli conflict of '67. It took me a week to get there. The war had only lasted six days. I shrugged off my disappointment and went further down, to Aden, where terrorist action against the British withdrawal from the colony was warming up. The authorities wouldn't let me in. They wanted to send me home to my parents. I set out east, heading for Vietnam, but paused in India, losing my objectivity for a while in a cloud of opium, in the notes of a sitar. I finally got to Nam in time for the battle of Khe Sanh.

My first pictures were lousy and nobody wanted them (until later, after the first book), but I was too eager to stop. I took more, got better, learned from American contemporaries. By the time My Lai hit the papers, I was good and my pictures sought after.

It was around that time that I saw the tattooed man. I was in country with one of the long-range reconnaissance patrols when the nervous point man opened up at shadows with his M-16. "I saw somethin' move," he said. "I saw the ferns twitch." We checked the area and found a blood trail which led to a cave just to the side of a waterfall. The patrol only had two fragmentation grenades between them, which they lobbed one after another, but still no one wanted to go inside. I didn't blame them. The cave looked like a rock mouth waiting to swallow boonie rats. The roar of the silver-toothed water didn't help. I was glad I was just there to take pictures. They called for assistance, and later a Huey dropped the patrol a flamethrower, and they scoured the interior with it. Then a single soldier went in carrying a forty-five. He came out backwards, dragging the corpse of a naked man. Most of the dead man's skin was gone, leaving only his left arm and part of his chest intact. The bits of skin that were left were covered in tattoos and had a weird effect on the eyes: the same kind of effect that one gets when looking at closely printed zigzag lines, black on white.

As the tattoos got tighter, more closely knit, he began to wonder if they were some kind of message. He stared at them in the mirror until he was giddy, trying to see some pattern which might be a language. He even tried moving, walking about in front of the glass, to see if the message might be more evident in the rippling muscles of his hard, lean body, in the actions of his limbs and torso. Nothing came to him. He had spent sleepless nights touring—not the bars but Chinatown, asking about anyone that might do tattoos. Finally a taxi driver took him to a sleazy basement, where there was supposed to be an illicit parlor. When the door was answered he knew he had the right place.

"You come for more?" the guy said.

He explained to the artist that he had no recollection of his previous visits, saying that he had been stoned on all occasions and had not known what he was doing. The artist looked stiff-faced and shook his head.

"Sure, you know," he said, in the accents of a new immigrant.

Suddenly there was the chilling thought that perhaps the tattooist was not Chinese but Vietnamese. Had they tracked him across the ocean? Were they getting to him, in his own country?

He shook his head to clear it of the paranoia. "See here, fella, I don't want any more. No more, understand? If I come here drunk or sober, you send me away again—don't give me any more tattoos. Okay?"

"Not okay. You no want come here. You want go some other place. I make good tattoo. You come here, I make good tattoo."

He threatened to tell the cops about the underground parlor, but the tattooist gave him an infuriating Asian smile. "You not go policeman."

That very night he collected another tattoo and on its discovery in the morning returned to beat the shit out of the artist, only to be met with an equal fury from the artist.

"You got flies in head. You crazy. Why you come here night and say, 'Make me tattoo,' then come in day all angry? You no want tattoo, you no come here, you stupid crazyman."

Relatives and friends of the tattooist seemed to come out of the woodwork of the basement, standing in the shadows behind the man, with their arms folded. The vet knew that if he caused trouble, they would be all over him in a few seconds, maybe with knives.

"You fuckers must be hypnotizing me or something," he said. "Why in Christ do I keep coming back? I don't understand it. What the hell's going on?"

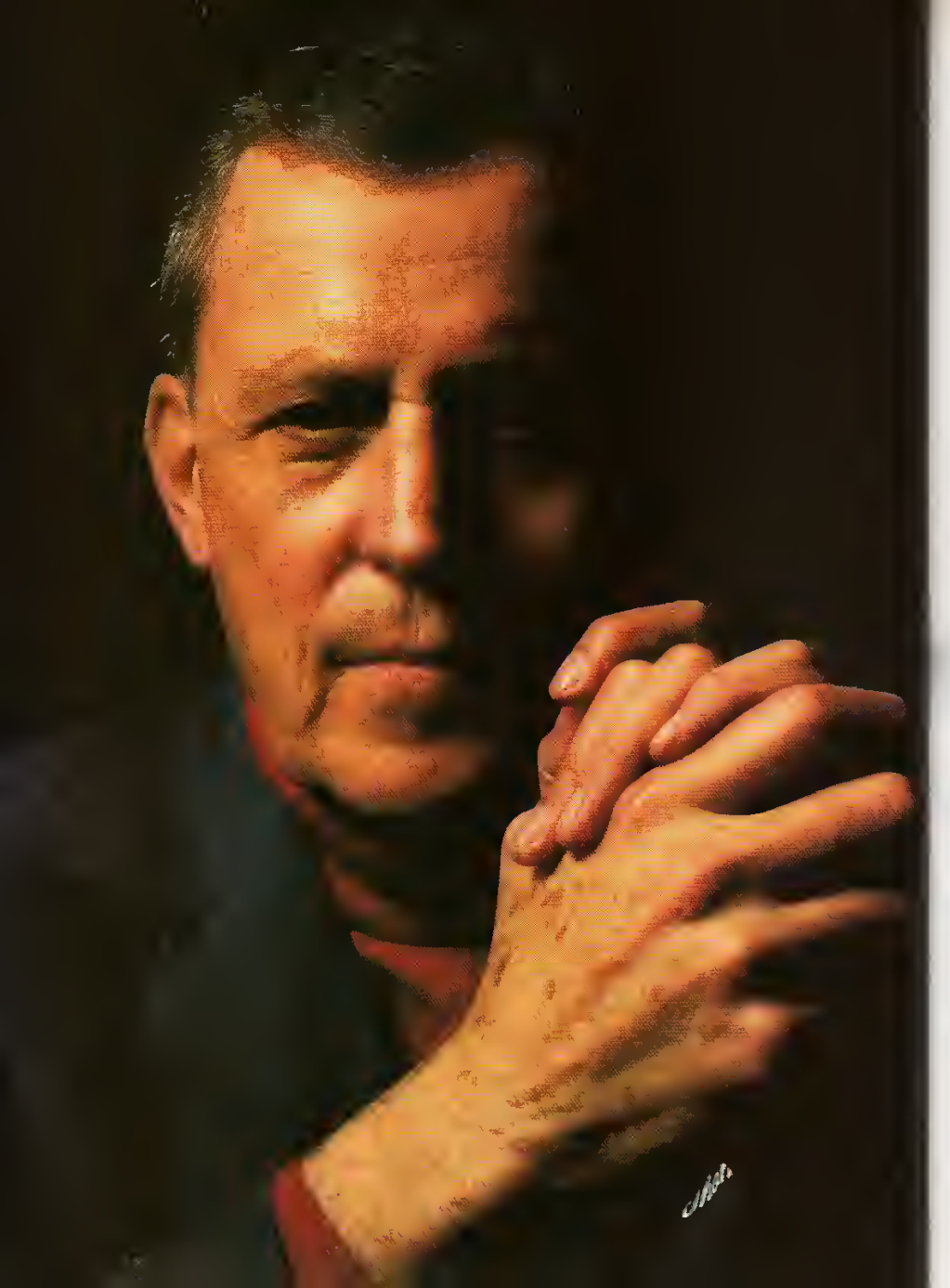
The tattooist shrugged.

"Well, where do you get these marks from? I've never seen marks like these before in my whole life."

The artist rummaged in a drawer at his elbow, coming out with a wad of paper. Carefully drawn on each piece of paper was a symbol resembling the tattoos. He stared at them, uncomprehend-

CONTINUED ON PAGE 86

"According to the latest polls, seventy-three percent consider you first in war, sixty-nine percent consider you first in peace, and eighty-two percent consider you first in the hearts of your countrymen."



"I never tried an operation that I believed wouldn't succeed," says the world's preeminent transplant surgeon, who daily faces such questions as, Who should receive a new organ? Should body parts be sold? When is a patient really dead?

INTERVIEW

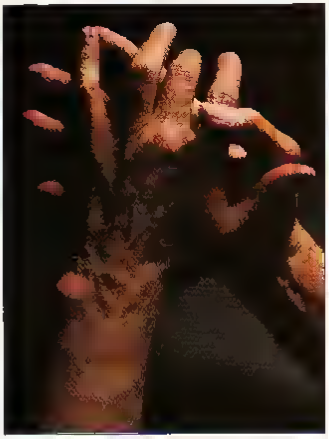
THOMAS STARZL

Twelve years ago Sandra McKeefry ley in the intensive cere werd et the University of Colorado's Denver hospital. Her vital signs were grim and she was completely unresponsive. Dr. John West, a young resident at the time, recalls. "Her bilirubin [red bile] count was so high she looked black. I thought she wes finished. The neurologist on duty wented to declere her dead. As we were about to close her chart and call the coroner, Tom Starzl came by to examine her. In a battery of routine tests, he obtained a minor reflex on one eyelid. Without hesitetion, Starzl personally wheeled the patient down to surgery, removed a liver from e brain-dead patient, and sewed it into her."

Sandra McKeefry is alive today. She would certainly heve perished under the care of a less aggressive, some would say less controversial, physician. Few practitioners of modern medicine ere as controversial as Dr. Thomes E. Starzl, now uncontested dean of American organ transplenting. Starzl himself says he despises controversy. Throughout his career he has let others decide for themselves if "multivisceral" transplants, mother-to-child segmentel liver transplants, and animal-to-humen orgen transplants are really "controversial."

Starzl, now sixty-four, was born in La Mars, Iowa, e small Midwestern town that touts itself as "the hog capital of the world." It seems fitting that its most famous citizen predicts that pigs will one day become humanity's transplant donor of choice, providing life-giving new parts for the endless stream of desperate patients who flock to the proliferating transplant units—most of which are modeled on the one Starzl opened nine years ago at the University of Pittsburgh. Although he has yet to transplant pig organs into human pa-

PHOTOGRAPHY BY PETE LIEPKE



"I operated on many of our HIV carriers, working next to some of my closest colleagues. In the course of doing liver transplants, we were drenched with blood and exposed to the virus for hours."

tients, he foresees the day when most of the organs we use to replace our own will come from other animals. That position is less shocking today than it was in the early Sixties when Starzl did his first xenografts, performing six baboon-to-human kidney transplants during the time he was teaching surgery at the University of Colorado in Denver. Before moving to Colorado, Starzl studied medicine at Northwestern University, then interned at the Johns Hopkins School of Medicine and the University of Miami.

Working on the edge of life and death, as transplanters do, is bound to create controversy—scientific, moral, political, and ethical. Every transplant surgeon faces such questions as: Should organs be harvested from living donors? Who should receive a new organ—the patient closest to death or the one who will make the best use of it? Should money be paid for organs? When *is* a patient really dead? Those questions are daily fare at any transplant unit. But as chief of the world's largest center at Pittsburgh, Starzl faces them in spades. He answered them all to his own satisfaction early in his career, although he later changed a couple of positions, then added a few issues of his own. When harvesting organs from living related donors was branded "cannibalism" by prestigious journals, Starzl performed them routinely. When such transplants became commonplace, Starzl not only stopped doing them but became a leading crusader against them.

After "required request" laws were passed, necessitating hospitals to ask the families of dying patients to donate their loved ones' organs, Starzl began advocating an even more aggressive approach to organ procurement. This is "presumed consent," a system practiced in some countries where surgeons routinely remove organs from any suitable brain-dead patient, unless the patient had legally stipulated he did *not* want his organs removed. And while major transplant units across the country announced they would not give transplants to HIV-positive patients, Starzl has operated on 25. "Providentially," he says with characteristic understatement, "I have not been infected."

Blessed with an elephantine memory and quick command of history, the tall, still lean and fit Starzl (despite many all-night surgical stints and more than occasional binges of deep-fried jelly doughnuts) offers a formidable debate to any challenger. He fights stubbornly for his positions, presenting long, well-reasoned arguments in forums that some associates wish were not quite so public. "People shrink in their chairs when he enters a room," says one young surgeon who asked to not be named. "He can be very intimidating, and they know it." Others describe him as a bully who dominates meetings or manipulates less mentally agile physicians into voting his way. Still others think he just likes to be contrary.

"It's the way he teaches," says former student Ruud Krom, now chief liver transplanter at the Mayo Clinic. "He says things that sound crazy and out of context. But they arouse your curiosity, and when you inquire or research what he said more closely, you find it makes more sense than you thought." Even foes credit Starzl with occasionally changing his mind on an issue about which he seemed intractable—but only when the science supporting the opposite position is unimpeachable.

In the end, however, moral and legal dilemmas are mere intellectual exercises, ancillary to the larger challenge. That's the one to which he returns early each morning when he visits patients on the liver ward at one of the four Pittsburgh hospitals where he operates. There he confronts again his true adversary, the human immune system, which works day and night to destroy the organs he has transplanted so carefully. In these wards Starzl usually appears in running shoes, slacks, and a windbreaker. At the bedside he is transformed from the moody Hotspur of the lecture hall or operating room into the very essence of human kindness. Next to his patients he becomes again the soft-spoken boy his mother raised in La Mars. —Mark Dowie

Omni: Who are your most memorable patients?

Starzl: I have a tendency to remember all of them.

Omni: It is said you can recall the names of patients by looking at slides of their livers.

Starzl: That's right.

Omni: How are you able to remember?

Starzl: How could I forget?

Omni: Some of your peers call you a "cowboy." Are cowboys necessary in medicine?

Starzl: Being from a part of the country where *cowboy* means something admirable, I do not mind being called a cowboy. I suspect, however, that the people who said that about me didn't mean to be complimentary. I've always thought what I was doing had high purpose, was humanitarian and completely logical given the information available. Time has only strengthened my convictions. The people I treated were doomed to an early death. They seemed to sense the genuineness of the efforts made for them. During the developmental period of my practice, I was never sued by a patient or family nor was there ever a threat to do so. I know of few physicians or surgeons who take care of extremely ill patients who've left the battlefield so unmarked

I try to teach others to understand as honestly as possible which diseases can be treated effectively and which cannot. That requires a constant reassessment of the available therapeutic tools, which are only partly surgical. Taking this attitude—I still tell my students—prevents self-deception. And the identification of worthless or even fraudulent operations becomes rather easy.

If examination of life-and-death alternatives is what cowboys do, and I know they do that on the farms and ranches where I grew up, I'd say, yes, cowboys *are* necessary in all important professions.

Omni: Did some incidents in your childhood presage your becoming a transplant surgeon?

Starzl: Being raised in a small town in Iowa has some virtues but also some limitations. Sometimes the two overlap. My early life pretty much centered around a movie house called the Royal Theater. Movies in those days—this was more than fifty years ago—did not have the realism of today's product. Sins were always punished, virtue rewarded. For a small boy it was easy to identify with warriors, kings, and healers. What you could not experience in a small town you could imagine. The imagination was more perfect than reality could ever have been. I may have invented role models larger than life. But I was exposed to medical role models through my mother's admiring eyes. Before she married she worked as a nurse for a surgeon in Sioux City [Iowa]. She had so much respect for surgeons. I seem to remember knowing even at age ten that eventually I was going to become a surgeon.

Omni: Why transplant surgery?

Starzl: I spent the summer of 1948 working as a copywriter at *The Chicago Tribune* and at night ran an industrial surgeon's office in the slums. I don't know if this specialty exists any longer. Probably not. In the Forties the large industrial concerns in Chicago had contracts with surgeons who maintained night offices but who worked themselves during the day. The night shifts were covered by medical students who carried out their duties without supervision. Today this would constitute such a liability risk that such an office would be closed down immediately.

When I returned to medical school as a sophomore, I kept the night surgeon's job. It was an exhausting schedule: the other medical students who shared these duties with me all came down with tuberculosis. I graduated in 1952 and chose to go on with clinical training. Toward the end of training, I was nominated for a Markle scholarship. That meant financial subsidy for five years. It was also an inducement to stay in academic medicine as opposed to entering private practice. I saw acceptance to be a moral commitment to stay in university work for the rest of my professional life. I spent several months looking for some broad underdeveloped field that would provide a lifetime of challenge—something difficult. At the time I was working in cardiac surgery, a relatively new field. But as open-heart techniques had already been introduced, it seemed to me the bloom was off that rose.

The two fields most enticing were oncology and transplantation. The latter was not really even a field at the time. In fact, it was widely conceived to be a biologic impossibility. In retrospect my decision seemed as naive as it would have been to announce my intention to walk on the moon. Nevertheless, I committed myself to transplantation and began working in the lab.

I hardly knew where to begin. That was a good thing, because I didn't have to bear the weight of an expert's misconceptions or pessimism. I honestly believed that transplantation could be accomplished. But somehow the immune system had to be controlled. I began developing immunosuppressive therapies, using multiple drugs or a combination of radiation with drugs that would arrest the rejection process. I always kept other interests, though—physiology, anatomy, neurology—for those times when I hit dead ends in my transplantation research. But I never really deviated from it for long.

"Transplantation will remain the nuclear component in the spare-parts field and won't be replaced by artificial organs, especially if it becomes feasible to use animals."

Omni: What were your most controversial operations?

Starzl: The kidney transplantations I performed at the University of Colorado between March 1962 and March 1964. Word quickly spread about what I was doing, and there was a barrage of criticism. Two patients received kidneys from their identical twins. Twenty-six and twenty-eight years later they are both still alive. This was not surprising in view of previous work with twins done in Boston. Forty-six patients were given kidneys from blood relatives, and among them the results were stunning for that time. More than seventy percent lived for more than a year, and even after ten years almost two thirds were still alive. Twenty-five years later, forty percent were still alive. Treatment was with one of the immunosuppressive cocktails I had developed in earlier research. Twenty-one additional recipients were given kidneys from nonrelated volunteer donors or from cadavers. Of this group only two are left. In addition, we carried out six baboon-to-human transplants. The organs functioned for a surprisingly long time—in one case, two months. All of the recipients of baboon kidneys eventually died.

But the whole episode was controversial. It flew in the face of the existing dogma that said transplantation was impossible. I believed then, and still do, that the effort was justified. The candor with which all this experience was made available to the medical profession opened a new field.

I never tried an operation I believed would not succeed. The concept of controversy was never on my mind. By March 1963 it seemed evident that organ transplantation was a practical enterprise. With my kidney record and five years of animal experimentation, I decided to proceed with the liver. Livers were unexpectedly difficult. It was four long years from the first effort to the first success in 1967. Liver transplants would remain controversial for seventeen years. That qualifies for the Guinness Book of Controversial Records. Would I do it again? If I still had the physical strength and force of character I was raised with, I would.

Omni: Is there anything you did in your medical career that you'd now advise young surgeons not to do?

Starzl: The night after I did my first kidney transplant, William Waddell, the chairman of the surgery department at Colorado, took me to dinner. I was thirty-five years old. No one outside our small group knew what we'd done. I will always remember with sadness the moment Dr. Waddell told me I'd climbed onto a tiger I would not be able to dismount from for the rest of my life. I wish I could have pursued medicine as less of a crusade than became my lot. I was not pursuing a personal career, mind you. It was the day-by-day obligations to my patients. They competed with my children for time and attention. Would I climb on that tiger again or advise younger surgeons to do something comparable? I don't know. Each young person will have to decide that without input from me.

Omni: Dr. Francis Moore, surgeon emeritus at Harvard Medical School, says the degree of human experimentation in organ transplanting has at times come close to abusing the Hippocratic oath. Do you agree?

Starzl: If Franny Moore said that, it's

news to me. In connection with our work, he's always been supportive. I can only tell you that my associates and I believe that we have upheld the Hippocratic oath assiduously. I am not Dr. Moore's pupil, although I would be proud of that distinction, because I regard him as a Socratic figure whose influence is universal.

Omni: Are transplant surgeons still exaggerating their results, as you suggested in the Seventies? Will the day come when they won't have to?

Starzl: It wasn't known until the late Seventies that the one-year survival rate for cadaveric kidney grafts was less than fifty percent nationwide. Transplant surgeons and dialyzers [kidney dialysis operators] were engaging in "lying contests," each group promoting its own deeply flawed method of treatment instead of delineating the shortcomings of its technologies and taking the necessary steps to correct them.

But failure is such a painful experience in this enterprise. And when patients die as they often do, it's difficult not to emphasize the good results and to obscure or minimize the failures. The most important articles I've written were tedious analyses of the reasons for failure rather than claims of success. My remarks were directed at the passive concealment of poor results. By making things look better than they actually were, the transplant field underestimated, even resisted, the need to evaluate new techniques and drugs like cyclosporine. Perhaps it's easier to take the "hair shirt" approach when a new technology is being introduced, as was the case with livers. Unfortunately, there were many who labored under the necessity of "establishing credibility." Perhaps my language was inflammatory. However, I did not believe that society demanded perfection. Only honesty.

Omni: How has AIDS affected organ transplanting?

Starzl: Almost no aspect of the donor or recipient process today fails to consider AIDS. For good reason. Incidence of the disease in all recipients of hearts and livers between 1981 and 1985, for example, was about two percent. Of course the majority of these patients were infected with blood transfusions at a time when AIDS screening of blood donors did not exist.

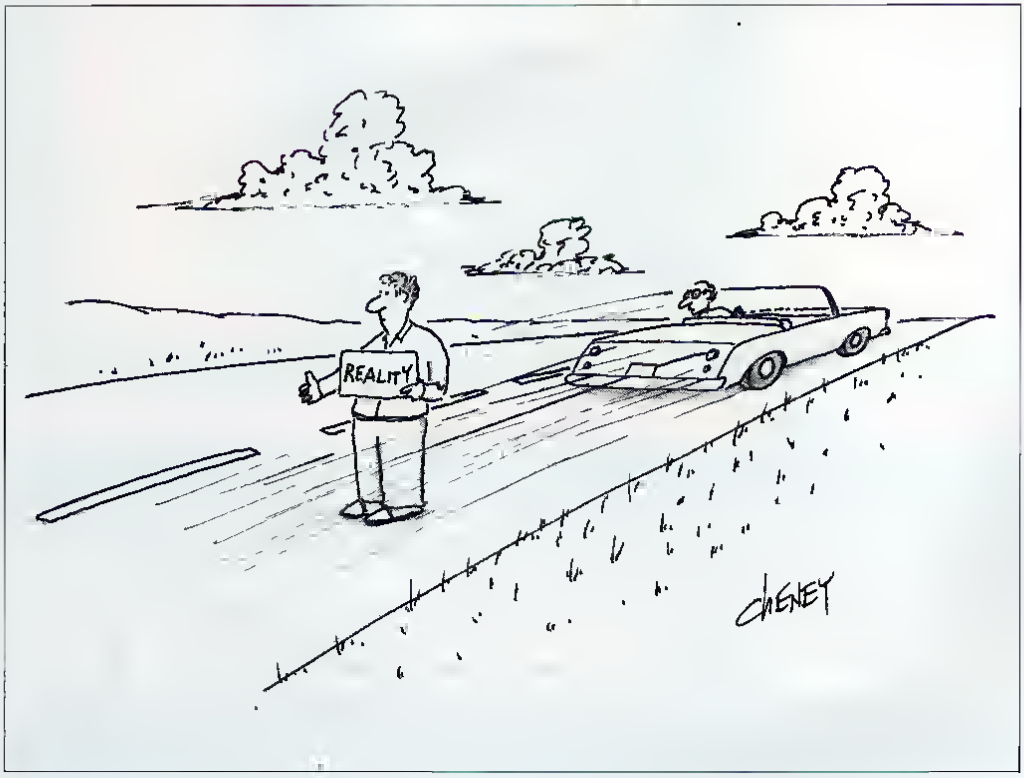
We test all our transplant patients for HIV but do not use the results as a means of exclusion. In fact, twenty-five of our transplant patients came to us infected with AIDS. Sounds like a lot, but they represent a tiny fraction of the thousands of transplants performed in Pittsburgh. HIV still constitutes a deadly reservoir. It's a miracle to me that no transplant surgeons have been infected to my knowledge. I operated on many of our HIV carriers, working next to some of my closest colleagues. In the course of doing liver transplants, we were drenched with blood and exposed to the virus for hours.

Omni: What is your stand on harvesting organs from anencephalic babies?

Starzl: An anencephalic newborn is delivered functionally dead. People have shrunk from using anencephalic donors because they may have brain stem function. Brain death criteria demand a cessation of brain stem function. Those criteria were evolved without the imaging techniques that have enabled us to see in detail the anatomic structures inside the skull. Nowadays we can determine with complete accuracy during pregnancy whether the higher brain is missing, as it usually is in a anencephalic newborn. The absence of a cerebral cortex means that the baby is doomed.

What's particularly unfortunate about the anencephalic controversy is the hypocrisy with which the situation has been handled. Usually an anencephalic newborn is kept on a ventilator for about a week. Then the ventilator is discontinued, heart allowed to stop beating, and the organs procured under conditions of urgency. This "staged" death approach deprives the whole proc-

CONTINUED ON PAGE 93



TEST YOUR ESP ABILITIES

We have devised a series of simple tests, conducted over the telephone, to help OMNI readers determine if they have an aptitude for ESP or PSI. Call now to test your own psychic ability.

THE OMNI TELEPHONE HOTLINE

900-886-6664

$2.00 the first minute and 75¢ each additional minute

The Intruders Foundation offers the very first nationwide help network for anguished UFO abductees

ANTI MATTER

UFO UPOATE

If you believe you ve been abducted by aliens, you may feel shaken and humiliat ed, with nowhere to turn But now all that can change The In truders Foundation (IF), launched recent ly by UFOlogist and best-selling author Budd Hopkins, offers the first nationwide help network for UFO abductees

Hopkins has been the patron saint of abductees for a dec ade After his first book about the abduction phenomenon, *Missing Time*, appeared in 1981, anguished victims kept contacting him for counsel He found dependable hypnotists and psychotherapists to work with them and even hypnotized many himself to help them remember their abductions But after the success of his best-selling book *Intruders* in 1987, he couldn t handle the load It was staggering, he says There were hundreds of letters I couldn t even respond to

Hopkins believes that IF will be the answer The not for-profit foundation, funded by donations and membership fees, plans to provide abductees all over North America with support Clerical personnel, says Hopkins, will make sure letters are answered promptly, and new members will have their names and vital information fed into a con tinuously updated computer bank Those needing psychological help will be referred to competent people who are experienced with abductees and often willing to work gratis IF will even prepare these professionals through conferences, personal training sessions, and a series of audiotapes and videotapes

Members will also get the newsletter *IF* four or more times a year The editor Pe nelope Franklin says the abductees' own stories will play a main part "Many abductees are isolated, she says "It will help them to know that others have gone through the same thing "

Jerome Clark, vice-president of the Center for UFO Studies, agrees that IF will play an important role "Some of these people are in bad shape, like rape victims," he says "The more information we have about them the more we ll help '

But Bill Ellis, a folklore expert at Pennsylvania State University who has studied abduction literature, doesn't believe that IF is positive at all Rather than performing a therapeutic service, he says, Hopkins s followers are constructing a new folklore "In many cultures, the 'terror that comes in the night is accepted as a common experience,' he says. "In Italy it is called the Momunia, and in Newfoundland the Old Hag But in Anglo American culture, the perception is considered too bizarre to talk about. The people who come to Hopkins, lacking the tradition to understand the phenomenon, may be inadvertently swayed to believe the group s unprovable abduction hypothesis " The danger, says Ellis, is that in dispensing a kind of folk psychiatry, a group such as IF will keep some people from the clinical help they really need Adds Ellis, "Less dramatic explanations will come out when the field attracts objective psychologists and folklorists who don t have a burning need to create a mythology for our time "—*MARK TEICH*

DISCOVER: ARKANSAS

The switchboard at the Jefferson County Sheriff's Department in Pine Bluff, Arkansas, was flooded with phone calls one evening last fall. Dozens of citizens insisted they were watching a glowing UFO. "We are obligated to investigate when we get a report like that," notes Sergeant Bernard Adams, who got a firsthand look at what all the commotion was about. While driving out to talk to an eyewitness, he spotted a mysterious round object hovering in the night sky.

"It looked like it had a haze or mist around it," Adams says. "It startled me. It would hover a bit and then, in the bat of an eye, it was gone. There were dozens of witnesses," he adds, including a couple of sheriff's department deputies.

Despite all the alleged eyewitnesses, Walter Andrus of the Texas-based Mutual UFO Network says his group has received no reports of UFOs visiting Pine Bluff. Opines Andrus: "I don't think it's anything to get excited about at all."

Technical journalist and skeptical UFO investigator Phil Klass agrees: "I haven't heard of this case previously and haven't investigated it, but the number of witnesses would suggest that it is *not* a hoax. And the fact that it was of long duration eliminates certain natural phenomena like a meteor fireball or reentering satellite debris. But that doesn't mean that Arkansas was visited by aliens from outer space." In fact, Klass points to a rash of similar multiwitness UFO reports in the southeastern United States in 1967 government investigators concluded those "flying saucers" were simply misidentified bright planets. Adds Klass, "There are prosaic explanations for at least ninety-nine percent of all lights in the night sky."

—Sherry Baker

ELECTRIC PEOPLE

The scene is reminiscent of a Victorian horror novel. On fog-shrouded London streets a young woman hurries home. It's dark and only the glow of incandescent street lamps guides her way. But each time she passes a lamp, it suddenly goes out, plunging the cobblestones into darkness.

What's going on? According to British paranormalist Hilary Evans, author of *Alternate States*, the young woman and others like her seem to be "upright human eels, capable of generating charges strong enough to knock out streetlights and electronic equipment."

Historically, Evans explains, "electric people" date to at least 1786. The most famous case is probably that of fourteen-year-old Angelique Cottin, whose peculiar powers caused compass needles to gyrate madly in her presence. To further studies in this largely neglected area of human interaction with the environment, Evans has founded SLIDE, the Street Lamp Interference Data Exchange.

Why focus on street lamps at the expense of more delicate circuitry like that found in laptop computers, for example? "Primarily," Evans says, "because more and more people who came up to me after lectures first mentioned street lamps. And it's fairly unambiguous. Either the lamp is turned off or it isn't."

Ultimately SLIDE will focus on all electrical interference effects involving a human agent, says Evans, but for the moment its goals are fairly modest. "To serve as a clearinghouse, or forum, for those who actually experience the phenomenon, as well as anomaly researchers who may be interested. Hopefully, the data will lead to more formal research efforts."

In the meantime, Evans has compiled a questionnaire to probe such issues as whether the phenomenon is conscious or unconscious and whether it is accompanied by specific emotions or events. For subscriptions to the data exchange, contact Evans at 59 Tranquil Vale, London SE3 OBS.

—Dennis Stacy

"Nothing is too wonderful to be true."

—Michael Faraday

"He loved the desert because there the wind blew out one's footsteps like candle flames."

—Lawrence Durrell

"The man who has no imagination has no wings."

—Muhammed Ali

"Taken as a whole, the universe is absurd."

—Walter Savage Landor

OSSIPEE TRIANGLE

When Ken Moak read a decades-old travel article about the countryside around Ossipee, New Hampshire, he was intrigued by a reference to a 'Mystery Pond" that locals believed was so deep it was virtually bottomless Moak, who researches anomalies in his spare time, started searching for more information 'I stumbled on indications that oddities cluster around this location," he says 'I call it the Ossipee Triangle "

Unlike the infamous Bermuda Triangle the Ossipee Triangle isn't associated with supposed supernatural disappearances of boats and aircraft But the area seems to have more than its share of unusual features For example, Mystery Pond, now known as Snake Pond, is one of several "kettle hole lakes carved by ancient glaciers And nearby are the remains of volcanoes at least 100 million years old

Moak also says he came across reports that a huge burial mound—now reduced to a small hill inside a golf course—was once located in Ossipee 'When it was excavated around 1800, between eight and ten thousand bodies were found buried in concentric circles People assumed the local Indians were responsible But this was not characteristic of that Indian culture Moak says "I suspect the mound may be related to prehistoric European burial practices and this could possibly be a Celtic site "

UFOs Moak adds, have also been spotted in the area There was a multiple-witness disc sighting at Province Lake about twelve years ago, ' he says 'And in 1977 something fell from the sky into a pond "

Moak may have had a paranormal experience of his own while exploring the Ossipee Triangle "I went into an abandoned house near Mystery Pond and felt the image of a hateful old woman,' he says "Some people think I saw a ghost, but I'm willing to say it could have been my imagination "

Moak admits that the abundance of oddities associated with the Ossipee Triangle could have a prosaic explanation "It could be a weird statistical anomaly,' he says 'Or it may be that if you look closely enough, you can find patterns anywhere "

—Sherry Baker

VISIONS FROM THE GREAT BEYOND

A curious aspect of the near-death experience, or NDE, is the prophetic vision that sometimes concludes it. After NDEers have left their bodies and traveled through a tunnel to the ' great light," they sometimes report seeing scenes of Earth's future These visions can depict earthquakes, volcanoes, meteorological disasters, and worldwide famine

In fact, the content of these visions is so uniform that University of Connecticut psychologist Kenneth Ring says they represent a collective need for planetary reform And many of the NDEers with whom he spoke specifically earmarked 1988 as a critical year But 1988 has come and gone and the earth seems as stable as ever So what happened?

The planetary visions Ring now says, should not be taken literally Instead we should consider them symbolic expressions of the "collective psyche of our time This psyche is generating images of death and regeneration, and the sensitive souls of our era serve as carriers In other words, NDE-inspired visions signal the need for a new cultural myth

—D Scott Rogo

ABOMINABLE SNOW JOB

Could the searches for the Abominable Snowman in the Himalayas in the Fifties have been an elaborate cover for spies investigating Chinese military and political activities in Tibet? Loren Coleman, a research associate at the University of Southern Maine and the author of *Tom Slick and the Search for the Yeti*, believes that some of them were.

Eleven separate expeditions were sent on the track of the mysterious yeti in 1959 and 1960 alone, just as the Tibetans were revolting against the Communist Chinese forces that had occupied their country since 1950, says Coleman. "The people who put these expeditions together may have thought they were on a scientific mission," he says, "but they could easily have been infiltrated by people who had spying as their main purpose."

In his book Coleman said that many of the cryptozoologists on these expeditions seemed to have what he calls "cryptopolitical connections"—links to the CIA and other intelligence agencies. The Soviets apparently thought so, too. An April 1957 *New York Times* story titled "Soviet Sees Espionage In U.S. Snowman Hunt" claimed that yeti hunter and Texas oilman Tom Slick was behind an effort to subvert the Chinese and free Tibet. Coleman's thesis is also bolstered by rumors that two members of the most famous yeti expedition—the one led by Sir Edmund Hillary in 1960—may have been investigating the launch of Chinese rockets from Tibet.

Hillary himself disagrees. He remembers seeing a strange object in the skies one evening but denies knowing about any spies in his expedition. "Never at any stage were we the slightest bit interested in spying on the Chinese," he says. The whole notion, adds a CIA spokesman, is "nonsense."

But others, including Daniel Taylor-Ide, a researcher who has lived and traveled in the Himalayan region for about 20 years, aren't so sure. "Given the perception of the world situation in the 1950's," he says, "it is plausible to me, having met some of the individuals involved in the yeti expeditions, that they had relationships with the CIA that may or may not have involved being paid for their information. The CIA had a policy of routinely debriefing people who went into remote areas."

William Leary, a professor of history at the University of Georgia and the author of two books on the CIA, wonders why the CIA would use the yeti search to mask its "extensive operation in Tibet." On the other hand," he adds, "they did some silly things back then."

—Patrick Huyghe

"I never know how much of what I say is true."

—Bette Midler

"What if everything is an illusion and nothing exists? In that case, I definitely overpaid for my carpet."

—Woody Allen

LOVE BUG

Noblewoman Maria d'Argona (1503–68) was famed for her beauty, brains, and standing in Italian Renaissance religious circles of the sixteenth century. Little did she know that her death might one day help us understand the evolution of infectious disease.

Recently paleopathologist Gino Fornaciari and his co-workers at the University of Pisa unearthed d'Argona's mummy in a Naples abbey. Examining the noblewoman's remains, Fornaciari found *Treponema pallidum*, the bacterium that causes syphilis, in a soft tissue ulcer on one arm. Says Fornaciari, "This woman seems to have had tertiary syphilis, most probably venereal in origin."

This finding is significant, Fornaciari says, because no one knows if the *Treponema* bacterium was the same 400 years ago as it is today or if it has evolved. To find out he plans to study the tissue sample and its DNA through electron microscopy. If there are differences, says Fornaciari, they will enable him to develop a model of the evolution of the bacterium. "This would be a general model," he says, "that could be applied to the evolution of all infectious disease."

—Paul McCarthy

"Each of us is a mobile museum. The fluid in our bodies is a perfect replica of that ancient sea in which we grew to fruition following our liberation from the clay."

—Lyall Watson


ROW ROW ROW YOUR BOAT
GENTLY DOWN THE . . .
DOWN THE . . .
HELP ME
STREAM
John O'Brien

CONTINUED FROM PAGE 40

Juba. "We don't know the effects of increasing the flow of the Nile or how that would alter the local traditional way of life," Jenness says. "The canal may take twenty-five percent of the water going into the Sudd," a diversion that would leave the already-depleted Sudd with even less water.

If the war concludes, pressure to complete the canal will grow. If the war continues, which according to Collins is likely, the unfilled 165-mile-long ditch is a zone of death full of decomposing animal carcasses—elephants and hippos, as well as the tiang and the extremely rare shoebill stork. Damned if they do or damned if they don't, though one thing seems certain. The pressures to exploit the Sudd (oil has also been recently discovered) may be so great that even a paradise no one wants to visit will disappear.

ECUADOR: SHOCK THE MONKEY

Deep in the Ecuadorean Amazon basin, in a region called the Oriente, is a lush rain forest where life goes on much as it has for thousands of years. To the small pockets of indigenous peoples, like the Huaorani tribe, the forest—their lifeblood—is a generous provider. Hundreds of plant species nourish them, protect them from malevolent spirits, heal them when they are sick, and offer them means for musical and artistic expression, in the form of bamboo flutes or berry dyes for decorating themselves for celebrations.

This is Yasuni National Park. Chosen by the United Nations Educational, Scientific and Cultural Organization as a UNESCO Biosphere Reserve, an example of a valuable and dynamic ecosystem, Yasuni is one of the last protected areas of the western Amazon basin—described by British environmental consultant Norman Myers as "the richest biotic zone on the earth."

Today, however, the very existence of the Huaoranis could be terminated, and the 700,000-hectare (1,730,000-acre) Yasuni could be destroyed, says Gustavo Gonzalez, a native Ecuadorean working with the Rainforest Action Network (RAN). The culprit: oil.

In the last decade, oil companies such as Conoco, a Du Pont subsidiary, and British Petroleum have identified great caches of crude in the jungle. Under the nation's laws, oil companies may, with the government's blessing, exploit large tracts of rain forest if they prove that the tracts will yield commercial quantities of oil. Although environmental organizations including the Corporación de Defensa de la Vida (CORDAVI) are challenging the legality of allowing an industrial zone in the national park (the case is before the Tribunal of Constitutional Concerns), the oil rigs are currently up and drilling in Yasuni.

The trouble, according to environmental groups like RAN and the Natural Resources Defense Council (NRDC), is Ecuador's apparent disregard for the rain forest and its peoples. In a study conducted for the NRDC in 1989, researcher Judith Kimerling reported that members of the Quichua tribe, living in an adjacent parcel of rain forest, suffered stomach and skin diseases when they used water contaminated by erosion from seismic searches, a common method of hunting for oil. And there are other problems. The gases emitted during exploratory drilling, says the NRDC, generate toxic pollutants, including carbon monoxide, carbon dioxide, and sulfur monoxide, which kill vegetation and create respiratory problems for people living in the vicinity of drill sites.

Long-term oil development dries out lakes, produces radioactive mud and other contamination, and creates potentially hazardous landfills, reports the NRDC. According to Kimerling, who still lives in Quito, Ecuador, leachate from the toxic landfills migrates into surface waters and drinking wells.

"Yasuni National Park, a lush rain forest deep in the Ecuadorean Amazon basin, is the richest biotic zone on Earth—but not for long. The oil rigs are up, the drilling's begun."

To botanists like David Neill of the Missouri Botanical Gardens, the loss of Yasuni constitutes nothing less than a tragedy. "The park is the last frontier for biological discoveries," he says. "Although it represents only two percent of the Amazon, it's the richest area as far as the number of species." The deforestation and contamination that will follow oil drilling in Yasuni, says the NRDC, will lay waste to some 4,000 to 5,000 flowering plants, many unidentified, 600 species of birds, more than four times that found in the ecologically diverse Galapagos Islands, and exotics like tigrillos, freshwater dolphins, harpy eagles, and giant armadillos.

The Ecuadorean government, however, dependent on oil for around 40 percent of its budget, maintains its right to the resources of the land. Since 1983 the government has conducted five international bidding sessions in which foreign firms—among them Texaco and Occidental—were awarded contracts covering more than 4 million hectares, or 10 million acres, of land. Under fire from environmental groups like RAN and CORDAVI, the government has pledged to require safe drilling practices, but it will not cease petroleum exploitation in Yasuni.

The oil companies insist that they will act responsibly in developing the Yasuni and minimize risk to plants and people. "We plan to cluster the well sites, ten to twelve wells in one clearing in the forest," says Alex Chapman, manager of the Ecuador Environmental Project of Conoco, the primary Yasuni concessionaire. "It will kill plants at the site. But animals will move out of the way. We'll identify species as we go along." He admits that "anything that will be spilled will go into the natural drainage system. You can't be out there without being near rivers." Not good enough, says the NRDC. "The companies' promises still fall far short of the minimum that would be legally required of them in the United States," notes Kimerling in the NRDC report.

As corporations and settlers carve out greater and greater chunks of the Amazon, Ecuador's stores of oil are running out, producing less revenue each year. Exports of petroleum accounted for only 44.5 percent of Ecuador's export earnings in 1987, down from 70 percent in 1984 and 73.4 percent in 1983. That leads observers like Neill and Gonzalez to wonder if the Huaorani culture will still exist when the oil is gone.

HAWAII: A GODDESS AND HER RAIN FOREST

"E Pele e! O goddess of the burning stones. Life for me. Life for you." In Hawaiian religious lore, gods and goddesses rule wisely over their islands' many volcanoes. Today, according to natives, one goddess, Pele, who rules over Wao Kele O Puna, a rain forest on the eastern slope of Kilauea Volcano on the big island of Hawaii, is very upset. The state government wants to build a geothermal steam plant in her rain forest. Pele's not happy, say her followers—and concerned environmentalists don't like the proposal, either.

Ninety percent of Hawaii's energy arrives in the form of imported oil. As further development of the big island is planned, plentiful, cheap, and clean power is needed. According to the nonprofit educational Geothermal Resources Council and the Pro-geothermal Alliance, a Honolulu-based consortium that includes True Geothermal, Mid-Pacific Geothermal, and Hawaiian Electric, geothermal is the answer. It's 13 times cleaner than oil, and, in the long run, it's a lot cheaper. According to

Dave Anderson the council's executive director, Iceland which switched fo geothermal in the Fifties and is now 95 percent reliant on geothermal power, pays about half what if would for oil One requirement to produce geothermal an active volcano like Kilauea

No way, say angry environmental protesters on all of Hawaii's five islands The major argumenf between the geothermal advocates and the conservationists seems to be whether Wao Kele O Puna meets the criteria of a rain forest The pro-geothermal forces say it doesn't The big island's tropical rain forest is only Class II or Class III, meaning there is already some nonnative plant invasion in the form of strawberry guavas and other foreign vegetation, according fo a Puna geothermal area biotic survey conducted in 1985 by Charles Lamoureux, a professor of botany from the University of Hawaii and a consultant for True Geothermal Class I is pristine wifh almost all native flora and fauna—lehua trees and the Hawaiian amakihi bird fhrive in these forests—and any diminishment of any native species lowers the classification to II or III

Anderson says the forest is already irreversibly contaminated and unreclaimable "Talk about nonnative plants—people are growing marijuana fhere" he says Dan Taylor, chief of resource management at Volcano National Park however, argues fhat the area "just has a weed problem Whoever says it's already ruined is full of bullshit Quote me on thaf"

Obviously, tempers run as hot as Kilauea s lava

There's also the question of whether geothermal power pollutes the air According to Annie Szvetecz Hawaiian campaigner for the Rainforest Action Network, hydrogen sulfide steam can escape into the atmosphere and cause irritation, respiratory distress and, in extreme cases even death An accident at a commercial geothermal exploration well in the Puna area occurred in the early Eighties Says Don Thomas, associate geochemist with the Hawaii Institute of Geophysics, "Vandalism caused the venting of hydrogen sulfide steam ' This contributed directly to five cases of asthma and other respiratory tract problems, according to Dr Thomas Green, an attending physician from nearby Hilo 'But many other doctors are seeing the same health problems ' he says "It s not like there are only five cases on this island '

Is the area geologically stable? According to Szvetecz, small earthquakes occur hourly on the site A major earthquake of 6 2 on the Richter scale was recorded last summer, leaving a 50-foot hole near the proposed site for the plant "Lest I forget to add ' she says "Kilauea is the most active volcano in the world How can you build anything there?" Yet according to Thomas, an earthquake in 1975 of 7 2 magnitude did not destroy a geothermal well drilled fhere at the time The system can be designed to withstand earthquakes and eruptions,' he says

Take your pick on one side geothermal energy, an obviously less pollutive source of power than oil or gas, on the other, one of our lasf rain forests, even if just Class II or Class III In the background, in her home of lava and fire, Pele fitfully rumbles Her vote is for the rain forest Hawaii has only fen left

BRITISH COLUMBIA LET THE RIVER FLOW

The awesome blue-hued glaciers of British Columbia's St Elias Range reach down to the edge of the Tatshenshini River, which flows from the Yukon through British Columbia and on info Alaska Mountain goats, grizzlies, and eagles share the deep-green spruce forests along the river valley This is the Tat no roads no people, no settlements A river rafter's dream, a fertile salmon spawning ground "They don't make wilderness like this anymore," says John Ball once a geologist for a mining company—until he came face-fo-face with the Tat "Two years ago I was dropped off by helicopter in the Taf Valley to explore for minerals,' he says "I looked down through the valley and saw a grizzly come off the ridges I remember what I thought *I'm here in this untouched beautiful valley and this really is the animals' valley I'm the intruder'* Now he puts his expertise to use for the Western Canada Wilderness Committee (WCWC), trying to save fhe valley from destruction by the indusfry that employed him

The threat to the bucolic wilderness is part of its bounty—vast deposits of copper buried deep in the Tat Valley too plentiful to ignore The Geddes Resources Company of Toronto plans fo build a $400 million open-pif mine to extract an estimated 165 million tons of the ore as well as stores of gold, silver, and cobalt "We're looking at somewhere in fhe top ten of the world's producers in terms of single mines," says the company s president, Gerald Harper Geddes has already gambled $30 million on the project to build an airstrip a road, and a driving tunnel into Windy Craggy Mounfain, which would be leveled for the pit If allowed to mine the mountain, fhe company would build a road along the river 104 kilometers, or 65 miles long, near grizzly dens and bald eagle habitats

Environmental groups like the Sierra Club Canada and the WCWC intend to stop Geddes in its tracks When sulfur-bearing rocks are mined and exposed to air and moisture, they oxidize and produce an acidic discharge Windy Craggy s wasfe rock—called the tailings—

would be dumped into a reservoir, behind a 100-meter-high dam. "The development of a copper mine releases massive amounts of sulfide," says Tom Cassidy, the public lands counsel at American Rivers, a Washington, DC–based organization pledged to preserving North America's rivers. "Once the bodies of ore are opened up they will remain a persistent source of pollution."

A major concern of conservation groups like the World Wildlife Fund of Canada and the WCWC is acid runoff into the Tat, which feeds into the Alsek River near the Canada–Alaska border and into major fisheries downstream. "It would destroy the river system," says Ken Lay of the WCWC. But what really worries environmentalists like WCWC director Paul George is that the mine sits on a major earthquake zone. (In 1958 a 7.9 magnitude earthquake occurred in the area; the 1989 San Francisco quake measured only 7.1.) "If the mine development goes ahead, the Tatshenshini would be under threat from an acid spill disaster for hundreds, perhaps thousands, of years," George says. "It's like putting a nuclear waste dump atop the San Andreas Fault."

Because the Tat region lies between two protected areas—Kluane Park of Canada's Yukon and the United States' Glacier Bay National Park and Preserve—the issue is of growing international concern. U.S. agencies, including the Environmental Protection Agency and the Fish and Wildlife Service, have expressed their opposition to the mine, and the National Park Service has urged the government of British Columbia to incorporate the valley into its parks system. "Our only hope is the United States," George says. "President Bush himself would have to request a joint commission to review the issue."

Yet Geddes remains undeterred. "We are proceeding," Harper says. "The land is zoned, and we have the right to build a mine there. And we're considering the concerns of the environmentalists." The company has promised to truck the mined elements by convoy, out of sight of the river and recreationists. As for the problem of acid drainage, however, company reports state simply, "Measures have been established to ensure there will be no impairment of water quality." The future of Windy Craggy hinges in part on an environmental assessment by the British Columbia government, one that the company fully expects to pass in early 1991. In June Geddes, which has already spent $1 million on environmental studies, was in the first stage of the review process. The company plans to break ground in mid-1991.

Conservationists are standing firm, ready to give Geddes as much grief as necessary. "We are a long, long way from the final chapter in the preservation of the Tatshenshini," Cassidy says adamantly. Ball, who gave up his career for the Tat, is just one of its ardent supporters. "It comes down to the mining people thinking of short-term profits and short-term jobs versus people thinking that this valley ought to be preserved as a monument to valleys across America—before man came."

PALAU ISLANDS: MILITARY MIGHT?

The Republic of Palau, a cluster of tranquil islands almost 4,000 miles west of Hawaii, is a study in contrasts. A hybrid of beautiful yet beastly qualities, it's an idyllic paradise like the islands of Yap or Pohnpei in Micronesia, as well as a showcase of American pop, perhaps at its worst. Its streets are dotted with minimarts and video-rental stores, and half of its workforce is employed by the government in U.S.-funded civil service jobs. Even so, in a constitution ratified in 1979, its rather cosmopolitan population declared itself nuclear free.

"Palau will buckle under the strain of troop exercises and the testing of explosives—decimating a neon-blue lagoon, sea grass beds, marine lakes, and rain forests."

Palau was occupied by the Japanese prior to World War II, when the United States took control and made it a trust territory—bestowing upon the people the benefits of U.S. economic aid and protection but taking away their right to govern themselves. At least four decades of foreign control have shaken Palauans loose from many, though not all, of their cultural traditions. Most Palauans supplement their diet of Budweiser (the islands' biggest import next to fuel) and Big Macs with turtle eggs and coconut crab.

Palau's natural assets, however, make it a Pacific paradise. Its neon-blue lagoon and spectacular coral reefs—teeming with 700 corals and 1,500 species of fish—have earned it designation as one of the seven underwater wonders of the world by CEDAM International (Conservation, Education, Diving, Archaeology, and Museums), a conservation and education group.

And Palau's got something else to recommend it: location. The republic lies just 600 miles east of the Philippines, where military contracts with the United States are due to expire next year. Along with Guam and the Mariana Islands, Palau, which currently receives about $20 million in U.S. aid each year, is considered a prime fallback site for a military base.

Unlike Guam and the Marianas, however, Palau is primarily pristine marine wilderness, its complex ecosystem constituting a botanical grab bag of rain forests, sea grass beds, marine lakes, caves, and coral reefs. These coral limestone and volcanic "rock" islands, as they are called, are home to plants and creatures found nowhere else on Earth. Exotic spotted shiny lobsters, gold-lipped oysters, saltwater crocodiles, and seven subspecies of giant clams frolic in Palau's lagoon. Within its 12 interior marine lakes, unique peach-tinted jellyfish intrigue divers and scientists alike—having slipped through the porous limestone from the ocean a millennium ago, they gave up their stingers and took up photosynthesizing.

A military base would turn this wonderland into a wasteland. "Because bases are huge industrial facilities, development would leave an irreparable imprint on the islands of Palau," says Jack Sobel, director of habitat conservation and marine protected areas for the Washington, DC–based Center for Marine Conservation. "Just building a harbor, having large vessels in the area, poses a threat for ships running aground. Military vessels carry a tremendous amount of fuel, so you always run the risk of oil spills. And a base would involve military testing—explosives and shelling—decimating the ecosystem. Within the islands' interior, rain forests would buckle under the strain of troop exercises and new construction."

Even after years of foreign domination, however, Palauans have proved themselves a mighty political force. In seven serial elections—the last in February—they stubbornly rejected a 'compact of free association' that would grant them limited self-governance and greater U.S. economic aid. The catch? The compact would also guarantee the United States 50-year access to the islands for military uses. At issue is the constitutional clause prohibiting nuclear materials on the islands, a clause that would have to be overturned if the United States wanted the islands.

"The Philippines served notice they wanted us out," says an anonymous State Department spokeswoman. "The President and secretary of state have both said we will maintain a Pacific power. We can't rule out the Palau Islands as a future military base."

SHIRAHO SEA, JAPAN: REEF OR MADNESS

The Shiraho Reef in the Shiraho Sea is special, really special, and the people

who live on Ishigaki Island, which is one of the southernmost islands of Japan's Ryukyu Archipelago. know it. So do the tourists who regularly fly in from Okinawa. Islanders call the Shiraho Sea by various names: Sakana Waku Umi (Fountain of Fish), Umi No Natake (Sea Fields), Inochi Tokeau Umi (Life Uniting Sea). They feed on the reef's abundant seaweed and fish, dry roast peanuts with its coral sand, and make tofu with its clean seawater. "The village was able to survive starvation during World War II because of that reef," says Tom Milliken, former director of the World Wildlife Fund in Japan.

But Shiraho stands out for another reason. It's alive. Unlike other reefs in the Ryukyu island chain, 90 percent of which are dead or in the latter stages of dying, Shiraho flourishes, enriching the lives of the island's rural population of farmers and fishermen.

Made of rare blue coral, an octocoral—there are eight tentacles per feeding polyp as opposed to the usual six—the reef is like a "magnificent primary forest," says Katherine Muzik, a coral specialist at Harvard University's Museum of Comparative Zoology, who lived on Okinawa. The 8,000-year-old coral reef ecosystem supports a mesmerizing array of sea life—130 other corals as well as hundreds of fish and crustacean species. Even the endangered green sea turtles still lay their eggs on Shiraho's beach.

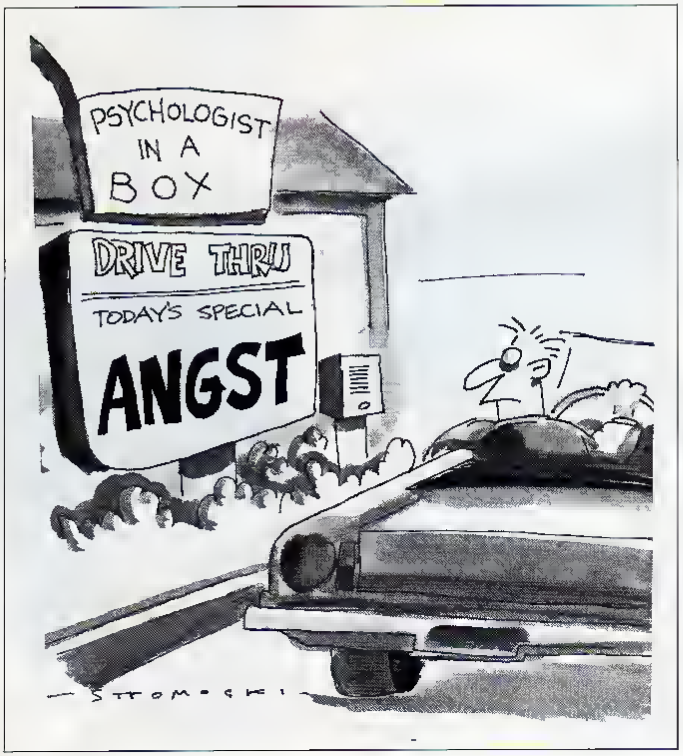
The splendor of Shiraho, however, says Muzik, appears to be lost on the Japanese government. In 1979, angering conservationists from Europe to Australia, the government claimed the reef for an airport runway, one that would allow jumbo jets to land on the island. The international outcry that followed, including appeals from such notables as Prince Philip and Jacques Cousteau, forced government officials to delay and eventually modify their proposal. Last year local authorities announced plans to move the runway 500 yards away from Shiraho's lagoon. To residents and environmentalists, the revised proposal is as ludicrous as the initial plans. But the government remains undeterred and expects to begin construction next year.

To bolster its position, the government issued an environmental study of Shiraho in 1988, says Muzik. The report denied any threat to the reef and its astonishing diversity. In response, the World Wildlife Fund and the IUCN produced reports of their own. Their findings differed dramatically. Construction debris will suffocate the pristine coral.

"The corals get eighty percent of their food from sunlight and if their tentacles get clogged up with sediment they'll die," says Don McAllister, research curator for the Canadian Museum of Nature, who participated in IUCN field surveys of the area. "It would take just one day's construction work next to the reef to kill the coral off, to cover them with silt." Without the coral to provide a buffer to currents, Shiraho's beach will erode, he says. And the island stands to lose the reef's natural protection against storms, "especially typhoons," says Stephen Edwards, head of the IUCN's species conservation program.

Because large jets can't land on Ishigaki's small airstrip, local officials claim the enlarged airport will bolster tourism, filling government coffers and creating jobs in one of Japan's most depressed regions. "The government is promoting tourist traffic," says Mary Donnelly, staff biologist of the Center for Marine Conservation. The new facility purportedly will allow a million and a half visitors annually to fly from Tokyo.

For the moment, the blue coral lives, awaiting another round with the formidable force of Japanese will. "Japan has never had the concept of limitation," Edwards points out. "Whatever they need, they go out and get." But airport opponents are counting on another facet of Japanese character, the concept of face. "The fact that the Western world is so aware of what's going on," Edwards says, "could break the government's resolve."



LAKE BAIKAL: THE INDUSTRIAL REVOLUTION

Deep in the Siberian forests where Barguzin sable roam wild and winters reach 40 below, sits the oldest, deepest, and one of the largest lakes in the world. While ordinary lakes are no more than 30,000 years old, Lake Baikal has been around for 25 million years. (Second is Lake Tanganyika in East Africa, at 2 million.) Baikal's size, more than a mile deep, makes it a receptacle of a whopping one fifth of the earth's fresh water. Not just fresh, pure, drinkable water, as pure as distilled. Drivers use it to fill car batteries.

In some spots you can see through the meter or so of ice to a depth of 40 feet, says Rein Ahas, a geologist at Tartu University in Estonia. Eighteen hundred species of wildlife and vegetation thrive from the surface all the way to the lake floor; three quarters of them are not found anywhere else on the planet, according to Mark Sergeyev, author of *The Wonders and Problems of Lake Baikal*. Says ecologist Jim Green, "Lake Baikal is without question the most scientifically interesting lake in the world."

But not for long. Lake Baikal is in trouble, says professor Charles Goldman, an expert on lake ecology. And Grigori Galazy, director of the Ecological Museum at Lake Baikal, agrees. The Baikal seal, the world's only freshwater va-

riety says Goldman, is getting distemper in alarming numbers. Ecologists such as Goldman and Galazy think it's from pollution, though they're not sure exactly what the pollutants are. And a thin oil slick from the 10,000 or so motorboats using the lake now spreads eerily over the waves, another worrisome sign, especially as the nation protecting Baikal is itself awakening from an environmental Stone Age.

The major pollution is from the heavy industry introduced by the Soviets in the last 30 years. Though the lake can clean itself to a point, a battery plant on the Silenaga (opposite the outflow end of the lake), still dispersing pollutants, and a giant paper and pulp mill erected at Baikalsk on the southern end of the lake, still dumping in tons of bleach, are taking their toll. A dam and power station on the lower Angara River, the only outlet of the lake, have already raised water levels almost three feet, causing serious chemical changes in the lake's entire northern section. And oil tankers daily unload their hazardous cargo into flimsy tanks lined up right on the shore—this in a region notoriously prone to earthquakes: as many as a thousand small quakes occur each year, some of which reach five points on the Richter scale. An 1861 earthquake is estimated by Sergeyev to have measured 11. "One oil spill will kill the lake," says Andrea Stolowitz, a recent visitor through the auspices of the Baikal Foundation, a grass-roots organization founded this year.

The real problem, Goldman insists, "is that the Russians have little experience with cleaning up or preventing pollution." Ask a huge, inefficient bureaucracy to police itself and you ask for disaster. If it occurs on the "great flame" (*Baikal* in Mongolian), it will be on a par, says Goldman, "with a major portion of Earth's rain forests all suddenly lost."

Impassioned supporters like Stolowitz, Galazy, and Goldman and a lot of luck will be required to keep Earth's most remarkable lake clean and pure.

THE ARCTIC: CRUDE AWAKENING

Near the top of the world, on Alaska's northeast slope, you will find, according to the Audubon Society, "the American Serengeti," a 1.5-million-acre tract of coastal plain. Each spring more than 180,000 Porcupine caribou (so called because of their proximity to the Porcupine River in Alaska) migrate to this remote Arctic wilderness. Traveling as many as 350 miles from places as far away as Canada's Yukon Territory, the caribou crisscross the tundra—their migration has been compared to that of the wildebeests in East Africa—in search of this narrow coastal strip, where they insist on bearing their calves.

Today a bill is pending in Congress to allow oil and gas leasing along this last unexploited stretch of Alaska's 1,100 miles of Arctic coast. "The Department of the Interior asked that this area be opened to development," says Joseph Lastelic of the American Petroleum Institute, the major trade association for the domestic oil industry. "Besides, there's nobody on that land."

Not many people, true. But according to the Alaska Coalition, a group devoted to protecting Alaska's environment, this 25-mile-wide by 125-mile-long strip of tundra is the center of wildlife activity for the 19-million-acre Arctic National Wildlife Refuge, adjacent to the plains and protected by the Alaska National Interest Lands Conservation Act of 1980. Aside from the calving caribou, populations of moose, Arctic foxes, and musk-oxen, plus snow geese and tundra swans—about 165 mammal and bird species in all—use the coastal plain to nurse and feed their young.

The protests of the Alaska Coalition and the Audubon Society were having little effect in March 1989, when the bill was speeding toward Senate approval, but the *Exxon Valdez* disaster in Prince William Sound quickly changed all that. The bill was shelved indefinitely. The House passed a bill last November, however, that holds companies liable for spills and establishes a $1 billion fund—financed by the industry—for cleanup. Randy O'Brien of the Wilderness Society, a public-lands conservation organization, says, "The oil lobbyists will now state they've paid their dues concerning the environment." O'Brien expects the reintroduction of the original bill (for oil development of that area) sometime next year.

Not if the Audubon Society and Meryl Streep, who narrated a TV documentary on the subject, have their say. According to an Audubon press release, a 1986 report by the Department of the Interior predicted oil leasing could cause a "major decline" of the Porcupine caribou herd. The estimate: as many as 72,000 animals lost.

These arguments don't even take into account the subject of spills. Here tempers flare and hyperbole soars. According to Brian Vincent, public lands coordinator of the Audubon Society, "The entire eight-hundred-mile Trans-Alaska Pipeline is pitted with rust after just thirteen years." (The industry assured structural integrity for at least 30 to 40 years.) "And we're talking about the last intact Arctic ecosystem in the whole of the United States."

Counters Lastelic, "We have said consistently that we need to develop the Arctic Refuge for our country." The *Exxon Valdez* may have put a crimp in what we need for our country. ∞

Reported by Rebecca Norris, Shari Rudavsky, and Steven Scott Smith

TATTOOED MEN

CONTINUED FROM PAGE 64

ing, until the Asian explained, "You draw. All time you coming here, taking piece of paper, draw picture."

"I don't believe you," he said, appalled.

"Don't give one shit."

He went home after that and stared at the wall. Gradually he recalled the incident, dredged it from the back of his mind, where he had tried to bury it, along with all the other nightmares from the jungle. The VC he had burned in the cave. The corpse had had tattoos on the arm, like those that were appearing on his own body. Little squiggles and shapes that looked as if they had been copied from the decorations on some pillar in a snake temple. Phil had been with him on that patrol. They had talked about it, amongst themselves. Phil had guessed they were some kind of religious markings—symbols as ancient as Vietnam itself.

"Used to be called The Country of Tattooed Men," Phil had said.

"What did?"

"This place—Nam. Three thousand years ago it was the kingdom of Van Tang, The Country of Tattooed Men."

Phil had been his lieutenant. Phil was his best friend. They had gone to college together, and he had rejected a commission just so they wouldn't be split up. They had got through their year of hell; they had come home together. Phil had let him stay in his apartment while he looked around for a place of his own. Only three weeks after they had been back, Phil was murdered, stabbed to death on the subway by a person or persons unknown. They had stolen his watch and rings and three dollars from his wallet. A whole year in Vietnam, with shit flying through the air cutting down American soldiers here, there, everywhere, and Phil had made it through alive. Made it through to be carved like a piece of meat on the subway, by some bastard who wasn't satisfied with a war in Asia; he had to start one in New York.

After walking around the park, staying away from the trees (I always stay away from the trees these days), I took a cab to Brooklyn, to the address on the letter he had sent me. I went up the back stairs of some sleazy building to knock on a door. He let me in.

"You remember me?" he said.

"I remember the time and place the event," I said. "If you say you were there, I believe you."

"I was one of the patrol—me and Phil—only Phil's dead now. They're probably all dead, except you and me."

I stared at him. He was wearing boots, combat jacket, and a longshoreman's hat which covered even the back of his neck. Only his hands and face were visible. Even on these parts the tattoos covered every square centimeter of skin. His coat collar was up and buttoned. The woolen hat had been tugged right down, covering his ears. On his cheeks, nose, and around his mouth and eyes were strange markings: centripetals, whorls, spirals. The individual lines seemed to follow the natural contours of his features but, when you looked more closely, deviated sharply in places and broke the basic structure into shapes and shadows which might have resembled leaves, blades of grass, pieces of tree bark. It was like looking into a still pool that reflected the light and shade thrown by overhanging foliage.

"You remind me of a picture I once saw." I said to break what was becoming an embarrassing silence. "An artist's impression of Queequeg—from *Moby Dick*. The tattooed cheeks—" I believe my attempt at lighthearted banter fell flat. I recognized no change of expression in the eyes. The eyes were my only link with reality, as the rest of his features shimmered and broke, scattered and reformed.

"He was just a disembodied voice in the trees ahead. His clothes lay on the ground in crumpled heaps. My skin was crawling, and when a twig cracked, I almost screamed."

"I'm bald underneath this," he remarked, meaning his hat. "Bald and tattooed. I don't shave it, I pull 'em out, like the Indians used to. It hurts but it means I don't have to do so much." He paused, then added, "I told you about these in the letter."

"You said you had collected tattoos, like the corpse we saw in Nam."

"Yeah. You—you bring the photo?"

I nodded, removing an envelope from my pocket. He grabbed it eagerly and extracted the photograph. It was one of the pictures I had taken of the burned Vietnamese at the cave.

"Yeah, that's him," he said in a satisfied tone. "Hey, look." He pulled up his sleeve to reveal an arm covered in colored ink symbols. It swam before my eyes. "Look. I got it right. Can you beat that? I did it from somewhere in here." He tapped his head. "Got them exactly right, without even thinking."

He had indeed copied the symbols accurately. They must have been printed indelibly on his subconscious. Something had triggered him into transferring those characters from his mind to paper and thence to his body. You could say he'd been tattooed a long time ago, internally, and the marks had only just worked their way through to his skin.

"Where did the rest of them come from?" I asked.

"Eh?"

"Well, you only had an arm and part of a chest. What did you cover the rest of your body with?"

"It's a pattern," he replied, looking up from the photograph. "It repeats."

"Oh."

"You ready now?"

"Let's go." I said. His letter had explained. He wanted me to take photographs of him against a background of grass or trees or rock, some natural environment. We took a cab to Central Park. On the way over, careless of the inquisitive cabdriver who continually glanced in the rearview mirror, there was talk of the discovery.

"It came to me one night," he said, "in the early hours. The point man was a trigger-happy Cajun with eyes like an eagle. He shot at mist, ferns waving in a breeze, a leaf falling from the sky, but I never knew him to be wrong. We always got a body count when that guy pulled the trigger. What was he firing at that day? I asked myself. I remembered we asked him then, and he said, 'Smell—I smelled this shadow.' This guy was used to hunting in the half-light of the bayous, back home. He was the best point man I ever knew. 'Did you see anything?' we asked, and he shook his head. I thought to myself, *Man, if that Cajun didn't see him, then the gook must have been hiding inside a tree.* Then it came to me—"

We arrived at the park. It was coming on evening, and most office workers were on their way home. There were people in the park, but he managed to find a spot in the trees where we were alone. It scared the hell out of me. It was the same area where the vigilante killing had taken place. I wanted to get it done, get it over, and go back to The Roosevelt.

He began to undress, and as he did, he talked while I took pictures.

"The perfect camouflage," he said. "Those guys in ancient Nam, they had it all worked out. They must have spent a *lot* of time getting this right. Perception. That's what it's all about. You look, it's there, but you don't see. That VC we burned—he must have found it in some old book, or maybe a picture on a cave or temple wall."

"Maybe he wasn't even NVA?" I said, the camera clicking rapidly.

"Could be, could be. Anyway, he had the secret—the secret of perfect camouflage. Early on in history, rulers of those ancient kingdoms—they must have used such men—assassins. And now me, I know. I think it only works if the *whole* body is covered—a piece of it, an arm or a leg, well there's an *effect*, but not the complete camouflage, not the blending into the background so perfectly that the tattooed man is no longer visible to the naked eye. You remember some of those snakes in Nam? How you wouldn't see them before you trod on them, even though you were staring right at them? Well, this is even *more* effective. It disguises movement, too. The artists who invented this must have perfected it over centuries, maybe even thousands of years. They must have studied the creatures of the forest, made a science of light and shade, the delicate balance between mark and space—hell, they were geniuses. Can you see them? Those Stone Age people, distilling the dyes out of flowers and leaves and scouring the rivers for different colored clays, testing this and that, until one day *bingo*, the perfect hunter...."

By the time he had finished talking, he was just a disembodied voice somewhere in the trees ahead of me. His clothes lay on the ground in crumpled heaps. I took photographs of nothing but trees. My skin was crawling, and when a twig cracked somewhere to my left, I almost screamed. As it was, I jumped back about two feet, scared out of my wits.

Are you still there?" I don't know why I whispered it, but I did.

There was no answer. I tried to watch the lengthening shadows for signs of movement. He couldn't change the laws of light and darkness. I watched for a flicker, the dark shape of a man on fallen leaves, but could not be sure of anything. Then something caught the corner of my eye, making me jump again, but it seemed to be the wind running over the grass. My heart was racing so hard, pumping my blood so fast, if I wasn't careful I would start to see things that *weren't* there.

I recalled the rest of the article about the vigilante who had killed the rapist in this park. None of the witnesses had seen the assailant. There had been a presence, but sensed rather than seen. A wraith, a phantom, visible only as a fleeting shadow moving through the evening. It suddenly occurred to me at that moment that perhaps there were only two people left alive who had witnessed the incident involving the tattooed man at that Vietnamese cave. Surely, if I was the only one who knew, then I was a danger to him? Just then I felt warm air on my cheek. I could smell someone's stale breath. I turned and ran from the place, yelling like a maniac at the top of my voice, *"Don't do it, don't do it, don't do it."*

When he joined me again, on the edge of the park, fully dressed, I had recovered my composure.

"That was a stupid thing to do," he said, but with a twisted smile on his face, as if it was the first amusing thing to have come out of all this.

"Let's put it this way," I answered, feeling foolish. "It doesn't matter whether the cause is scientific or supernatural. I'm not used to seeing men disappear before my eyes."

He grunted, then reached inside his combat jacket and produced a notebook. He handed it to me.

"What's this?" I asked.

His eyes looked black and cold.

"My diary. You'll find all you need in there when you write the article."

"The—article?"

"Yes, but leave it for a month. It'll be a bigger story by then."

"I see," I said.

"No, you don't," he snapped. "Not yet, you don't."

We walked out of the park, into the river of humanity on the sidewalk. Before he left me there, he took my arm

in a strong grip. The New York traffic flowed past us, the noise and bustle of the city was all around. People began to jostle us as we blocked their way.

"Listen," he said, "what do you think of the new President's idea—the military advisers for Thailand?"

"What do *you* think of it?"

He stared upwards, to where the buildings fought for light and space in the dying sky.

"I've got an eighteen-year-old son at college," he said.

Feeling more secure amongst buildings, with people around me, I threw in my accusation. "So you're going to kill the President, like you did that rapist?"

His reply was completely unexpected. "We've decided that probably won't be necessary," he said. Then he was gone, hurrying along the sidewalk. I watched the knitted hat until it was out of sight, then took a cab to my hotel.

When I got back to my room, I took out the diary he had given me. It told me very little I didn't already know. It certainly didn't expand on that shocking plural he had thrown at me as a parting shot. "We've decided..." *We?*

That night I went out and got drunk.

The next morning I hired a darkroom and developed the photographs I had taken in the park. I stared at the prints for hours, in all kinds of light and found nothing but trees, grass, and shadow. Plenty of shadow. He was in there somewhere, but I couldn't see him and I doubted anyone else could either.

I suppose he wanted me to publish them, along with the article I had promised him, but how the hell can you prove that you've taken pictures of an invisible man? You could see him in his half-dressed state, a tattooed man climbing out of his clothes, but once they were all off, he was gone. I suppose it's a bit like putting a red scarf around a tiger's neck and having him stand in his natural environment. The piece of cloth helps you locate the beast, and you can perceive its shape, even against a background of shadows and foliage. It's when you don't know precisely where to look and what shape to look for (upright, prone, crouched, supine, curled?) that the camouflage works its magic.

And this was not nature's attempt at camouflage—like the tiger's, or better still, the woodcock's markings—this was the result of a science, or perhaps an art, perfected by man. The vet's tattoos were to a tiger's stripes as rocket engines are to sea gull's wings.

I packed my bags, intending to return to California as soon as possible. Or perhaps I would go back to Britain for a while? *Anywhere* that was a long way away from Washington.

I thought about ringing the police but changed my mind. The police may or may not have believed me, but certainly the media would then get hold of the story, and they weren't so fussy. They loved such stories: tattooed men, invisible assassins, vigilante killers, threats against the President. Putting aside fears for my own life, if it became public, there was the possibility of the story becoming stretched to include such things as *the presence of Vietnamese agents in New York*—and—*hypnotized veterans triggered to kill*. I could see the headlines. MANCHURIAN CANDIDATE LIVES. The President would have his proof, and anyone with Asiatic features would be unable to walk the streets.

I was going to have to forget what I'd seen or, rather, what I had *not* seen, and go back on my promise of publicity. The arguments I used to defend my position were quite flimsy. I was a photographer. I recorded events, I did not interfere, I did not take sides. I was like a priest or a lawyer, or a doctor. I maintained client confidentiality.

I had been stupid to come. He had been stupid to ask me. I suppose the Vietnam bond was still strong, or he never would have, and neither would I. His idea of reality must have undergone severe alteration in the past few months, and perhaps he had needed to test its authority on someone who had been there, experienced the same incident. My own idea of reality was now crumbling. Something was beginning to seep through its layers: the thought that perhaps he was not the only one. It was a long war with many untold incidents. Maybe our experience was not unique? In any case, there was nothing to stop him passing on his secret. "*We've decided that probably won't be necessary.*"

I don't know how many of them *are* out there, moving silently, unseen through the forests and fields. Perhaps only one, possibly a thousand. More. It could be that there are so many they have taken over the areas outside the towns and cities, within the parks, that the open land has become a subworld beyond our control. There's no way of knowing. To take the extreme, it might no longer be a case of saying that there are tattooed men in the country, but rather the reverse—that *we*, we are in the country of tattooed men.

Something happened yesterday—something momentous, extraordinary. I haven't seen a newspaper for several weeks, or heard the radio, or watched television—not since I left New York. I know something happened because it's in the air, like the buzzing of a million flies. The footsteps outside have an urgency about them. The people in the streets are hurrying, faster than usual, as if they should be somewhere else.

There are cries reaching out for my ears that are never quite heard.

I have no plans to investigate this phenomenon. OMNI

DEAN OF PSI

CONTINUED FROM PAGE 46

had an obligation to seek scientific proof, either for or against. If was clear that no junior faculty member could risk a project as flaky as this one. Only someone as senior as Dean Jahn could wangle permission from a university administration that was reluctant to say the least. Indeed, to ensure that the research was up to scientific standards—and to give Jahn pause—the university created an overseeing committee of top administrators.

But Jahn did not pause at all. Instead he hired Brenda Dunne, a developmental psychologist from Chicago, the first psychologist the engineering school had ever hired on its research staff.

Dunne, who has smooth skin, gray-streaked hair she wears in a braid, and an unnerving ability to raise one eyebrow at a time, had first become interested in psychic phenomena in college. Her intellectual curiosity was aroused not by psychokinesis but by remote perception experiments like the one Jahn had carried out from the comfort of his bedroom. At first Dunne explains she had been a skeptic. *I can't take this seriously*, she remembers thinking. *It's beyond imagination.* Then I said, Why don't I just try a little experiment? The following Sunday while folding laundry, I tried thinking of somebody I knew and tried to imagine where she would be at five o'clock. Almost instantaneously I had this image or feeling that this friend of mine was walking in the forest preserve. She wasn't the forest preserve type, I said. Well, I didn't do it right. About twenty to five my doorbell rang. This friend of mine was standing in my doorway and she said, 'I'm going stir-crazy. I was thinking it might be nice to go over to the forest preserve and take a walk. Would you like to come?' My jaw dropped and I said, Oh, my God.'

Dunne's sense of wonder helped her transform Jahn's basement room, an old storage area, into a lab. A warren of five small offices lies behind a door unmarked but for the faded outline of a Greek psi, the symbol for psychic phenomena, which Dunne removed when someone pointed out its resemblance to a devil's pitchfork.

In the lab's main room are a worn Indian rug, a coffee table made of rough-hewn wood, and a comfortable orange couch. "User-friendly is the idea," says Dunne. The lab houses about as strange a mix of researchers as can be found under one roof: an astrophysicist, electrical engineer, aerospace engineer, developmental psychologist, and an experimental psychologist. The lab's $250,000 annual budget comes mainly from a foundation set up by the late

James S McDonnell, Jr., a founder of the McDonnell Douglas Corporation and a Princeton alumnus.

The lab works in two areas: remote perception, like Jahn's experiment with his colleague in Paris, and psychokinesis, similar to the experiments Jahn's bright student performed with an electronic coin flipper. In the lab's remote perception experiments, one person attempts to perceive something about a place where a second person has gone and "immersed" himself for at least 15 minutes. That place may be thousands of miles away. All the immerser is told is to "share" his experience with a perceiver, who most of the time hangs out back at Princeton.

The person doing the perceiving writes a description of his impressions. In the 336 trials that have been run, the descriptions range from hauntingly accurate to total misses. The target site in one case was the railroad station in Glencoe, Illinois.

The perceiver described this scene: "I see a train station, one of the commuter train stations that's on the expressway, getting the image of a sign, but I think it's probably the sign of what station it is. There are about eight or ten letters in the word. Maybe something like Clydeburn or Clayburn." One difficulty of this type of experiment is that it is tough to distill lengthy impressions into data that someone can sit down and number-crunch. At PEAR the person who immerses himself in a scene and the person who tries to free his mind and perceive it both answer 30 yes–no questions. For instance, the questionnaire asks whether the scene is indoors, whether it is confined or expansive, and whether people or animals are present. When these responses are analyzed, it becomes clear, say Dunne and Jahn, that the percipients somehow collect, on the average, 15 percent more information about the target site than could be expected if they'd guessed at the answers. That extra information appears no matter how far apart perceiver and sender are in time or space.

"When you observe these results for yourself," says Dunne, "they can keep you up nights. Either you have to totally ignore them or they bring into question some fundamental aspects of time and space."

One aspect of Jahn's remote viewing work that has been particularly open to criticism is the fact that the two people—the perceiver and the sender—are generally either friends or acquaintances. For instance, George Hansen, who has done remote viewing research himself, notes that when perceiver and sender know each other, the perceiver may know something about the type of site the sender would choose, or the types of details he would pick out in a site chosen at random. This, claims Hansen, skews the odds. "If you know a friend is a horny guy and you know he looks at girls," says Hansen, "then you can sit back and think what he's going to be looking at are women." As a result of this criticism, PEAR spent the better part of a year examining every perceiver–sender team that had done at least five experiments together. The impact of such associations was negligible. Dunne concluded: "far too insignificant to account for the overall effect." Indeed, explains Dunne, at PEAR most of the remote perception experiments are precognitive, which means that most of the time a person is trying to perceive a target site before the acquaintance has even arrived. Thus the experiments set out to transcend space *and* time.

The lab's experiments in psychokinesis, on the other hand, attempt to investigate the capacity of the mind to engage the here and now. The research depends on random number generators to flip electronic "coins." The sophisticated random number generator used in Jahn's lab today goes through about 200 "coin tosses" per second. A typical session includes either 50 or 1,000 such trials, taking either one minute or ten. The new machine is so rapid, in fact, that the PEAR lab can collect more data in an afternoon than early psychic phenomena researchers amassed in their entire careers.

> *"Five small offices lie behind a door unmarked but for the outline of a psi, which Dunne removed when someone pointed out its resemblance to a devil's pitchfork."*

The PEAR random number generator—about the size of a personal computer—sits on a table in a room that doubles as a work space for York Dobyns, a thoughtful young astrophysicist who did his Ph.D. dissertation at Princeton on the development of galaxies. Dobyns first came into contact with PEAR while volunteering as a subject for experiments, something he remembers well. "What kind of crazy people does it take to sit in a room and stare at a box for an hour at a time?" he thought. In its ten years, PEAR has accumulated more data on psychokinesis than any other group in the country. According to published reports, when 33 operators doing 750,000 psychokinesis trials (at 200 coin flips per trial) sat in a room, stared at a random number generator box, and thought high, the average number of heads was slightly higher than when they thought low: 100,037 versus 99,966. (The possibility of this occurring by chance is 1 in 5,000.)

What this means, says Jahn, is that when an operator wanted a head, the probability of a coin landing heads up was not 50 percent but 50.02 percent. The effect was small, but as Geoffrey Watson, a professor of statistics at Princeton, says: "If you believe it, then you're talking about nothing short of the overthrow of modern science."

Moreover, the data showed that this effect was not limited to a few gifted operators but was a capability shared by all operators and, by inference, all people. Most operators produced results so individualized and reproducible that the researchers called them "signatures." With these results in hand, Jahn turned to the next question: Can a mind influence something more substantial than a microelectronic pulse, something, say, like a ball?

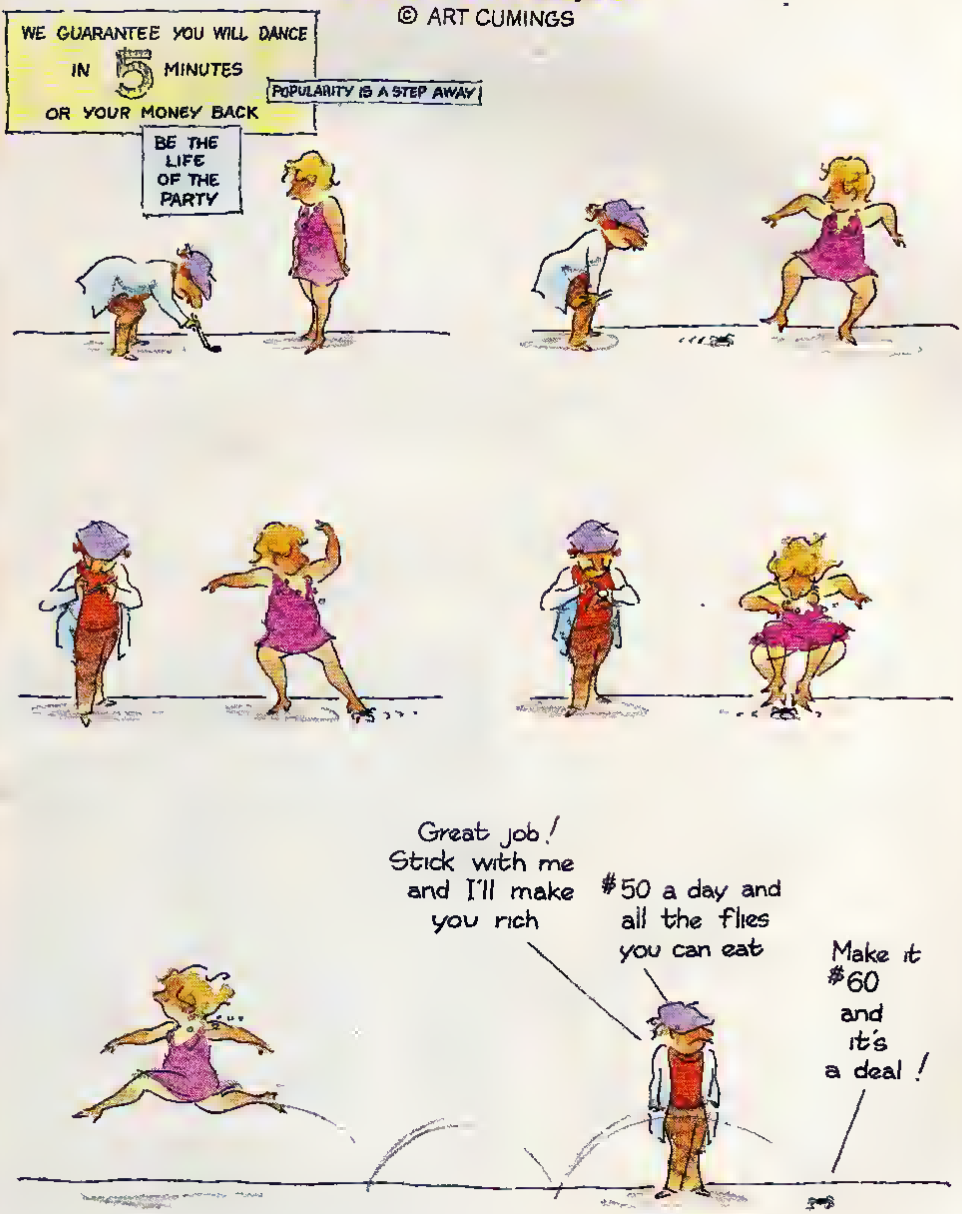
On the wall opposite the orange couch, where a picture window ought to be, hangs the device built to answer this question. Sometimes Dunne calls it "the pinball machine," though in the literature it gets the more lofty name of *random mechanical cascade*. Not just one ball but 9,000 polystyrene balls—each three quarters of an inch in diameter—are ferried up the side of this ten-foot-high construction and dropped through 330 pegs before landing in 19 bins. Normally, more balls fall in the center bins than the outer ones, and the distribution looks like a bell curve. An operator seated on the comfy couch about eight feet away is asked to try to make more balls land in the bins to the right or the left.

When John Bradish, PEAR's electrical engineer, first heard about the pinball machine, he wagged a finger in the air and said, "Wait a minute, you mean you're *willing* those balls to go in those holes?" The exercise lasts 12 minutes and sounds like hail hitting a tin roof.

From 3,393 random mechanical cascade runs, it seemed clear to Jahn that 25 operators could create a marginal but measurable shift in where the balls landed—though, unexplainably, only to the left. (There was only a 1-in-33,000 chance of this distortion happening at random.) Even odder, operators could create these shifts even when the couch they were seated on was several thousand miles away. Whatever the distance, individual "signatures" tended to be similar to those established with the random number generator. The person mattered, not the device.

PEAR's work with psychokinesis has

The Artist



garnered its share of supporters and detractors alike. The random number studies on which Jahn puts the most emphasis are particularly controversial. For instance, Marcello Truzzi, a sociologist at Eastern Michigan University in Ypsilanti, and director of the Center for Scientific Anomalies Research, says the random number generator work "holds up remarkably well. I find it very difficult to dismiss."

Ray Hyman, a psychology professor at the University of Oregon and an executive council member of the Committee for the Scientific Investigation of Claims of the Paranormal (CSICOP), on the other hand, doesn't buy PEAR's results. Hyman contends that Jahn unfairly groups together data collected over the course of ten years, despite several refinements in technique. As a result, says Hyman, "Jahn's probabilities don't make any sense."

Dunne, who confirms that PEAR has used two generations of machines, says the data have been looked at separately *and* combined. Says Dunne, "There's no difference in the results no matter which machine is used."

But additional criticisms abound. A 1987 National Research Council report, for instance, found "no scientific justification" for parapsychological phenomena after reviewing research conducted over the past 130 years. The report *did* note some deviations from chance not readily explained but uncovered no conclusive evidence for remote perception or psychokinesis, Jahn's two areas of interest.

And according to James Alcock, a psychology professor at York University in Toronto who wrote a background paper to the report, "You can't rule out flawed methodology with Jahn." After reading PEAR's papers, Alcock concluded, "The dafabase is not as neat and clean as he would like to believe. Methodologically, it's difficult to sort out how impressed one should be by the statistical data."

In addition to debating specific methodological issues, Jahn's critics have launched another, more encompassing attack. This argument acknowledges that some anomalies have been demonstrated but disputes their importance. "I'm not calling people liars or frauds," says Alcock, "but you can't jump to supernatural explanations just because you can't think of an apparent one." Hyman argues that the effect Jahn has registered is so small and the database so large that the slightest bias could explain the deviation from the norm. "My feeling," says Hyman, "is that it's not ready to be talked about."

Jahn welcomes criticism. In fact, he addressed the annual meeting of CSICOP on March 31. What disappoints him, though, is that his fellow scientists, and perhaps especially hard scientists like himself, haven't attempted to replicate his experiments. In part, their reluctance is due to the expense. The cost of a random number generator would be about $50,000—if you could buy one, which you can't. (Jahn was able to get his built in the aerospace shop.) The reluctance also comes from a kind of cynicism that neither the field nor Jahn seems able to shake. At one point Jahn asked Watson, the Princeton statistics professor, to provide an assistant professor at PEAR's expense. Watson says, "I couldn't really say to a young guy, 'You should do this and blow the dean of engineering sky-high.'" Anderson, the Nobel physicist, says, "When Bob calls himself a physicist, we're a bit skeptical because if he is right, he would be negating the entire basis of the profession. After all, if someone just *thinking* about the electrons in my experiment can influence them, then precision measurement becomes pointless. Why do the experiment at all?"

The U.S. Office of Technology Assessment is aware of this attitude. In one of its reports, it noted "unusually strong resistance" from the scientific establishment and contended, "The field appears to merit [fairer] consideration."

Alcock, like Hyman, an executive council member of CSICOP says, "I would love to see someone come along and say we're going to pick impartial people and have them sit down with Jahn to devise a watertight experiment and then run it. I believe Jahn is already persuaded by his own data. A study that failed to replicate it [his data] wouldn't dissuade him."

Perhaps that's true. As embarrassing as he might be to some at Princeton—he has recently stepped down from his position as a dean—Jahn isn't about to pull up stakes now. "I've got twelve years of my career in this thing, at considerable personal expense," he says. "My sense of the importance of this topic is much higher than anything else I've ever worked on. It is an elusive business and I have become impatient at our pace, but I have yet to see anything here that tells me we're wasting our time." As Felix's tail wags over Jahn's head, he talks about taking the long view. Maybe the role that he and Dunne will play is that of pioneers, making it easier for the next generation of workers.

Delusions of grandeur, some colleagues say. Jahn thinks otherwise. "It's natural to want and to savor the approval of one's colleagues," he says. "It would be nice if everyone was saying, 'That's exciting. Bob, keep at it.' But I can't allow the lack of support to control my life. We have incontrovertible evidence that these phenomena exist. We have asked the cosmos a question. And the cosmos has answered." ∞

EDUCATION

CONTINUED FROM PAGE 14

countries by the International Association for the Evaluation of Educational Achievement, American fourteen-year-olds ranked fourteenth in overall math and science performance. These gloomy numbers translate into fewer and fewer graduate degrees in science-related fields, an almost inexplicable turn of events, because both science and technology form the backbone of today's society.

These disturbing trends are well-known to those American companies that depend on technically literate employees. "Our national strength and prosperity in the twenty-first century will depend on our ability to compete in a highly technological world economy," reads a report issued on the science center. "The decline of scientific interest begins and can be reversed in elementary school if ways can be found to stimulate children's natural curiosity with exhibits and experiments."

At last December's groundbreaking for the $50 million science center, then-New Jersey governor Thomas Kean, who was instrumental in the state's donating seven and a half acres of land for the center, discarded the traditional shovel ceremony. Instead Kean pushed a button triggering a laser beam from the Statue of Liberty to the park, igniting a fireworks display of the center's logo.

During the dedication ceremony, Kean commented that he wished the center had existed when he was in his "wonder years." He would, the former governor said, "have loved a place like this. . . . what a joy it would have been to see my science textbooks come to life."—John Cummings

CREDITS

Page 4 top left, Basilius Besk./courtesy of Abrams; **page 4 top right,** Andrew Holbrook; **page 4 bottom center,** M. P. Kahl/Bruce Coleman; **page 10 top left,** Gary Lilien; **page 10 center top,** Gary Lilien; **page 10 center left,** Anne Dowie; **page 10 center right,** Gary Lilien; **page 10 bottom,** John Stuart; **page 14,** SJF Associates, Inc.; **page 16,** Dan McCoy; **page 18,** Robert Burger; **page 20,** Attila Hejj; **page 22,** Jon Blumb, 1988/Gamma-Liaison; **page 26 top,** Stephen Dalton/Photo Researchers; **page 26 bottom,** Th. Bernier/Gamma-Liaison; **page 27 top,** Movie Still Archives; **page 27 bottom,** Walter Dawn/Photo Researchers; **page 28,** The Bettmann Archive; **page 29 top,** Isothermics, Inc.; **page 29 bottom,** NASA; **page 30 top,** Shimizu Corporation; **page 30 bottom,** John Chiasson/Gamma-Liaison; **page 31 top,** Thomas Hanscom; **page 32,** Marika Moosbrugger; **pages 34 and 35,** Robert W. Hernandez/Photo Researchers; **page 34 insert,** Doug Cheeseman/Peter Arnold; **page 36 top left,** Francisco Erize/Bruce Coleman; **page 36 top right,** David Doublet; **page 36 center,** G. Brad Lewis; **page 36 bottom,** Loren McIntyre; **page 37,** Patrick Morrow; **page 38,** G. Brad Lewis; **page 38 top,** G. Brad Lewis; **page 38 bottom right,** Frans Lanting, 1986/Minden Pictures; **page 38 bottom left,** Robert Caputo; **page 39 center bottom,** Gordon Langsbury/Bruce Coleman; **pages 50 to 55,** courtesy of Abrams; **page 73,** Tim White; **page 74,** William James/Johnson; **page 75 top,** Jim Harter; **page 75,** Bettmann Newsphotos; **pages 88 and 98,** Gary Lilien; **page 102 top left,** Gary Lilien; **page 102 top right,** Patton Designs; **page 102 bottom left,** Fleishman-Hillard Inc.; **page 103 top right,** Zan Productions; **page 103 center left,** Gary Lilien; **page 103 bottom,** Hover Dynamics Manufacturing, Inc.

CONTINUED FROM PAGE 71

ess of dignity, not to say logic. For the sake of appearances, an agonizing end of life is orchestrated for a beating-heart donor, and at the same time the very justification for the procurement of organs is degraded physiologically.

I believe anencephalic newborns are bona fide donors and as such they should be used. I transplanted organs from anencephalic donors without creating the artificial conditions of cardiac arrest fifteen or more years ago, when the probity of taking organs from anencephalics was not even under question. But I haven't taken organs from them for several years. We're not being offered anencephalic donors. The debate about such donors and the uncertainty about pronouncement of death have made it unlikely that procurement teams will look seriously at them, particularly if the 'staged' cardiac death is insisted upon.

Omni: What is your position on fetal tissue transplanting?

Starzl: I'm not an expert in either the techniques or the complex ethical issues that could arise in that work. When I say 'could arise,' I mean from the deliberate insemination of a woman with the ultimate purpose of growing a crop of fetal tissue for harvest for abortion. I oppose this. On the other hand, I don't understand why fetal tissues obtained in the normal practice of obstetrics and gynecology should be thrown away.

Omni: Where do you stand on the European practice of presumed consent?

Starzl: The medical community assumes, in fact has often predicted, that the American public would be shocked by the idea of presumed consent. I don't agree with my peers. I remember in the mid-Sixties how the medical community predicted there would be a widespread public revulsion against the establishment of brain death criteria. They were proved to be absolutely wrong. The public may be smarter than we give them credit for.

Omni: You once harvested kidneys from living donors. Then you suddenly stopped, and now you're vehemently opposed to the practice. Why?

Starzl: When I did those operations, I believed they were completely safe. But later I became aware of a number of deaths of kidney donors. Some even occurred in highly reputable and proficient centers. Worse still—the deaths had been concealed. As my experience with living donors grew into the hundreds, I became more and more uneasy about it. I also came to realize that truly free choice by a donor was very difficult within the family structure.

And another factor changed. A major justification for living related donors in the early to mid-Sixties was that renal dialysis wasn't available. In those days failure to find a kidney was often tantamount to a death sentence. With wide availability of dialysis, the prospect of dying receded into the background, urgency was reduced. Now there's more time to wait for a cadaver donor. So now I am opposed to the procedure.

But it's hard to imagine kidney transplantation getting off the starting blocks without living donors. All the important lessons from transplants came from those early procedures. Cadaveric organs were almost impossible to obtain in the Sixties before brain death statutes were passed. Even if they had been available, under perfect circumstances, the rejection response against unrelated organs was still too formidable for the immunosuppressive therapy we had at the time. After cyclosporine was discovered, the results of brain-dead donors became competitive with those of living donors. So I no longer saw justification for taking kidneys from living people. Fortunately, I never lost a donor, although I did experience some potentially fatal complications.

Omni: Do you feel the same way about removing sections of the liver or pancreas from a living donor?

Starzl: Pancreas transplantation is not a lifesaving procedure. For that reason alone, the removal of a portion of a living person's pancreas is questionable. In contrast, the liver is a vital organ, so an argument can be made for removal of a portion of it in the absence of other therapy. When a portion of a parent's liver is taken and used to save an otherwise doomed child, as has been tried in Australia and Chicago, it's hard for me to criticize the action.

Omni: Tell us about the new immunosuppressive drug FK 506.

Starzl: FK 506 was discovered in Japan at the Fujisawa Corporation. They found the basic materials for it in some soil near their factory. I heard about it at an international transplant meeting in 1986. The experimental results seemed remarkable. I asked for a supply but was unable to get it. Fujisawa had evidently made some kind of trade arrangement with a British pharmaceutical company, which, in turn, was working with my old friend and colleague Sir Roy Calne in England.

Omni: Didn't Calne find some serious problems with it?

Starzl: A small number of the dogs he tested with the drug became violently ill. Sir Roy became quite critical of FK 506 and increasingly outspoken about its deficiencies. But I wasn't convinced, so I flew to Japan with a Japanese colleague to persuade Fujisawa officials that someone else should test the drug. No, they said, their agreement with the English company was exclusive. We persisted and one of their executives left right away for London to renegotiate. A week later while I was still in Japan, the Fujisawa officials gave us a small supply of FK 506. We brought it back to Pittsburgh and experimented on rats with it. We moved up to monkeys and eventually humans.

FK 506 prevents T-cell activation. We think it also inhibits the synthesis of the immune system protein interleukin 2. That makes it a potent immunosuppressive. The mechanisms are similar to cyclosporine, even though the two have completely different molecular structures. The exciting difference is that FK 506 appears to be remarkably free of toxic reactions. It does not cause hypertension, hirsutism, or many of the other troubling side effects of cyclosporine. There is a tremendous avalanche of activity with all kinds of transplants made possible by FK 506.

Omni: Yet you said that this research has been met with a "chorus of boos."

Starzl: Perhaps "chorus of boos" shouldn't have been taken so literally. But there have been some very acidic discussions after some papers were read at transplant conferences over the past several years. As far as I'm concerned, FK 506 is the most powerful and safest immunosuppressive available. And since I have participated in so many other advances in the field of immunosuppression, that is not a statement to be made or taken lightly.

I am so confident of this drug that I submitted a paper to the British medical journal *Lancet*, suggesting that FK 506 might also promote the regeneration and repair of damaged livers. If this proves true, FK 506 may well be an agent that in some cases reduces the need for liver transplantation.

Omni: Prominent French transplant surgeon Henri Kreis predicts that eventually half of all surgical procedures will involve the replacement of organs and other parts. Do you agree?

Starzl: Yes, Kreis is right. In the next century surgery will be dominated by transplant technologies. And remember, the next century begins in just nine years.

> *"In the next century, I believe, surgery will be dominated by transplant technologies. And remember, the next century will begin in just nine years."*

Omni: There is talk of reconsidering the ban on commercialization of organs.

Starzl: When the Organ Transplant Act was passed in 1984, most discussion centered on the prohibition of the sale of organs—kidneys in particular—by impoverished donors to wealthy recipients. Curiously, it is ethicists who have been most critical of the statute that takes the decision about what one can do with one's kidneys away from the individual and, in essence, gives it to a consortium of physicians who charge fees for their participation. The ethicists' argument holds that it is not appropriate for a person to sell a kidney for money, even when this money could lift a family from poverty and provide opportunities that might have ripple effects throughout coming generations.

In spite of its legality and seeming propriety, transplantation from blood relatives sometimes has had overtones of nonemotional and materialistic rewards for the donor. A law that states it is all right to remove a kidney from emotional or blood-related donors but illegal under other circumstances seems based on distinctions that are not realistic. Uncertainty about these matters is another reason for my not wanting to use living donors, related or nonrelated.

Omni: Should we alter our definition of death again to save more people with end-stage organ diseases?

Starzl: Acceptance of anencephalic donors is a redefinition of brain death. Perhaps this is why there is such an instinctive and negative reaction to it. I haven't advocated redefining brain death under other circumstances, although I'm cautiously watching the outcome of legislation that would define cortical death as brain death.

Omni: Will organ transplantation change civilization's view of humanity?

Starzl: It already has. The noblest acts I've witnessed in forty years have been on the transplant wards.

Omni: Jean Hamburger, a French pioneer in transplantation, predicts that in the next century, transplantation will be obviated by less invasive cures for end-stage organ diseases. Do you agree?

Starzl: Hamburger is correct in saying that artificial organs, genetic manipulation or prophylactic measures will have an impact on vital organ diseases. Transplantation, though, will remain the nuclear component in this complex spare-parts field and won't be replaced by artificial organs. This will be particularly true if it becomes feasible to harvest and use animal organs to treat humans. I predict it will become possible very soon through the application of some technique already available but unrecognized for its potential. The next stage of transplanting will almost certainly be xenografting—animal to man. We're doing lots of experimental work animal to animal, but we're not ready yet to proceed with humans. There are still things we don't understand, and it would set the whole field back if we tried now and failed. One problem is that the closest animal to us—the chimp—is an unacceptable avenue because it is so humanoid and there are so few chimps. The most likely source is the pig.

Omni: What of your own future?

Starzl: That's impossible to answer. I went through life without a game plan, without really knowing with any degree of certainty what I might be working on the day after tomorrow. A future plan becomes restrictive in direct proportion to the details added. All game plans should be fluid.

I can look back with wonder at being able to come to work with enthusiasm every day for thirty-eight years without ever having an absolutely clear idea of what the day might hold. It would be easy to lose that kind of energy by trying to figure out far in advance what the future holds. If I have any good advice it would be "Do *nothing* for career development." **DO**

GAMES

CONTINUED FROM PAGE 99

8 RAZZLE According to Darwin Ortiz in *Gambling Scams* (Dodd, Mead & Company, 1984), a hustle called Razzle is "the all-time champion money-maker of gaffed carnival games. It should be illegal, but it still pops up at carnivals and wherever fools and their money are ripe for parting." Gryczan says it is "the most vicious game to be found on the midway."

Razzle takes a great many forms, but whether the player tosses marbles into a box with numbered holes on the bottom or hurls darts at a board marked by numbered squares, the essential element is that the operator tallies the numbers quickly (while removing the darts or marbles), announces a total, and consults a chart to see how many points are earned toward a goal number. You might be handed a "one free play" coupon and decide to try it because you have nothing to lose.

Your first play is lucky. You might score a 42-point total, for instance, which gives you "twenty-five yards" credit according to the chart. The amazed operator says that the goal is to complete a total of 100 yards and win the grand prize—a color TV set. You're already a quarter of the way toward your touchdown on your first try. For a dollar you can play again and try to boost your total. You decide to continue playing, and after a few more bets you get another ten or 20 yards. You then score a total marked BONUS PRIZE on the chart. That means your 100-yard touchdown will now get you two prizes—the TV set and the CD player. You like the sound of that, but then the operator points out a sign reading ONE DOLLAR PER PRIZE. Because you are now playing for two prizes, he explains, each play of the game will cost two dollars. You can win only if you keep playing; if you quit you lose all the yards you have gained.

A good Razzle operator plays his victim alternately tugging at the drive to win big and the drive to avoid foolishly giving up all that has been gained so far. You might get to 90 yards after you have spent most of your money and have to pay more and more to keep playing, but those last ten yards will never come. If you can't get ten yards at the end of the game, how did the agent let you get those 25 yards on your very first try? A very good question. You should have asked it then.

ANSWERS

1 RODENT. Brill's Bible offers the following: "If the operator will dip finger in ammonia (can be diluted with water) and rub finger around hole in color on which least money is played—[rodent] will run to that hole. The ammonia should be wiped from hole of previous play. Do it unobtrusively."

2 RING. Close analysis indicated that all 12 of the winning shots were ricochets. The light plastic rings, the FBI found, bounced off a bottle neck even when dropped from only a few inches above it.

3 MILK. One bottle is heavier than the others. When the carny wants to show you how to win, he places the heavy bottle on top of the two lighter ones. When he wants you to lose, the heavy bottle goes on the bottom and slightly farther back than the other bottom bottle.

4 BOTTLE. The bottles are slightly heavier on one side. Roll an empty bottle on its side across the tabletop, and notice it rolls in an eccentric slow-fast-slow-fast pattern, reflecting the uneven distribution of glass. The game owner sets the bottle with the heavier side up, making it harder to tilt smoothly into an upright position.

5 PLATE. The heat causes the sides of the plate to droop slightly, making the surface flatter than it is on the same style plate found in stores. The best strategy is to toss a coin in an arc, without spin or wobble, so it lands on the back rim of the plate and bounces toward the center. Some owners will strategically hang prizes from the top of the booth so that they dangle over the plates, preventing coins from falling in the optimal arcs. Try tossing two or three coins at once, pressed together as a sandwich. The top coins will deaden the bounce of the bottom one. Because this significantly improves the player's chances of having one coin stay put on the plate, operators keep an eye out for this tactic.

6 DARTS. If you pop some balloons higher on the board than others, the operator may remind you that he said you must break three in a row to win. Because your three weren't all in a row, you lose.

7 STRING. You won't get the panda. Strings attached to choice prizes are folded back into the operator's hand. They aren't available for you to pick from. Any string you select will be attached to one of the cheaper prizes.

8 RAZZLE. The operator adds the numbers too quickly for you to follow, removing the evidence while doing so, then gives you a total he knows will translate into immediate yardage. He initially cheats but in your favor, so you are not likely to question his accuracy. Later, when you start losing, you'll want to check the totals, but the addition will be correct, as the most common totals don't win any yardage. By then you're in a position of having to pay money to protect what you have already invested, and you'll know you've been Razzle dazzled.—Scot Morris

EXPLORATIONS

CONTINUED FROM PAGE 22

ified the four conditions necessary to establish a violation of the Nonintercourse Act. A Native American nation has a legitimate case if the tribe has not previously disbanded and is the same as the one that signed the treaty. The claim must involve the same area stipulated in the treaty. The United States must have clearly agreed to not remove the tribe from the territory. And the treaty must still be in effect.

Negotiators worry about finding the hundreds of thousands of acres New York will need to satisfy the claims. "You try to find alternative lands, like public lands—maybe reforestation or undeveloped areas that are sparsely populated and can be purchased and made public domain," Batson says.

Meanwhile, hostilities are festering between the tribes and property owners. "As long as ongoing litigations don't undermine the landowners' rights, there will be no problems," says Romulus, New York, supervisor Raymond Zajac, who chairs Cayuga County's Indian Land Claims Committee. "But if title companies won't write title insurance or owners can't transfer real estate, then you're going to see some very irate people. There will be a revolution!"

Keeping a close eye on the St. Regis Mohawk actions, Roland Poirier, chairperson of Citizens Concerned With Land Claims, wants an end to what he calls double standards. "If the treaties are invalid and we're living on land that never belonged to us, then we expect to receive the same benefits as the Indians—like legalized gambling, free hunting and fishing licenses, and no taxes," he says. "And if we don't get them, we'll file a discrimination suit."

Native American nations, however, aren't interested in seizing private land or questioning property titles. The Onondaga, for example, plan to claim the area they feel is their territory but they'll negotiate for land in state preserves. The settlement between New York and the Cayuga Nation may include the creation of a new reservation.

Financial settlements could also provide money for land acquisitions. The land claims in Maine, for example, resulted in Congress's appropriating nearly $90 million to the Passamaquoddy, Penobscot, and Maliseet tribes.

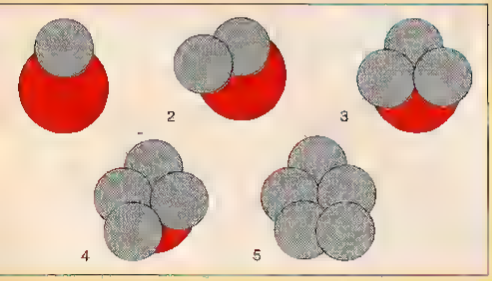
"Non-Indians are claiming that the Indians' lawyers have found a loophole," says Ron LaFrance, a member of the Mohawk negotiating team. "But that's the furthest thing from the truth. I've buried two sets of grandparents who fought for our land claims as long ago as about 1910. And they took up the fight from the folks who came before them. We have always known what is rightfully ours."—Dean Kuipers

GAMES

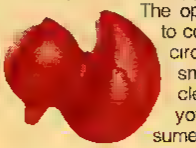
MATHEMATICS ON THE MIDWAY
What's fair at the fair

Strolling among the summer smells of corn dogs and cotton candy, I walk past the merry-go-round and over toward the House of Horrors. Finally I find that timeless American attraction: the arcade of games. A fast-talking pitchman waves me over to his booth. "The name of the game is Spot the Spot," he says while dropping four-inch metal discs onto a red circle, six and a half inches in diameter, painted on the top of his counter. "The object: Drop these five discs onto the spot and completely cover it."

The man slowly demonstrates, and sure enough once he drops the fifth disc none of the red paint is visible. I pay a dollar, hoping to win a huge stuffed panda, but every time I try (even dropping the discs from only an inch or so above the spot), I always leave a visible sliver or two of red. The game can be won, as the agent repeatedly demonstrates, but a steady hand isn't enough. The secret is in the geometry of the overlapping circles.



Cover your bets: Below, the secret to winning Spot the Spot at the carnival. Placement of the first disc is the most critical. Bottom: The game Duck Pond is unlikely to be fixed. Prizes are worth less then the cost of pleying.



The optimum way to cover a large circle with five smaller circles is not, as you might assume, to spread the five circles symmetrically like daisy petals around the spot. The first disc must be placed so that it touches the spot at two points on a diameter, with exactly half of its circumference inside the spot (shown below at left). If you don't place the first disc this way you might as well quit. You won't be able to place the other four discs in a winning way. The second disc must touch the first disc at the edge of the spot as shown so that it reaches just beyond the midpoint of the first disc. The third disc goes in mirror-image fashion to the second. If the fourth disc is dropped to intersect the outer edge of the second disc and the inner edge of the third, there will be some room for error in dropping the fifth disc so that all the remaining red area is covered.

The geometry of Spot the Spot is interesting. For a given spot diameter, what is the smallest possible diameter for the five discs? It turns out the answer is .618 ... , a proportion that mathematicians know as the golden ratio. If the discs are any smaller than that, relative to the spot, the puzzle becomes unsolvable. Even knowing the unexpected asymmetrical strategy, Spot the Spot is still very difficult to master. The agent has practiced for hours, maybe years, to develop his consistent technique. Because it is so hard to win, some localities have outlawed the game, but it is a genuine game of "skill," as performance definitely improves with practice.

CASING THE CARNY

Matthew Gryczan, a Detroit newspaper editor, has studied midway games with a passion, interviewing game manufacturers, carnival operators, and law-enforcement agents. In his recently published book *Carnival Secrets* (Zenith Press, Royal Oak, Michigan, 1988), Gryczan gives tips such as the best times to play. (Operators usually award the most prizes on the first days of an engagement, as a way of advertising. On the last days of a run they will be out to maximize profits and recoup losses from any rained-out days.) He also reveals curiosities like the fact that concession operators prefer booths on the right side of the fairgrounds from the main entrance because people tend to turn to the right after passing through the ticket booth.

Gryczan's main focus, however, is on the games and their secrets. "There is a way [for the operators] to cheat at every game on the midway," says Gryczan. But there are general rules for telling which games are usually run honestly, which ones are sometimes rigged, or "gaffed," and which ones are sure-bet losers—scams to avoid.

One of the arcade's most honest and entertaining games, he says, is the Fool the Guesser booth. Pay a dollar and if the operator fails to get your weight within three pounds you win a comb or plaster figure worth about 20 cents. Booths that give away cheap prizes worth less than the cost of playing are called hanky panks and are usually run honestly because there is so little to gain by gaffing them. In the hanky pank game Duck Pond, people pick up a plastic duck at random from a running stream, read the number on its bottom, and get a corresponding prize—usually a cheap trinket known as "slum." If pricier prizes are offered, the operator

may avoid giving them out by peeking at the number before showing it to a customer, and blocking part of a winning number with his thumb (for example, covering the top of a 17 to make it look like an 11). Ironically, the games that are usually run honestly may be disallowed in some jurisdictions because they are classed as games of chance—considered a form of gambling—and constitute an illegal lottery.

Other games that are usually fair are those in which players compete against each other, like squirting water into a toy clown's mouth to inflate a balloon, or rolling balls through chutes to move a mechanical horse along a track in Kentucky Derby. The first player to break his balloon or cross the finish line wins, and the size of the prize will depend on how many people participated.

See if you can tell what scams are being run with the following common midway games. (Answers begin on page 96.)

1. RIGGED RODENT. There are many ways of rigging a Wheel of Fortune game to prevent certain numbers from turning up. One clever variation is the Rat Wheel, in which a live rat is placed in a cage at the center of a wheel, which is then spun slowly. Players bet on which colored hole around the wheel's rim the rodent will scamper through when its cage is lifted. The game seems fair—surely the rat can't be trained to avoid the colors that customers have bet on—but don't bet on it. Aaron K. Brill, president of A.B. Enterprises in Peoria, Illinois, and author of a privately circulated guide (known as Brill's Bible) for making and operating carnival games, tells how Rat Wheel can be gaffed with a secret ingredient—ammonia. How does it work?

2. RING AROUND THE COLLAR. When "chance" games are not allowed, games that offer player participation may pass as "skill" contests. In one such event, a player pays one dollar for the privilege of tossing curtain rings at an array of plastic soft-drink bottles and wins a prize (sometimes a big one) whenever a ring comes to rest over a bottle's neck. The gambling unit of the FBI has run tests on the game, Ring a Bottle, in order to advise law-enforcement agencies on whether it takes money under false pretenses. Laboratory researchers conducted a study in which they tossed rings with an inside diameter of one and three quarters inches from about six feet away onto a square of one hundred 64-fluid-ounce soft-drink bottles, each with a collar around its neck two inches in diameter. In 7,000 throws they scored 12 winners, a rate of one win every 583 tries. Some players will win the expensive prizes, but even so, the FBI doesn't consider Ring a Bottle a "skill" game. Why not?

3. SPILL THE MILK. The player gets one softball to throw to topple a pyramid of three "milk bottles," each made of aluminum and weighted with up to three pounds of lead. The ideal throw hits the triangle where the three bottles meet. The agent can demonstrate the game and succeed, but players almost never do. Why?

4. BOTTLED UP. An empty beer bottle lies on its side on a platform, and a player with a stick and string, with a ring attached to the end, tries to hook the neck of the bottle and pull it upright. The bottle's paper label has been removed but otherwise it is unaltered. This fact is the basis of one subtle deception. What is it?

5. PLATE PITCH. Glass plates rest on the heads of stuffed animals on a table. A player tosses a nickel from behind a railing a few feet away, trying to get it to land on a plate and stay there. The plates may tilt a couple of degrees away from the player or toward the center of the table, and a silicone coating may make the glass extra slippery. One company that supplies the salad plates heats them in a furnace for 48 hours before distributing them for use in this game. Why? What is the best way to toss a coin to make it stay on a plate? And why don't the operators let you throw more than one coin at a time?

6. DART BOARD. You get three darts for a dollar to throw at a bulletin board covered with balloons. 'Break three in a row to win a prize,' the operator says. The darts might be extra lightweight, with blunted tips or with twisted fins so they won't fly accurately, and the balloons may be underinflated so they won't pop easily, or they hang from short lengths of string so they can bounce away from a glancing blow. Forget those physical tricks. Even if you still manage to pop three balloons with three darts, the operator may still say you lose. Why?

7. STRING PULL. The operator holds out 100 strings and offers to let you pull one and claim the prize on the other end of the string for two dollars. The strings go up over a rafter, then down to the prizes on display. Most of the prizes are cheap trinkets, but there are a few cassette players and watches and a giant panda you'd just love to win. The agent pulls all the strings and all the prizes rise, even the panda. After you pay and pull, what prize are you unlikely to get? Why?

CONTINUED ON PAGE 96

VIDEO SCANS

COMPACT DISC-O-TECH

These games tap the potential of the CD for broadcast-quality entertainment

Whodunit? First CDs replaced records. Will Airwave Adventure and other CD games now make video game cartridges obsolete?

The dry California hills stretched into the distance beyond the televised golf course. The golfer teed up. The pro's form was good, but I thought he wasn't addressing the ball correctly.

And then I became God.

I twisted a joystick beside the television, and the golfer shifted his feet. I pressed the button and he took *my* best shot. The camera panned across the sunburned hills to track the ball. When it fell short of the green, a pair of human announcers appeared to comment on my less than professional performance.

At first it was difficult to tell if this was an actual Saturday afternoon sports broadcast or an incredible computer simulation. It had true television quality video with human figures and spoken narrative and it was interactive.

Compact discs, home video, and personal computers are melding into a new interactive video medium that will transform home leisure and information. With the aid of compact disc–read-only memory (CD–ROM) computer disc–graphics (CD–G) and compact disc–interactive (CD–I) technology, families will explore the Smithsonian Institution without leaving their living rooms. Children will control the action of *Sesame Street* characters while learning verbal and mathematical concepts. Armchair quarterbacks will call the plays in simulated Super Bowl telecasts without spilling a drop of their brew.

The technology utilizes the same compact disc that revolutionized home audio. The CD, however, provides not only the ultimate in stereo sound but also an awesome storage capacity for video and computer graphics and data. It can contain the entire text of an encyclopedia and still have enough room to illustrate the strategic Civil War battles, replay the actual recording of Richard Nixon's presidential resignation speech, and much more. All you need is a special CD player, a computer to process the data, and a television to display the results.

A few innovative products are already tapping the technology's potential. Activision's *Cosmic Osmo*, for example, uses the CD and an Apple Macintosh computer to create a cartoon universe. With an on-screen pointer, you activate 3-D illustrations, listen to talking characters, and enjoy a CD-quality stereo soundtrack.

The Magic Flute (Warner New Media) also requires a Mac. You can read the Mozart opera's libretto in English or German, synchronized with the music, hear musical excerpts that demonstrate the special features of the opera, search a glossary of musical terms, or research the historical and literary symbolism of the libretto. No college course can match it for information or interactive entertainment.

Tiger Media's *Airwave Adventure* drops you in the middle of an interactive murder mystery. The CD–ROM whodunit features comic-booklike graphics recorded dialogue by actors, and more than 1,500 different scenarios. *Airwave Adventure* is currently available only for the expensive Fujitsu FM/Towns CD–ROM computer, which you can purchase only in Japan. The CD, however, will be among the first games available for Commodore's Dynamic Total Vision, or DTV.

A multimedia system that requires an Amiga computer, the DTV player is an interactive cross between a CD player and a videocassette player. During an evening news report, say, on the Soviet Union, you can grab the remote control and turn on the DTV to display maps, pictures, and details of Soviet life. After the broadcast, you can conduct more detailed research in the stored audiovisual data.

Made for the TurboGrafx-16 game system, NEC's first CD-G games include an arcade shoot-em-up called *Monster Lair* and a martial arts combat game. This fall, however, Cinemaware will release a TurboGrafx CD version of *It Came From the Desert*, an affectionate send-up of the Fifties' giant ant movies. For the first time, a CD based product will include computerized graphics of real actors speaking dialogue, all augmented by a full film score. And the interactive TV movie of the week is entirely under your control.

Planned for release early next year, Philips's CD–I multimedia player will provide the storage, audio, and graphics advantages of CD–ROM and CD–G. It will also display lifelike images and full-motion video, like surrogate visits to the golf course and tours of the Smithsonian.

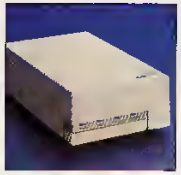
For more than a decade electronics pundits have predicted the merging of audio, video, and computers into the home leisure system of the future. The wait is nearly over.—Bob Lindstrom

STAR TECH

ACCESSING THE FUTURE

THE GRASS IS GREENER

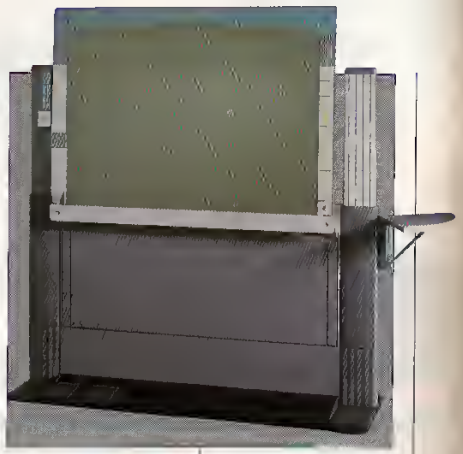
Connect the office PCs for printer sharing, file transfers, and electronic mail with the Local Area Wireless Network, or LAWN. Each transceiver box is slightly larger than



an external modem. Cost: $298 per PC. Contact: O'Neill Communications, Raleigh, NC; (800) 624-5296.

PAGING DICK TRACY

Now you can receive your urgent messages at the flick of a wrist with Seiko's Receptor MessageWatch. Cost: $275. Contact: AT&E Customer Service, One Maritime Plaza, San Francisco, CA 94111.



BOARD MEMBER

As a horizontal surface or a vertical screen The Workspace 2000 prototype incorporates phone, printer, and fax. Contact: Patton Design Enterprises, Costa Mesa, CA; (714) 966-1616.

MOMMY'S LITTLE HELPER

The customized high-tech kitchen by Eric Bernard features a computer station that houses audiovisual, lighting, nutrition, fire, and security programs. Monitors can be used with a centrally located laptop computer that can store, for example, 300 recipes that are programmed for their nutritional and caloric value. Cost based on custom design. Contact: Eric Bernard Designs, New York; (212) 876-9295.

SMOKE-OUT

Attention nonsmokers. Now you can monitor and document levels of carbon monoxide in passive cigarette smoke. The TobaCOlarm also detects carbon monoxide in automobile exhaust and other pollutors. Cost: $12.95. Contact: JRB Company, Laguna Hills, CA; (714) 586-2384.

SMOOTH SAILING

Skim land, water, snow, ice, and marshes, and jump waves in the RX2000 hovercraft. Cost: less than $10,000. Contact: Hover Dynamics, Cumming, GA; (404) 889-5660.

LAST WORD

By David Brenner

"You allow saliva to drool from the corner of your mouth past the ink smudge you put on your cheek, to duplicate that look you had the day you took your passport photo"

When you travel, especially away from your natural environment, there is always the danger of contracting diseases. Most of them can be prevented or treated, if you are aware of them and know the symptoms. In addition, as in all human endeavors, there are phobias particular to the traveler. I have composed a list of the most common traveler's diseases and phobias.

CINCYBIZZO *(Sin-sea-biz-oh)* This is the fear that on a very long flight, seated next to you will be a businessman from Cincinnati who would never believe that there is a human being alive who wouldn't be fascinated by the long story of his company's merger. *Symptoms*: You check to see if the person next to you is wearing white socks, you wear a hearing aid and constantly bang your fist on the dead battery case, as soon as you take your seat on a plane, you begin speaking a language even you don't understand, in the airport bathroom, prior to getting on your flight, you put on a fake Mohawk wig and decals of skulls and crossbones on your arms.

TAKUMWITTUSITUS *(Tay-kum-with-us-eye-tus)* This disease begins to strike just before you and your spouse leave on that much-awaited vacation or second honeymoon, when, all of a sudden, you decide that it would be great to take your children with you. *Symptoms*: The main symptom is a total lapse of memory of how the kids absolutely destroyed every moment of happiness on your last vacation; feeling sorry for them, even though they seem to not care less that you are going without them; completely forgetting the meaning of "nervous breakdown."

WRECKARENTALITUS *(Reck-ah-rent-al-eye-tus)* This is when, knowing the rental car doesn't belong to you, you decide to do all the things you would never do while behind the wheel of your own car. *Symptoms*: The first symptom is when, instead of moving up slowly behind the car in front of you that is stopped for a red light, you floor the accelerator and slam on the brakes only inches from its rear bumper, the second is when you buy a crash helmet and install a roll bar in your rental car; the third, you swerve to hit cows, and finally, in a car wash, you try to pass the car in front of you.

PASSPORTPICPHOBIA *(Pass-port-pic-fo-bee-ah)* The fear that you are beginning to look like your passport photo and that the metamorphosis is inevitable. *Symptoms*: You stare at your face in a mirror, close one eye, half-close the other, pull ten hairs to stand straight up in the air, jam your tongue into your lower lip and open your mouth and allow saliva to drool out of the corner of your mouth past the ink smudge you put on your cheek to duplicate that once-in-a-lifetime look you had the day you took your passport photo.

UPCHUCKBABEPHOBIA *(Up-chuck-bay-b-fo-bee-ah)* This is the fear present during your entire trip aboard any form of transportation, that the baby seated next to you will throw up on you. *Symptoms*: believing you saw the baby's head spin a full 360°, trying to attach an airsick bag under the breast of the mother, having a rubber dress suit made. Also, you keep waiting for the baby to look at you, wink, and then put its finger down its throat, the buttons on the mother's blouse and skirt look to you to be balls of dried Pablum.

BUGZAPITUS *(Bug-zap eye-tus)* This is the fear that, while camping or vacationing in the country, you will sleepwalk naked into an electric bug zapper. *Symptoms*: You find yourself running at full speed away from all blue lights; you sleep in asbestos underwear; you cover your privates whenever someone snaps their fingers, you are very nervous at a wienie roast.

NOTHINGTHEREPHOBIA *(Noth-ing-th-air-fo bee-ah)* The omnipresent fear that nothing—hotel, rental car, flight, luggage, city, country—will be there when you arrive. *Symptoms*: You ask everyone you know and meet if they've been where you are going; you use up all your film in your home before leaving, you don't pack anything, you take only enough money for a movie and a snack; you leave your driver's license and credit cards at home; you don't tell anyone you are going, you leave threatening messages on your travel agent's answering machine.

DIDNOTSEEPHOBIA *(Did-knot-sea-fo-bee-ah)* The fear that you didn't see all there is to see or missed one of the most important things to see. *Symptoms*: You continually check and recheck every travel guide and map; you look down every street, whispering to locals, "Okay, where is it?", you follow groups of three or more, including workers breaking for lunch and people heading home, you call everyone you know who has been there and ask what they saw; you decide to never leave the place you're visiting.

KARLMALDENITUS *(Car-ell mall-din-eye-tus)* An affliction of the irresistible urge, whenever you hear that someone has lost, misplaced, or forgot their traveler's checks, to yell, "What will you do? What will you do?" *Symptoms*: always wearing a gray hat and a red bulbous nose; looking for someone to remove their hand from a woman's purse, always listening for the words "Stop, thief!", staying up late worrying how Michael Douglas is doing. OMNI