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FIRST WORD

SIGHTSEEING IN THE GALAPAGOS:

Be careful what you leave behind

By Paul Bohannon

It's been over a century and a half since Darwin landed on the Galapagos. Now a new kind of evolution threatens the islands.

There I was—one hundred fifty-eight years, five months, and four days after Darwin, and about three hundred years after the pirates. How and why we found ourselves—Darwin, the pirates, and now me—on Chatham Island in the Galapagos has a lot to say about how different cultures at different times can alter the terrain of a faraway place.

Darwin brought almost nothing with him to the Galapagos except an enviable capacity to observe what he saw. He left after about a month with a lot of data about tortoises and finches—and seeds of the ideas that would change the direction of biology forever. Darwin's shipmates, however, took a lesson from their seafaring ancestors and stored away a load of giant tortoises for food.

By the time I got there, Ecuador's effective National Park System had turned the islands into an ecologically protected area. I paid my \$80 entrance fee to the park and proceeded, first by bus then by dinghy, to our ship. For the next few days, I went on informative tours of several of the islands. We were warned by vigilant guides, who accompany every party that lands, that we must take away nothing—not even a tiny sea shell. I left only a little money and came away with snapshots.

But the buccaneers who were there in 1677 did not come empty-handed or leave empty-handed. They brought rats and cats; they freed goats and burros and horses and cattle on the unoccupied islands. They took away giant tortoises by the shipload—tortoises stacked on their backs in the hold of a ship can live as much as a year without food or water—providing the crew with fresh meat.



It may have seemed insignificant to the pirates, but in leaving behind their livestock, they set in motion a chain of events that would eventually lead to an important discovery in European social science. Long before Darwin, Viscount Townshend, in his book on the poor laws published in the early 1700s, cited the buccaneers who reported that the goats they had released on the islands had multiplied to the point that the islands would not support any more goats. When Malthus read that report, he reasoned that human beings were doing the same thing.

What people bring to a place and what they take away is the key to how culture ruins environments. The Galapagos in the 1600s was no different from any environment today—what we put in and what we take out determines the future.

It used to be that human beings ruined their environment by taking stuff out of it. Some ten thousand years ago, before the agricultural revolution, hunting and gathering was successful enough to make huge incursions on the hunted animals. As some species became scarce, people

either had to change their way of living or perish; they took to farming. Again, by the end of the Middle Ages, European peasant agriculture took so much out of the soil that the growing population could no longer be supported. And again, people either had to change their way of living or perish. So began the Industrial Revolution.

But we now are dumping a new kind of waste into the environment. Buccaneers traveled for loot. Darwin traveled for knowledge. Tourists, however, travel for pleasure. What they leave behind is money.

For most of the tourists in our party, picking up a new set of place names to drop in their "been there, done that" displays was an immense pleasure. They also came to hunt for bargains: the passion that Adam Smith called "a certain propensity in human nature . . . to truck, barter, and exchange one thing for another." They looked for bargains in the islands, and actually found them on the mainland of Ecuador. Bargaining is a passion driven by the idea of getting more than you give, never mind that the artifact will end up tucked away somewhere. But the passion, while it was on them, was as exciting as sex and as demanding as hunger.

After the frenzy, the tourists leave the islands with their trinkets thinking their money well-spent. But just as surely as those buccaneer goats altered the ecology of the islands, the money left by modern tourists is altering the social structure of Ecuador. It seems that there is more than one way to devastate a local landscape. As the naturalists keep watch on the delicate balance of the island ecology, we need to wonder who is looking out for society. **BO**

FUNDS

ALL THAT GLITTERS: Cashing in on the interactive future

By Linda Marsa

Customers are getting a sneak preview of the future as telecom giants launch field trials of interactive services.

Flick a switch and cyber-jockeys will cruise lightning-speed networks on virtual voyages to the far reaches of the data galaxy to bring the world into their living rooms. At least that's the tantalizing promise of the electronic superhighway. But the interactive future may simply be just a more sophisticated version of what exists already.

Cable outfits, Baby Bells, and media giants like Time-Warner have launched field trials around the country to glean a glimpse of that future. No matter who wins the battle for control of the network's infrastructure, some analysts say the real profits will come from the programming piped into the nation's homes. The spoils in this electronic range war will go to the firm that can deliver services and products that people actually want, at affordable prices. But what falls under the rubric of interactive media is complex, and the industry is volatile.

Though virtually every studio in Hollywood has launched a new media division, no one knows how well Hollywood's skills will translate to the interactive world or even what role the New York publishing giants will play. With so many imponderables, advises Michael Murphy, editor of *California Technology Stock Letter*, "don't invest in content suppliers purely for the high-way play. Stick with firms whose basic business is solid."

There are, however, a handful of visionaries who are pushing forward the electronic frontiers, like designers of computerized theme park rides, PC software, and Tronlike videogames of the future, where players move within the electronic landscape. Among the key innovators are Iwerks Entertainment, which



builds 360-degree screen theaters for theme parks and is experimenting with virtual reality experiences; Electronic Arts, a developer of entertainment software for PCs and video cartridges for Nintendo and Sega; and Silicon Graphics, the magicians who created *Jurassic Park's* dinosaurs.

To prevent getting trampled by a stampede of data, viewers will soon rely on software agents to monitor the flow of information, ferret out movies, news, and information of specific interest, and even do routine chores—sort of an electronic valet. General Magic, a consortium of technology giants whose intelligent agents patrol cyberspace, seems to be ahead of rivals in this particular niche.

But devising the software that drives this gadgetry "is tricky, and delivery dates are constantly being pushed back," cautions Denise Caruso, editorial director and publisher of the *Technology & Media Newsletter*. It may be years before any of this digital wizardry pays off in viable products—and investors

could lose on long shots. In the interim, advises Caruso, "look for things that are exciting, yet don't require the technology to jump through hoops."

In the planning stages are original channels aimed at specific consumer tastes, like game shows, talk shows, crime shows, or soap operas. Subscriptions to online services like the Internet, Prodigy, Delphi, and America Online are also skyrocketing. "Online services ranging from cheap chat lines on up will be money-makers," says Murphy. "People want to connect, and they want information, online services can fill both needs right away."

However, there are likely to be more than a glitch or two involved in wiring up America. Investors looking for less risky ventures might be better off investing in mutual funds specializing in the new technology and leaving the headaches of monitoring this volatile market to portfolio managers. Most of these funds, like T. Rowe Price's New Age Media Fund, are so new they don't have a reliable track record to evaluate performance. But often their managers do, like media maestro extraordinaire Mario Gabelli, who helms the newly formed Interactive Couch Potato Fund. And don't forget goliaths like Microsoft, Motorola, and Intel, which are strategically positioned to surf the next technological wave.

Moving to true interactivity—the ultimate sound and light show—will require vast changes in the technological and regulatory infrastructure. "Something is being created that is not movies and is not television," says Denise Caruso. "No one really knows what it is just yet. But I wouldn't invest in a company where the people involved didn't have a vision for the future." **DD**

BOOKS

WRITING WITH THE NET UP: Emphasizing the "science" in science fiction

By Robert K. J. Killheffer

They don't call it science fiction for nothing, though sometimes it might seem that way. The mushy physics, galaxy-hopping mysticism of *Star Wars* and *Star Trek* may hark back to the pulp science fiction of E. E. "Doc" Smith and Edmond Hamilton, but they don't say a lot for the average level of science education among Hollywood producers.

Nevertheless, there is a long and healthy tradition of more scientifically faithful science fiction, running from Jules Verne and H. G. Wells through writers of the 1930s, 1940s, and 1950s (think of Arthur C. Clarke and Hal Clement) and on into the 1960s and 1970s in the hands of Larry Niven, Gordon R. Dickson, and others. Hard science fiction stands for some readers as the true heart and soul of the genre, and it continues vigorously today, as is evidenced by a look at some recent publications.

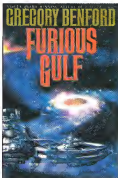
The nearly 1,000 pages of *The Ascent of Wonder: The Evolution of Hard Science Fiction*, edited by David G. Hartwell and Kathryn Cramer, offers a good introduction to what hard science fiction is all about. Here you'll find familiar classics of the form, such as Bob Shaw's "Light of Other Days," which takes off from the intriguing idea of slow glass through which light passes so slowly that images are effectively preserved for years, and "Surface Tension," James Blish's marvelous tale of microscopic humans living on a world almost entirely covered with water. But you'll also encounter stories and authors not normally associated with hard science fiction: "The Indefatigable Frog" by Philip K. Dick, a delightful exploration of Zeno's famous paradox, and Ursula K. Le Guin's thought-provok-

ing "The Author of the Acacia Seeds," which examines the possibilities of nonhuman languages. In *The Ascent of Wonder*, hard science fiction emerges as a rich tradition, but the book also provides plenty of ammunition for critics, who complain that other literary values—such as believable characterization—get short shrift from these science-fiction writers.

Gregory Benford's most recent novel, *Furious Gulf*, confirms hard science fiction's contemporary vitality. Set in the far future, *Furious Gulf* picks up where *Tides of Light* (1989) left off, following a band of humans as they flee the murderous "mechs" (intelligent machines) toward the star-crowded center of our galaxy. The book comes most alive when Benford focuses on the panorama of the cosmos, the "furious gulf" of gaseous and forces that surrounds the all-consuming black hole at the galactic core, and the mind-boggling effects of space-time warping under the black hole's giant pull. Dealing with the immensities of the cosmos, Benford achieves pure poetry: "Ten billion years of sacrificed matter . . . have their single tombstone in the mute remaining disortion. A galaxy's ancient pain persists as silent gravitation."

Paul Anderson, one of hard science fiction's most consistently impressive writers, evokes the majesty and mystery of the cosmos closer to home in his latest, *The Stars Are Also Fire*. Two plot strands converge, one following lunar matriarch Dagny Beynac's lifelong peacekeeping efforts, the other focusing on Ian Kenmuir and Aleksa Kame who, centuries later, undertake their own struggle against the static (but peaceful and prosperous) rule of artificial intelligences

("sophotects"). Both plots turn as much on politics and human choices as on the laws of science, but Anderson's hard-science spirit imbues every page. The bleak surfaces of distant asteroids and the nearer moon become beautiful and vibrant in Anderson's hands, and attention to accuracy informs even the details. At one point, as Kenmuir cycles an airlock, he notices that the light from the lock's fixture dims as the air is pumped out—without air molecules to scatter it, only a small fraction of the bulb's



Creating fictional worlds that are grounded in scientific plausibility is the very heart and soul of hard science fiction.

light reaches his eye.

Whether hard science fiction is indeed the spiritual center of the genre or not, there's no doubt the form is alive and well in the hands of writers like Benford and Anderson. Just as the net provides a vital structure to a tennis game, the strictures of scientific plausibility lend a special intensity to hard science fiction, presenting the grandeur of the universe with the power of a revelation. Inspired by science, the best hard science fiction makes science inspirational. **DD**

MEDICINE

EDIBLE VACCINES: Enhancing the benefits of nature

By Linda Marsa

Healthy eating may soon include fruit and vegetables bioengineered to provide us with the antigens necessary for immunization.

Michael Hein carefully inspects his charges, dozens of alfalfa seedlings that sit in neat rows in a locked hothouse tucked away in the corner of an underground parking garage. Hein, a plant biologist at Scripps Research Institute, hovers over the scrawny shoots like a protective parent. But these are no ordinary alfalfa sprouts. These plants have been genetically endowed with antigens—proteins on the surface of disease-causing microbes—that provoke production of antibodies that confer immunity to cholera, which kills 10 million children each year.

Hein is one of a handful of researchers using the tools of bioengineering to transform ordinary fruits and vegetables into botanical cargo vessels that carry life-saving vaccines. Edible vaccines promise to be an affordable and safe way for people in even the most poverty-stricken parts of the world to protect themselves against disease. They dispense with the need for refrigerated and purified serum, hypodermic needles, or even trained medical personnel to distribute and oversee vaccinations. The goal is to give people in developing countries the genetically engineered seeds that will sprout edible vaccines. "Every culture on this planet raises food," explains Hein. "This can provide developing countries with a stable vaccine source because it will be genetically coded into the food."

Using recombinant DNA technology, researchers can now isolate the genes—called antigens—that mobilize our natural defenses. But impregnating plants with these antigens requires an impressive bit of molecular legerdemain. At Scripps Research Institute, for instance,



the antigen is snipped off the deadly cholera pathogen. Then it is inserted into the cells of a bacterium that causes a plant disease called crown gall. The alfalfa plants are infected with these transgenic crown gall organisms, which can penetrate the plant's cell walls. The plant cells containing the foreign genes are then cultured in a petri dish until they are mature enough to be transplanted.

The next step is to test the potency of the antigens in plants raised in the field, outside of the cloistered laboratory. "We've just harvested this crop of alfalfa," says Hein, who's in the midst of measuring its antigen levels. He plans to feed this transgenic grain to mice soon, and hopes to begin safety trials on human subjects within the next year. Hein chose cholera as an experimental model because he knew the disease's antigen could avoid being chewed up by the acids in the digestive tract. (Antigens for other illnesses often dissolve in the stomach so they lose their potency.) But the real test will be whether these cholera toxins are

absorbed by the body in high enough concentrations to stimulate an immune response.

Similar research is being conducted by Charles Amntzen, a molecular biologist at Texas A&M University. He's produced a potato that prevents gastroenteritis and is now cultivating a banana to block hepatitis B, a disease that afflicts 300 million people around the world. Amntzen's team has already overcome one major hurdle: They've managed to coax a foreign gene into the genetic structure of the plant's cells.

Other research, such as the vaccines concocted by Richard Curtis III, a biology professor at St. Louis's Washington University, uses a wide variety of plants to carry the payload, including broccoli, turnips, cauliflower, cabbage, and Brussels sprouts.

In the meantime, formidable scientific obstacles remain before getting vaccinated will be as easy as munching a salad. But sometime soon, a mother scolding her kids to eat all their vegetables may take on a whole new meaning. **DO**

ELECTRONIC UNIVERSE

TIME OUT:

Take a break from science-fiction entertainment

By Gregg Keizer

Enough's enough. Sometimes even *Omni* readers, gluttons that we are, need a break from science and science fiction. Light-speed space ships, astrophysics, time travel, and genetics aren't the only things going in electronic entertainment these days, not by a long shot. Ignore all the rest, and you're cutting yourself out of a big chunk of today's digital diversions. To make up for the lapse, here's a trio of gotta-get titles that have as much to do with science as a creationist's thoughts on evolution.

Panasonic's 3DO CD-based game player, which this spring dropped from \$700 to a more manageable \$500, still suffers from title deficiency. Games like Electronic Arts' *Twisted: The Game Show*, though, offset the puny library. A wacko game show parody, *Twisted* struts the video power of the 3DO machine, for it's packed with live-action actors, music and sound

effects, and plenty of dialog. You get a reliably obnoxious host, a six-pack of off-beat video contestants, and enough trivia questions, time-critical puzzles, and laughs to keep you interested. As many as four can play by sharing the controller and since you can set each player's difficulty level separately, *Twisted* is a decent family game. You'll relish the contestants (Humble Howard Humbert, a slick TV evangelist type, grovels appropriately in front of the camera); you'll roll the Cyber-die, and you'll move on a 90-space board when you get things right. *Twist-*

Oliver Stone's story, *J.F.K. Assassination* is a bull's dream. Not only can you watch the famous Zapruder home movie—and others shot on the scene—in its entirety on the PC screen, but you can step through it frame by frame for a truly gruesome perspective. Computer-created 3-D animation traces the shots (both real and suspected), and complete text from the Warren Commission, the House Select Committee on Assassinations, and the conspiracy book *Crossfire* is available for deeper meanings. Scores of other elements—the TV clips of Oswald are keepers—crowd the disc. *J.F.K. Assassination* may not highlight a pretty part of history, but it's a fascinating wrap-up of the biggest event in 1963.

An even darker part of the twentieth century is the footing for Voyager's *Complete MAUS*, a CD now available for the Macintosh, with a Windows version soon to follow. Based on Art Spiegelman's Pulitzer Prize-winning two-volume *MAUS: A Survivor's Tale*, this disc contains the contents of those comic-style memoirs of the Holocaust and its aftermath. On-screen reading isn't what it's cracked up to be (pages are either too tiny or chopped in half), but you're really here for the extras that only a CD can bring to the table. The most intriguing—and in their way, the most horrific—are the two hours of audio clips pulled from Spiegelman's interviews with his father Vladek, an Auschwitz survivor. Other elements, particularly the preliminary sketches, audio notes, and archival documents tagged to specific pages, give you a glimpse of the books' evolution. Who said CD-ROM couldn't be compelling?

Sure *Omni* and science go together. Just not this month. **CD**

Truly Twisted: This wacky game-show parody for the 3DO may be an indication of what we'll come to expect from interactive TV.



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the Music



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SOUNDS

DATA BASS: Empowering the amateur musician

By John Thompson

The music of machines and men merge: Machover's new piece for the hyperkeyboard. *Bounce*, is now available on CD through the Bridge label.

Since the mid Eighties, Tod Machover, composer and computer wizard at the MIT Media Lab, has best been known for inventing "hyperinstruments," such as his hypercello, which is packed with electronic sensors that relay a player's subtlest motions to a computer which can then augment the sound with harmony, new timbres, or complex rhythms.

But lately Machover and his colleagues at the Media Lab have been working on enhancing the enjoyment of the amateur musician. One resulting instrument should be available late this year for under \$1,000: *Drum-Boy*. This interactive percussion system could make current drum machines look like animal-skin bongos. *Drum-Boy* has three basic components: an 88-note keyboard, a drum synthesizer, and a Macintosh II computer which holds the brains of the system, an artificial-intelligence software system called *Hyperisp*.

The top part of the keyboard is played like a conventional drum machine—different keys correspond to different preprogrammed drum sounds, some keys also generate a standard pattern or beat. After calling up one of dozens of standard patterns, the pattern can then be altered at the keyboard, without the encumbrance of the usual buttons and knobs. Or easier yet, the user can play a pattern and *Drum-Boy* will call up different variations until the desired result is achieved.

The bottom part of the keyboard offers a complex new palette of expression that Machover calls "adjective transformation." One note, for example, might be labeled "calm," another "energetic" or "agitated." The software analyzes a given drum pattern in real time in 20 different



ways: pitch, instrumentation, repeats, downbeats, tempo, and so on, and it can then alter the drum pattern to match the adjective. How hard the note is played changes the degree of the adjective—for an even more energetic sound, the "energetic" key is played harder. *Drum-Boy* keeps drumming until told to stop, one key can record, store, and layer desired tracks. Machover likens the system to "having a great musician in the room with you—you try to coach that musician to play what you want."

Although designed for percussive sounds, Machover adds that it could easily be hooked to a sampler or customized to play a number of different instrument sounds simultaneously. But to really add melody and harmony in a highly sophisticated way, Machover's team is developing an even newer concept: seed-generated music. Using this system, still an embryonic idea itself, the user plays a few notes, a seed of music. A computer then analyzes that seed in 15 or more parameters and begins making up music in the same style and

character as the music fed in. The process of composing thus becomes a collaboration between man and machine—the composer tells the computer to add a little more of this and take away a bit of that, and the computer responds, inspiring new directions for the composition.

A plus to the seed system is the degree of control it would afford. A fine control would allow the composer to make detailed changes in, for instance, the melody alone. On the other hand, the user could stand back like a conductor and make broader alterations—for example, making a whole section more legato or more dissonant. Director Oliver Stone has recently expressed interest in having a music editor use the system to steer a music track while screening a movie.

With all of this control, an amateur musician may very well feel like a magician, throwing possibilities into the air. But then, the virtuoso musicians have always had magic in their fingers. Machover just wants to show us all how to do a few tricks. **DD**

STYLE

COSTUMING AT THE WORLD CON

Fancy dress fashions that are out of this world

By Tessa DeCarlo

Hard-core fans of science fiction and fantasy are a strange breed. They speak their own jargon, criss-cross the country going to various cons (science-fiction conventions), and devote large chunks of their lives to writing, publishing, and reading fanzines about characters from out-of-print books and defunct television shows. And then there's the way they dress.

At this year's World Science Fiction Convention, for example, many of the nearly 8,000 fans in attendance showed up at San Francisco's Moscone Center garbed as *Star Trek* crew and bullet-headed droids, as Gibson girls and harem girls, as post-apocalyptic road warriors in junk-trimmed leather and medieval maidens in flowing brocade, as pirates, satyrs, and Elizabethan vampires.

"Science-fiction and fantasy fans are characterized by an interior fantasy life that is far greater than I find in other people," explained Janet Wilson Anderson, a premier costumer. "Costuming is an expression of that very rich interior life in an environment that has always been accepting of the unconventional."

Because enthusiasm embraces everything from hard-science spaceship tales to mythology and fairy stories, costumers have an unlimited array of possible personae. But unlike most Halloween or carnival getups, these costumes are often as carefully researched and beautifully crafted as the wardrobe in a Merchant and Ivory feature production.

Costuming has always been a feature of science-fiction conventions. Among the items of historic memorabilia on display are photographs of caped spacepeople from the first WorldCon in 1939.

More recently though, costuming has spun off its own conventions and organizations, and most of these science-fiction gatherings now include not only "hall costumes"—outfits worn around the halls of the convention—but competitive masquerades where costumers take their most impressive and outrageous work up on stage.

At the 1993 WorldCon Masquerade, 50 competitors—both individuals and teams—presented their handiwork to a crowd of over 2,000, many of whom were also in fancy dress. Although few costumers are the alter or design professionals and the masquerade, like the entire convention, was an entirely volunteer affair, the contestants put on an amazing show ranging from low comedy to breathtaking spectacle.

A stunning entry titled "Nightwing" featured two jeweled creatures who opened gigantic 18-foot moth wings to reveal a pattern of red and purple eyes. A chess game was brought to life in gold and silver lame by a dozen people from Southern California, while a couple calling themselves "The Folded Universe" appeared dressed entirely in origami paper.

From Berkeley, California, Dana and Bruce MacDermott's "Waiting for a Miracle" depicted a future religion led by an eight-foot-tall, four-armed pope and based on the psychedelic iconography of the Grateful Dead. The couple, who were unemployed at the time, went all out on their entry which included robotics for the pope's second pair of arms and elaborate detailing on his four acolytes' vestments. "This is an expensive, outrageous hobby," sighed Dana

MacDermott. "The joy of it is in the creation of it."

Masquerade stage appearances last only a minute or two, and the awards are rarely more than a ribbon or certificate. Yet costumers unanimously say the months, and even years, of work are well worth it.

Wilson Anderson thinks she understands why. "When you do a piece that other costumers remember and talk about, you pass into legend," she says. "And what is money compared to legend?" **DD**



"It takes long nights and a lot of coffee to make a costume," says one designer, "but when I get a compliment, it's worth it."

MOTIVATIONS

THE PURSUIT OF HAPPINESS:

A businessman's database offers guidance toward contentment

By Robert K. J. Killheffer

Ever since the beginning of the Industrial Revolution, optimistic soothsayers have been predicting that the future would be easier—20-hour workweeks, robot housekeepers, moving sidewalks along every street. Of course, what we've got instead is information overload, two-income households, long, wasteful commutes, and legions of other daily headaches. Demand has effortlessly outpaced the supply of extra "free" time created by new technologies, and living gets more complicated and challenging as the years go by.

How can we make sense of it all, then, and pursue happiness as our hallowed Declaration of Independence assures us we may? New York entrepreneur Gary Spirer has a few ideas.

Well, more than a few—actually enough to fill an immense database, for starters.

Called *Investing in Your Destiny*, Spirer's vast compilation of anecdotes, quotations, summaries of other thinkers' ideas, and his own thoughts and experiences forms an interactive, multimedia self-help program. The database holds thousands of entries from sources as varied as Aristotle and *Time* magazine, Rush Limbaugh, and Rabbi Kushner, and they're keyed by Spirer to a wide range of applicable topic headings. From Biblical times to the present, Spirer says, *Investing in Your Destiny* surveys the "repeating patterns" used by "successful people and effective people" in confronting the challenges of their lives. In effect, it offers an easy-access, interconnected window on what he calls "the human legacy."

At 48, Spirer is a highly successful businessman. He has helped start dozens of companies and made himself millions, starting on his own in 1974 with nothing but a \$15,000 loan and plenty of pluck. Today, as president of the investment-banking Capital Hill Group, he overlooks the urban panorama of New York City from his office on Park Avenue; he's been married for 22 years, has two daughters and a comfortable home in Westchester County. "Looking back, I would say I've done most of the things I wanted to do," Spirer muses, without a trace of smugness. "I'm fortunate. I don't have a lot of regrets."

But all along he's felt that "to really be part of life, you have to contribute something." With *Investing in Your Destiny*, Spirer hopes he's finally found his way. It's the product of his own 20-year search for self-understanding, and several years ago it

struck him that he could compile the fruits of his labors—his thoughts and insights, the passages that have revealed things to him or helped him along—into a tool to help others on their own quests for success.

Most importantly, he thinks, people have to state their goals as specifically as possible, before trying to apply techniques or strategies to attain them. "People often have stated our public goals that are not in line with what they really want to do," he says. Those who come to his seminars frequently start out with vague pronouncements like "save the world," "help my fellow man," and so on, which sound nice but aren't nearly specific enough to work toward.

On the other hand, he notes that the majority of self-help and advice books—and even common wisdom—offer only strategies for pursuing goals, not ways of specifying them. It's all well and good to say you have to work hard, Spirer points out, but it gets you nowhere if it's applied in the wrong direction, or without any direction at all. Spirer emphasizes that his program offers no easy outs or get-happy-quick schemes. "Much of the self-help literature," he says, "tells people that there's some kind of happiness without struggle. It doesn't exist." The key, he thinks, is knowing how to struggle, and in what direction, so that it gets you somewhere you want to go.

But don't expect him to have all the answers. "You have to design your own destiny," he insists. "I can't tell you what's good for you." The process of self-discovery and self-motivation never ends, not even for Spirer. "I keep going back to this material," he admits. "I'm not the perfect example of everything I'm writing about. I'm still learning, too." ☐

Motivations is a new column that will feature Gary Spirer's advice on how we can redesign our lives for greater success.



BREAKING THE MARTIAN QUARANTINE:

Must we prevent life on a planet where none can exist?

By Randall Black

The robotic rover sets a course across the frozen red tundra of Mars' polar region. Equipped with a sophisticated onboard biology lab, the multi-billion dollar machine has parachuted onto the surface of Mars and now pursues its primary mission. Find life.

Back on Earth, Rover's human controllers watch eagerly and command the machine to dig. The robot dutifully scoops a soil sample into the automated lab.

"Look at that. He's found life!" The scientists cheer with excitement. But not for long.

"Oh, no!" shouts the chief scientist. "That's the gene sequence of *E. coli*. That's Earth bacterial. Mars has been contaminated."

Welcome to an exobiologist's worst nightmare. Long considered the most likely planet in the solar system to support extraterrestrial life, Mars has also been the focus of a costly international quarantine. Recognizing that any chance of discovering Martian life could be ruined by prior biocontamination, Earth's spacefaring nations agreed to a policy of planetary protection as early as 1967, requiring that both U.S. and Soviet Mars landers undergo rigorous sterilization. Roughly five to 15 percent of the cost of the \$1 billion Viking mission was spent on thermal sterilization of the two Mars landers, according to Richard Young, who served as NASA's planetary quarantine officer in 1978.

Scientists of the former Soviet Union claim to have taken similar precautions with their spacecraft. But an absence of details about both past and upcoming Russian missions makes U.S. scientists suspicious. Is there a chance that Soviet spacecraft that crash-landed on Mars were not completely sterilized?

"Traditionally it's been really

hard to get any information out of the Soviets," says Kenneth Nealson, distinguished professor of biology at the University of Wisconsin and chairman of the National Research Council's Task Group on Planetary Protection. "When you ask, 'How did you do it?' they say, 'That's a secret.'"

But times have changed, and not just in Russia. The failure of Viking to find even organic compounds, coupled with a greater understanding of Mars' profound hostility to life, has many scientists wondering if the costly Martian quarantine still makes sense.

In fact, Nealson's task group

"They did a funny thing," he says. "They said Mars was a harsh place and virtually no organisms we know on Earth could survive there. But they also said that, nonetheless, spacecraft that go to Mars with life-detection experiments should have Viking-like sterilization. To me that makes no sense at all."

McKay questions the logic of a blanket policy of sterilization for spacecraft with life-detection experiments. "Say I've got a system that looks for ammonia life. I don't need to sterilize that. I want the decision left up to my own scientific judgment."



Life, the universe, and everything: Every spacecraft that touches Mars must undergo costly sterilization to prevent it from sowing terrestrial Earth bacteria on the Red Planet.

unanimously agreed that "It is extremely unlikely that a terrestrial organism could grow on the surface of Mars." It concluded that spacecraft orbiting or landing on Mars should be clean but "need not be sterilized." However, the group recommended that landers carrying instruments to detect Martian life should undergo "at least Viking-level sterilization procedures."

That second recommendation disturbs Chris McKay, a research scientist at the NASA Ames Research Center who hopes to devise biochemical experiments for future landers.

Most scientists agree that Earth microbes have little chance of overrunning Mars. However, bacteria freeze-dried in the cold vacuum of space have proven hardy survivors. In 1969, Apollo 12 astronauts retrieved parts from the unmanned Surveyor lunar lander and found viable *Streptococcus mitis* bacteria. Somehow the microbes had survived on the moon for more than two and a half years.

"No matter how hard we tried, our task group couldn't say that the probability of contamination of some Earth organism on Mars was zero," Nealson says. ☐



CONTINUUM

LOOKING FOR A HERO:

Modern comic book characters toil in an imperfect world. Plus, shaving bad compact discs and pumping gas from Uranus

Superman is dead, Batman is eligible for retirement, and Thor has gone back to Valhalla. What has happened to our comic book heroes? Dystopian anti-comics explore such issues as mental illness, lurid sex, and graphic violence. It is all too telling that Clive Barker's world of the Cenobites has come to life in his *Hellraiser* comics. In a world that could really use a hero, Barker offers us a dead man.

For Ted McKeever, a comic artist and writer who started at the fringes of the comic industry with his black and white *Eddy Current* comics, visualizing the world as a singularly dark place and accepting the powerlessness of individual acts of courage are not the same thing. Today, his work with DC Comics has entered the mainstream, blending together his bleak vision of society with the nearly primal need for true heroes.

Like Sisyphus, McKeever's characters toil in a world which may not notice them. They are heroes rolling the boulder up society's hill, only to see it roll down again and again. However, given the opportunity, they do have the ability to do something. What is rewarding in McKeever's comics, is his attempt to find noble action in ordinary or impoverished lives.

While his characters struggle to settle the demons within, they find only a partial redemption, never a perfect one. In fact, nothing offends McKeever more than perfection, for him, the ideal hero is "Don Knotts cast in the role of Arnold Schwarzenegger."

Jasper Notochord, one of the central characters in *Metropolis*, represents the typical McKeever hero: disenfranchised, visionless, helpless. This 90-pound weakling is recast into an angel of the Apocalypse, his flesh falling away to reveal gleaming, invincible metal underneath. Even though gifted with otherworldly abilities, Jasper is still confused, unsure, an agnostic playing out a role he is not quite sure he wants.

Through Jasper's struggles to live out his new role as a hero, we can draw corollaries to our own lives, and through this connection, we come to care very deeply about our hero. For McKeever, it is not the results



his heroes achieve which is paramount, but it is the process, the day-to-day struggle of attempting to be a hero, which is at the heart of his tales.

McKeever's Florida studio looks onto the sapphire-blue sky, contrasted against the palms that dot the carpet of grass. But, inevitably, he is drawn away from this beauty and attracted to the decaying patina of rust on an air-conditioner, or the patterns of dust and cobwebs in the corner of the window. When he creates, he gives himself up to the experience, letting himself be driven by the emotion which he is trying to convey. Drawing one-panel in pen and ink, the pen nib snaps, and the thick, blotchy line conveys the feelings perfectly, and he works with the pen, letting the ink pool and spatter into lines which streak out of control. "I

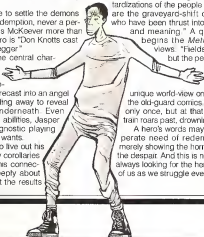
am at the mercy of what I sit down to do," says McKeever. "I have no perspective or perception of what I'm doing. When I'm done, I'm done."

For his sources, he spends his hours at the local mall, watching people. He records the images mentally, with no sketchbook at all, and his characters evolve out of his observations, becoming alterations, mutations and bastardizations of the people he's seen. His heroes, then, are the graveyard-shift convenience store workers who have been thrust into a heroic role "full of poetry and meaning." A quote from Socrates which begins the *Metropolis* series sums up his views: "Fields and trees teach nothing, but the people in a city do."

Currently, McKeever is finishing up work on a Batman story, casting his unique world-view on the most prominent icon of the old-guard comics. In his story, Batman speaks only once, but at that crucial moment, a subway train roars past, drowning out the words of the hero.

A hero's words may fall on a deaf world in desperate need of redemption, but for McKeever, merely showing the horror of existence only adds to the despair. And this is not enough, in his work, he is always looking for the hero's heart that beats in each of us as we struggle every day for survival.

—PAUL C. SCHUYTENA





CONTINUUM



Life in an unlikely spot: *Movie Cave* in Rumania, an environment with little oxygen and lots of poisonous gas

YOU REALLY CALL THIS LIVING?

A host of newly identified bacteria, insects, spiders, and crustaceans have thrived for up to 5 million years in a cave in Rumania, in conditions that known scientific principles say should be incapable of supporting life.

"Before the cave was discovered," says Rumanian biologist Serban Sarbu, a researcher studying the cave's unique environment who is now at the University of Cincinnati, "we didn't think these kinds of organisms could survive in such high levels of carbon dioxide and hydrogen sulfide and extremely low levels of oxygen, which vary from 7 to 10 percent. Normally, air is 21 percent oxygen." Also, it appears that most food is produced by bacteria that obtain energy from hydrogen sulfide. The amount of hydrogen sulfide, a poisonous

FOR EVERY SHARK THAT TAKES A BITE OUT OF A HUMAN BEING, HUMANS KILL ABOUT A MILLION SHARKS.

gas, was by itself thought to be detrimental to terrestrial life forms."

Certain species of crustaceans living along the ocean floor also thrive in high levels of hydrogen sulfide and feed on bacteria that draw energy from the gas. But, Sarbu contends, "the most important difference is that organisms living around the deep-sea hydrothermal vents obtain food from outside sources that drop down from the ocean's surface. In the cave, the system appears to be isolated from the surface, and hydrogen sulfide appears to be its only source of energy."

—Bruce Galt

GIVING COMPACT DISCS A SHAVE

Up to 30 percent of the millions of compact audio discs manufactured every year in the United States suffer damage in production or sit unsold in warehouses. Disposing of these unwanted discs poses a massive problem. Not only are they made of hardy polycarbonate plastics designed to resist deterioration, they're also coated with protective layers of aluminum and resin. Most manufacturers don't even try to recycle the discs because the chemicals used to steam or sandblast the coatings from the defective CDs are even harder to dispose of than the indestructible discs themselves.

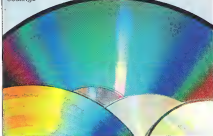
"The manufacturers just grind them up and dump them in landfills," says August DeFazio, an inventor whose Star-Brite Incorporated in Darlington, Pennsylvania, has patented a way to remove the coatings

"My invention skims the top off, down to three one-thousandths of an inch, taking off the aluminum, the print ink, and the coatings."

DeFazio's automated machine uses a rubber roller to feed as many as 3,600 discs an hour through a surface mill that brushes away the shavings and leaves just the pure, recyclable plastics that can be sold to any number of packaging companies. Several big discmakers have expressed interest in DeFazio's device.

DeFazio can only venture a guess as to how large his business could become should manufacturers decide to start recycling discs. "3M alone must have something like fifty thousand pounds a year, and they're not even in the music business," he observes. "Sony could have two hundred thousand. There could be one hundred thousand tons of rejects a year. Who

knows?"—George Nobbe



POTATO PHYSICS

According to Peter Barham, a physicist at England's Bristol University, you must follow the formula $T = r^2/c$ to get a perfectly cooked potato. T is the cooking time, r is the radius of the potato, and c is the constant that depends on the water's heat capacity and the diffusivity of the water and the potato.

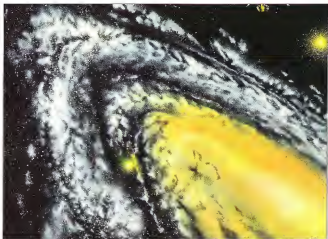
Barham points out that potatoes consist of starch granules which in turn are made up of two types of large-polymer molecules, amylose

THE SOVIET UNION HAS A LAND AREA THAT WOULD COVER OVER HALF THE SURFACE AREA OF THE MOON.

and amylopectin. When heated above 60 degrees Celsius, the molecules start to absorb large amounts of water to form a translucent material scientists call a gel—the cooked potato.

Barham's experiments entailed cooking potatoes for various periods and then slicing them in half. He found that the ring of cooked potato moved gradually to the center, not linearly with time but with the square root of the time.

He claims that his findings show that many cookbooks are mistaken. "They say you should calculate cooking times according to weight, which is completely wrong," says Ivor Smullen



Don't give up on those galactic travel plans just yet. A computer simulation took a look at a million stars and discovered 28 that might just host life-sustaining vacation spots.

ANYBODY HOME?

Are we alone in the universe? Not a chance, says a British astronomer.

With the help of the Probability Research Group at the University of London's Birkbeck College, Martyn Fogg, who holds degrees in both astronomy and dentistry, performed an experiment whose results may startle those who believe that life can't exist elsewhere. "We may require another explanation for the 'Great Silence' other than the lack of suitable sites for the origin of life," he says.

Using a computer simulation, Fogg devised a mathematical sky sweep of

1 million stars in our own Milky Way galaxy. He divided the contenders into two groups, biocompatible (life-sustaining) and habitable (suitable for Earthlike conditions). He reasons that in order for a star to sustain planets in regular orbits, it must consist of gaseous nebulae, containing sufficient heavy elements for life to flourish. Next, for a star to have a biocompatible planet, it has to generate sufficient surface temperature to permit water in a liquid state. A habitable planet must orbit the star within a zone compatible with life—global temperatures of zero degrees Celsius through an upper limit

similar to the earth's greenhouse effect.

Fogg's methodical sky sweep turned up 28 stars that could meet these conditions—all less than 22 light-years away, possibly with biocompatible planets circling them. "The nearest biocompatible planet may lie around 14 light-years distant," Fogg says, "and the nearest habitable planet, around 31 light-years away."

Fogg's computer model predicted that Alpha Centauri A, which he describes as "a sun that is right on our cosmic doorstep," has the highest probability of possessing a world where life could exist.

—Erin Medlicott



CONTINUUM



Uranus could be an inexhaustible source of energy.

CONSOLIDATED EDISON OF URANUS

Can a gas found on Uranus help power your blow dryer?

The idea isn't quite as far-fetched as it sounds: John S. Lewis, a professor in

the Lunar and Planetary Laboratory at the University of Arizona and co-director of the university's Space Engineering Research Center, is working on a project that would use gas from Uranus to run a nuclear-fusion power plant on Earth. Lewis's plan calls for sending an automated system to float in the atmosphere of Uranus, where it would separate out and collect helium-3, a rare isotope of helium. Back on Earth, combining the helium-3 with deuterium would produce electric power via fusion. Unlike today's fission reactors, fusion reactors wouldn't produce radioactive waste as a by-product, Lewis says.

There's enough helium-3 on Uranus to sustain a population 100 million times the size of the present

population on Earth from now until the sun dies of old age," Lewis says. Moreover, the energy brought back via Lewis's system would far exceed that expended to get to Uranus.

The plan should be fairly easy to design and ex-

seriously at deep-space missions. The long travel time presents the major problem. "Robotic tankers flying back and forth from Earth to the processing plant may take 10 years to make the trip," he explains. "But it doesn't take a whole lot of

THE WORLD'S SMALLEST FISH IS THE DWARF PYGMY GOBY (*PANDAKA PYGMAEA*), A FRESHWATER SPECIES OF THE PHILIPPINES. IT TAKES MORE THAN 35,000 OF THEM TO MAKE AN OUNCE.

ecute, Lewis adds—"even when the engineers and the lawyers get done with it."

Robert Ash, professor of aerospace engineering at Virginia's Old Dominion University, feels that Lewis's plan will be feasible once we begin to look

helium-3 to get a lot of energy, so it justifies the trip." How long until we can tap this power source? "The time required to develop that technology is probably similar to the time required to make an economical fusion reactor."

—Devera Pine

SEIZURE CEASER

A small electrical generator has halved the number of epileptic seizures suffered by patients in preliminary tests at approximately 25 medical centers in the United States and abroad.

Cyberonics, of Houston, devised the 55-gram, pocket-watch-sized generator, which is inserted above the rib cage. Its wires carry current to electrodes wrapped around the vagus nerve in the carotid area, which sends signals from the visceral system—the heart, stomach, intestines, and vocal cords—to the brain. When activated, the gener-

ator typically emits one or two milliamperes of pulsed current in 30-second bursts every five minutes, which somehow dampens seizure activity.

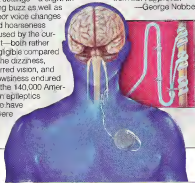
Patients given high stimulation in the first three months of tests experienced an average of 23 percent reduction in epileptic seizures. In the second year, the subjects—who averaged 60 seizures a month during a baseline period—averaged less than half as many seizures.

The patient can activate the implant, which lasts for three to five years, by turning on a switch using a hand-held magnet when a seizure seems imminent,

explains Joe Wernicke, vice president for clinical affairs for Cyberonics. Volunteers report minor side effects which can be managed by changing output settings—a slight tingling buzz as well as minor voice changes and hoarseness caused by the current—both rather negligible compared to the dizziness, blurred vision, and drowsiness endured by the 140,000 American epileptics who have severe

seizures despite current treatment methods. The device costs \$6,000, about the cost of three to four years of drug therapy, and is two years from FDA approval.

—George Nobbe





CONTINUUM



Research conducted in Cairo shows that grasshoppers treated with compounds from Western plants don't develop into locusts.

AMERICAN DIET FOR MIDDLE EASTERN GRASSHOPPERS

Desert grasshoppers in the Middle East are usually harmless solitary creatures content to munch on whatever plants they find. But when profuse rains cause a burst of plant growth,

types of flora that grow primarily in the West, including fir trees and sweet-basil plants, act like hormones, controlling the grasshoppers' ability to transform into locusts, he says.

"We're finding that there are plants which contain compounds that mimic this hormone, and if

THE EARTH'S ATMOSPHERE HOLDS ABOUT 3,100 CUBIC MILES OF WATER—ENOUGH TO COVER THE ENTIRE EARTH WITH MORE THAN ONE INCH OF RAIN IF IT FELL AT ONCE.

the insects can within a generation transform into gregarious, ravenous locusts, capable of swarming over thousands of miles, devouring crops and devastating farmers. Now William S. Bowers, professor of chemical ecology in the entomology department of the University of Arizona at Tucson, believes he has discovered a natural way to prevent the grasshoppers from swarming.

Compounds in various

you give the insect little choice but to feed on this plant, it will tend to keep it in the solitary phase," Bowers explains.

Scientists can use recombinant DNA techniques to splice genes into the Old World's desert vegetation, from American plants carrying the pertinent compounds, he says. A more mundane solution might be simply to transplant some of the useful plant varieties, he adds —Dale McGeheon

REPAIRING BLOOD VESSELS

How do you keep arteries unclogged by angioplasty from closing after surgery? Doctors could soon be coating the interior of the cleared arteries with a "paving polymer" developed by a Tucson cardiologist.

Arteries expunged of plaque will frequently close up after surgery. So doctors currently implant permanent metal stents as a sort of internal artery scaffolding. But in 30 percent of the 400,000 angioplasties performed each year in the United States, a condition called restenosis develops when too much scarlike tissue forms inside the stent-implanted arteries.

"It seems a liability to put a permanent implant device like a stent in a living, beating heart for what is a short-term healing process," says Marvin J.

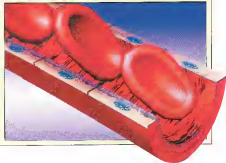
Stepian, an assistant professor of medicine at the University of Arizona and director of interventional cardiology at the Tucson Veterans Administration Hospital.

Stepian experimented with a biodegradable dissolving plastic from the polyester family that turns soft when heated by a solid-state laser. In its malleable state, it can be applied by a catheter and molded to the interior walls of heart arteries. "It can be custom-tailored to the hills and valleys of the arteries, and six months after angioplasty when you don't need it anymore, it's gone," he explains.

The material could potentially be used in tube-like areas elsewhere in the body, Stepian adds, and doctors could mix medications into the polymer as well to create an internal drug-delivery system.

—George Nobbie

Coating arteries with a biodegradable dissolving plastic may keep them from closing up after angioplasty.



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A NEW APPROACH TO INTUITION

IQ₂

AN UNABASHED
JUNGLIAN TAKES A STARTLING LOOK
AT INTUITION—
AND SHOWS HOW TO MEASURE YOURS.

ARTICLE BY DANIEL CAPPON, M.D.

This is the story of a groundbreaking test of human intelligence and of how I came to develop it. The IQ₂, the *Intuition Quotient Test*, seeks to measure the capacity or innate ability of what I think will turn out to be the oldest and greatest part of human intelligence: our intuition.

It may seem absurd to some that intuition, too long regarded as irrational, should be explored through scientific study and measurement. But ours is a world in which only seeing is believing, and only analysis and logic are reality. So I seek to demonstrate the truth of intuition.

Both kinds of intelligence dwell in the same mind: intuition, the handmaiden of inductive reasoning, and analysis, serving the same purpose for deduction. Ideally they work in balance, yin and yang. If logical reasoning and scientific analysis have brought knowledge to the crown of human intelligence, then intuition—and its inseparable twin, creativity—form the jewel in the crown.

If I am correct, and intuition can be measured, then IQ₂ may prove to be much sounder scientifically than many widely accepted psychometric measurements in use, and certainly more valid than intelligence tests (the original



PHOTOGRAPHS BY ROBERT CLARK

IQs.) To that end, I have based IQ2 on an operational definition of intuition, which makes all the difference between rhetoric and reality.

It is my belief that in the millions of years of evolution preceding the development of speech, intuition ruled everyday life. Since the development of speech, however, intuition has gradually lost dominion to informed thinking. Further, in the centuries since the Enlightenment, the role of intuition has been degraded to the point at which it's often depicted as located somewhere between Mystics Boulevard and Psychic Lane.

It is time to remedy this. My goal in my work has been to demythologize and demystify intuition, restoring its reputation and nobility.

My first attempts at studying intuition were undertaken in the field. I had the hunch that intuition was the key to individual and collective success in all human endeavors. This became my main hypothesis. Seeking to explore this

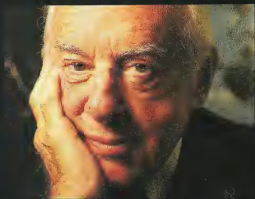
intuition comes in two forms, however it differs among individuals: *Fast-track*, life-saving intuition seems to come from nowhere. Like lightning in the brain, it flashes in the seconds during which an accident or injury is avoided. *Slow-track* intuition takes shape differently, as a successful solution to what has seemed an unaddressable problem.

The personal determinants of intuition—how big the individual's capacity, how easy the access, how effective the application—were subject to my investigation. My work, using the Cappon Intuition Profile, suggests that Type A personalities inhibit and even atrophy intuition, while Type B personalities expand and access it.

But it is the anatomy of intuition, the structure of it, which is where IQ2 comes from, based on my operational definition of the intuitive process and the skills on which it rests. That definition, in fact, came to me through a process guided by my own intuition.

Ordinary language still deals with intuition as an instinct,

M_y
GOAL IN MY WORK
HAS BEEN
TO DEMYTHOLOGIZE,
DEMISTIFY
INTUITION AND TO
RESTORE
ITS REPUTATION AND
ITS NOBILITY.



hypothesis, I approached companies to see if their key decision-makers were intuitive. At the time, my research tool was an Intuition Profile Survey.

I discovered, to no surprise, that intuition was generally held to be disreputable. Worse, I found that the more an organization flew by the seat of its pants, and the more the organization became human-service related, the more unwilling the organization was to permit us to study intuition in its ranks.

By now, I had followed Linnaeus's example and taken steps toward a classification structure for the whole phenomenon of intuition. I divided it into an anatomy—the structure of the innate capacity or ability to be intuitive, a physiology—the accessing variables which fire off the intuitive process in the field; an embryology—both the collective evolution of the capacity for intuition and also the personal determinants for its functioning in individuals, and the process itself.

particularly in regards to everyday situations. This despite science having long since swept away notions of instinctive behavior in humans and replaced them with environmentally imprinted behavior. The implication of this transformation of instincts into higher orders of conditioned behavior, merged with my sense of history, psychology, and anthropology, created for me a picture of the early human consciousness. And this brought the flash of realization concerning our collective intuitive roots.

In our early ancestors, defensive reflexes became conditioned and clustered into instincts. Instincts then became transformed into economical iconic imagery stored in the vaults of the transpersonal or collective unconscious. Over the long course of preverbal history, these instincts became a nascent intelligence, namely *intuition*, useful for survival and for further mental development.

With the development of speech, a curtain lifted from the twilight of consciousness. The eventual result of this new

ASSESSING YOUR OWN INTUITION:

You can assess your capacity for intuition, or quantify it, or do both. Also, you can gauge that capacity naturally by testing yourself on occurrences from everyday life, or from setups with other people's help (as indicated below), or both.

One warning: Once you've tested a skill, do not repeat the same representation of the skill. If you do, you may no longer be testing your innate intuitive capacity but a trained or developed skill.



DETERMINE YOUR OWN INTUITIVE POWERS WITH THIS NEW TEST DESIGNED BY DANIEL CAPPON

1. See how many dissociated (different) images you can generate while looking for seven seconds at a colored sheet of paper (red makes a good test). Count one point for the first four images, and one point for each image above four.

2. See how many associated (similar) images you can produce while looking at a neutral or pastoral image. Count the same as above: one point for the first four images, one for each above four.

3. With your eyes covered, have someone place a single object about six feet in front of you. Open your eyes quickly, blink once, then identify the object. Score two points if you are right.

4. This one is difficult to set up, and can be eliminated if you cannot establish the necessary conditions. Look at an object for seven seconds through an obscuring field such as heavy snow or dense fog, and then identify the object. Score two points for a correct identification.

5. Have someone cut a drawn image into six or seven fragments, which are then scattered on a table. Identify the image in seven seconds. Score four if correct.

6. Play *Find Waldo*. Look for seven seconds at one of the more difficult pages in a *Waldo* book. Score two points for spotting Waldo, and one point for each of the next four objects you identify.

7. Have someone show you a

picture of a camouflaged object. Identify it in seven seconds, and score two points if you are right.

8. Arrange for someone to undertake a task such as assembling something. Watch the first seven seconds of the process, and estimate how long it will take the person to complete the task. Score four points if your estimate is within 10 percent of the actual elapsed time, two for being within 10-20 percent, and one for being within 20-25 percent of the actual time.

9. Have someone place 12 very different objects on a tray, and then cover them. Have the cover lifted so that you can study the objects for seven seconds. Then have the person remove four of the objects and replace them with four objects for seven seconds. Score one point for each of the four objects you recognized as being different from the first group.

10. The same as above, only this time the person should replace eight of the original twelve objects. Score one point for each of the objects you recognize as different from the first group.

11. Have someone show you a crowded picture—that should

include inanimate objects, plants, animals, and people—for seven seconds. Then have that person ask you four questions: one about an inanimate object, one about a plant, and so on. Score one point for each correct answer you give.

12. Have someone show you a picture of an item that is either very ancient or very futuristic. Study the picture for seven seconds. Score four points for correctly identifying the object.

13. Have someone show you for seven seconds each a series of eight pictures (frames) in sequence. Good examples are an athlete catching a ball, a plane landing, and so on. Your challenge is to say, "Now!" when you think the next image will show the moment of completion—the ball being caught, the plane's wheels on the ground, and so on. Score four points for being right; score two for being two frames off; score one for missing by four frames; score zero for missing the moment altogether.

14. Have someone show you for seven seconds each two consecutive pictures of an impending event, such as an explosion. If you can anticipate the event from the first image, score four points.

15. Have someone show you for seven seconds an image depicting the aftermath of an event such as an environmental disaster or a devastating illness. Use your intuition to explain the cause that produced the displayed effect. If necessary, the image can be shown to you again, this time with a clue given. Score four points if you identify the event without the clue, score two if you identify after being given a clue.

16. Have someone show you for seven seconds an image of a problem, such as being lost in the woods or trapped in a dangerous situation. Propose a solution. If necessary a second image can be

CONTINUED ON PAGE 95

ability was logical, rational thinking, analysis and, ultimately, science and so-called civilization. The ongoing merger of both types of intelligence (the old preverbal unconscious intuition and the new verbal rational thinking) grew to be dominated by the rational, by conscious reasoning. This, in turn, led to our modern techno-intelligence, which has subjugated all planetary resources to the greedy will. As a consequence, the formerly natural adaptive maneuver of changing to suit the environment yielded to something else. The *autoplastic* maneuver of early humans still nestled in their bioniche, gave way to our current *alloplastic* maneuver, whereby we alter the environment to suit ourselves. Humans jumped out of our particular bioniche. The older autoplastic approach, supported by intuition which could have led to enhanced social intelligence, grew to be grossly overshadowed by techno-intelligence.

For my work, implicit in all this is the idea that information, like energy, conforms to something similar to thermodynamics. Namely, information cannot be destroyed or newly created, only transformed. Consequently, the bulk of latent intuition finds its store in imagery, and with the collective memory vault as its repository.

On the other hand, conscious reasoning has been increasingly processed verbally, through learning, with its information stored audiovisually in the more recent, though deep, layers found at the interface between the collective and personal memory vaults.

And that, essentially, is the mental landscape against which I built my theory. I carefully collected everything I could garner from intuitives and their students, from the insights of philosophers, scientists, and writers. I brought together their insights and mine, and the fragments fell into place like the pieces of a puzzle, sorting themselves into the divisions I had established: genetic and personal determinants, the process itself, the accessing variables, and the structure or anatomy.

I realized why intuition had to be processed in the deep unconscious, inaccessible to introspection and therefore untraceable. Because it was generated and stored in prelogical areas of memory, intuitive information had to be stored economically, iconically unfolding in response to stimulation, like the "life passing before your eyes" that allegedly precedes drowning, or the messages encapsulated in archetypal sleep dreams.

I had, in fact, seen the manifestation

of such encapsulated information not only daily—and clinically—in the hundreds of thousands of sleep dreams I had collected as an onirologist, but also had seen them actually when accelerating subjects by g-thrusts to a gray-out in a lab. These subjects experienced extremely rapid back-to-the-past and up-to-the-present experiences. This afforded me the vision of fast-track intuition for survival, executed in seconds. It also led me to a decision. No matter how I was to dissect the anatomy of intuition, its testing must be not only totally visual, but also as archetypal and primitive as possible.

Obviously, slow-track intuition is not built solely on the collective unconscious and past experience. It is also built upon ongoing and up-to-date knowledge, on the products of outside information and inside-constructed experience. This is the marriage of the yin of intuition and the yang of consciously building an area of expertise, a process called constructive observation. This is accessed when intuition is most likely to be followed and proved correct. Outside these areas of expertise, slow-track intuition, at best, can only be more than luck, but not much more than a good guesstimate.

It was in this context that I finally grasped why, in order to access and activate the process, the initiate's state of consciousness must reach back into that ancestor's mental twilight stored in deeper levels of our consciousness.

I had postulated that some of the skills would be more passive, innate abilities, located in the deeper levels of memory and waiting to be energized. Other skills would be more recently acquired, more active, more specifically stimulated, and more likely deposited in the speech-related memory areas of our more recent ancestors. As a result of this insight, I arranged the various skills into input and output groups.

I had deduced from this theory about the collective genesis of intuition that the skills would be hierarchically stacked from basic, perceptual, and cognitive to the higher levels of knowing. If there were a middle point or a fulcrum to this assemblage of skills, it would be foresight (or anticipation) and timing. The capacity for imagination—creativity, remember, is the twin of intuition—would straddle the middle ground, between basic input skills and higher output ones.

My years of research, not only into the works of intuition experts, but also that of writers and artists—the radar warnings of things to come—led me to a taxonomy of 20 ± 2 skills of intuition. The skills constitute my operative defini-



the people Jacob Bronowski once called the generals (not the footsoldiers) of science.

Current time flow (A7)—probably along with other orientational perceptions of a high order, such as perceiving the three dimensions or estimating weight and speed—must have been innate before the dawn of consciousness, speech, and logical reasoning, not to mention the invention of clocks or simpler tools for time measurement.

Quick memory (A8) was a compromise I devised in order to compensate for the fact that the accuracy of intuition depends largely on constructive observation and on inner-built and outer-derived knowledge accumulated over a lifetime—hardly the sort of thing that can be tested in a lab situation. Quick memory, then, along with some other cognitive skills, are hypothesized as parameters for constructive observation, especially in fast-track intuition.

Psychosmosis (A9) is the only esoteric or arcane concept in the entire group. I derived it from numerous testimonies given by people who retrieved from their personal or collective memory things they didn't know they knew. Good examples of this are memories or associations triggered by sensory cues such as odor or taste, forgotten—or unsuspected—knowledge aroused by what seem to be the most trivial of incidents. Proust knew a thing or two about psychosmosis.

Collective and symbolic archetypal sleep dreams offer testimony to the power of psychosmosis. These dreams do not imply previous lives, but merely that ancestral information remains stored beyond the vaults of personal memory, preserved as iconic imagery in the collective unconscious.

Passive or spontaneous imagination (A10) measures the capacity to produce images against a neutral or non-visual background, whereas active imagination (B1) tests the capacity to produce images stimulated by a specific picture. In analytical therapy, the Jungian method of associating spontaneous wakeful imagery or fantasy induced by the recollection of dreams, and particularly missing data such as the dream's ending, often prove immensely more fruitful than Freudian verbal free association.

Anticipation or foresight (B2) is unique to humans. I think it implies stored memories, because it is neither a simple response to a stimulus or a conditioned reflex. How do intuitives "see it coming"? How do they "know it would

happen?" Anticipation and foresight are vital for fast-track intuition, and for individual and collective survival.

Optimal timing for intervention (B3) is the secret of success in the money market, in entrepreneurship, and in many sports. Quite simply, optimal timing means being in the right place at the right time. We can think of foresight as the intrapsychic antecedent of timely intervention. But while the two skills link, they are not the same. Foresight is not necessarily or inevitably followed by the best timing. But when the two skills do interact, they can result in that Midas touch that gets people in and out of the market at the right times.

The next two skills, the hunch or optimal solution (B4) and the choice of optimal method (B5) are usually linked. Countless scientists have acknowledged these skills as intuitive and lying outside science or logic. The hunch is the illuminated visualization of a problem and its probable solution, while the optimal method is the process of intu-

is deciphered. This ability linked with psychosmosis is what enabled the translation of the Rosetta Stone. This is the thinking skill of those who see the big picture, who use their imagination and vision to create the inductive waves of philosophy and religion.

I had assumed that once this conceptual construct was complete, it would be a simple matter to invent a test to bear out my theory. I was wrong. The test I designed—my IQ2—is best executed on laser disk with hundreds of images selected to find the precise matches between the intuitive representation of a skill and the picture itself. It has been quite a labor of love, and in some ways may not be done yet. While laser disk technology offers many advantages, there is another technology even more appropriate. Virtual reality will be a natural home for the IQ2.

Meanwhile, for our purposes here, I have rendered my IQ2 into a verbal format to let you measure your own capacity for intuition. Words, as I have

tried to make clear, are not a precise substitute for images, whose nature, being visual, is more fully universal and archetypal. But as you take the written IQ2 presented with this article, I think you'll get a good sense of what I have tried to accomplish.

With IQ2 poised to be released into the world, I hope to see it answer some long-standing questions. Are women more in-

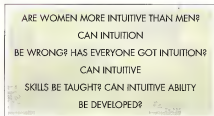
tuitive than men? Can intuition be wrong? Has everyone got intuition? Can intuitive skills be taught? Can intuitive skills be developed?

And, like a parent with high expectations for a child, I have larger ambitions. I would like to see IQ2 tests given to political leaders. Surely intuition is as important a leadership skill as intelligence and charisma.

I look forward to proving the complementary nature of IQ2 and existing IQ tests. If they prove complementary, it should be possible to create a sort of periodic table of human intelligence.

Altogether, intuition and intelligence, creativity and wisdom, should enable our species to build up our social intelligence to match our techno-intelligence, enabling us to address our planet's physical, biological, and psycho-social problems far more effectively than we do at present.

And above all, I want to see that intuition is recognized as a full and measurable component of that greatest of our skills, human intelligence. **GG**



tively choosing the best method of proving the hunch correct.

While these skills are essential for scientists, the optimal application (B6) is the secret of success for technologists and innovators. It's one thing to see steam move a kettle lid—quite another to see it move a train.

Hindsight (B7) is the special skill of medical scientists and other natural diagnosticians, including anthropologists, archaeologists, geologists, psychologists, and sociologists. Hindsight helps the investigator know where to look in order to find things, deduce causes, diagnose illnesses.

The associative and dissociative skills of sorting things out (B9), of matching and contrasting things, belongs to artists, graphologists, detectives, and many others engaged in imposing order on seemingly disparate items. Linnaeus and Darwin were gifted at sorting things out.

Finally, through seeing the meaning of things (B10), the information contained in iconic imagery and symbols

LUCID DREAMING REVISITED

ARTICLE
BY
JOHN HORGAN

We met at a long rectangular table, a score of total strangers and I. The youngest was a blond, teenaged boy wearing mirrored sunglasses, the oldest a woman with a rosy face and snowy hair. She and several other people were wearing T-shirts with the question *Is this a dream?* printed on them. The topic of conversation, too, was dreams.

A woman sitting beside me announced that she is pursuing a couple of different goals in her dreams. "I've known since about 1975 that I have healing hands," she said in a brisk, matter-of-fact voice, "and I want to develop that." Because she also runs a small com-

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BRAD HOLLAND



puter-consulting company, she wants to practice "management skills and people skills" in her dreams.

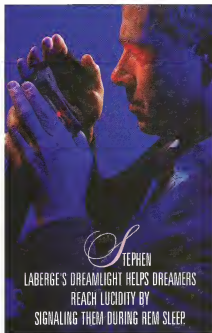
As she spoke, she looked at a man sitting at the head of the table, the group leader. His pale, unusually protuberant eyes made him seem both startled and hypnotically intense.

"Dream characters are certainly harder to manage than others," the leader said. "They can give you a good experience of how to handle real people." His voice was mellifluous and soothing. I could imagine him intoning, "You are getting sleepy, very sleepy," or perhaps introducing songs for an easy-listening radio station.

I asked, hesitantly, for a definition of the term "healing hands." "It's like psychic healing," the woman sitting beside me said. "Laying on of hands," another person chimed in.

Time for a reality check. Was this scene about dreams itself a dream, a surreal parody of a New Age self-help group, perhaps, cooked up by my subconscious for my nocturnal entertainment? No, actually, this was the bi-weekly workshop of the Lucidity Institute in Palo Alto, California, and these people were all exploring lucid dreaming—a paradoxical mental state in which the dreamer becomes aware that she or he is dreaming and in some cases then deliberately takes control of the dream action.

The man with the FM-light voice was Stephen LaBerge, a 45-year-old psychophysiology investigator—and promoter—of lucid dreaming. LaBerge is a walking cross-section of California: a Stanford-trained scientist, high-tech entrepreneur, and guru rolled into one, with lucid dreaming the binding thread.



LaBerge likes to call himself and his fellow lucid dreamers "oneironauts," a neologism he coined from the Greek words for dream and explorer.

Lucid dream references date back at least to Aristotle, and the Dutch psychiatrist Frederik van Eeden coined the term *lucid dreaming* almost 80 years ago. Modern surveys indicate that most adults can recall at least one lucid dream and that roughly one person in ten has such dreams regularly, once a month or more. Yet lucid dreams generally interested only dabblers in paranormal and occult phenomena until the late Seventies, when LaBerge began his investigations as a graduate student at Stanford University.

At that time, many sleep researchers believed lucid dreams to be simply delusions occurring during brief arousals from sleep. By definition, they argued, dreams are devoid of real awareness or volition. To rebut this claim, LaBerge did experiments in which he and other lucid dreamers communicated with the waking world by means of eye signals. He thereby established to the satisfaction of many sleep researchers that lucid dreams occur during a phase of sleep marked by rapid eye movement, commonly called REM sleep, when ordinary dreams occur.

With this method, LaBerge and colleagues at Stanford have conducted a series of experiments showing that dream activities—including

singing, counting numbers, and sex—evoke much the same neural and physiological responses as corresponding experiences do in real life. He has also tested various methods for inducing lucid dreams, including both purely mental techniques and devices that provide external cues during REM sleep. Among the latter are tape recorders that whisper, "This is a dream," vibrators attached to the mattress, and lights mounted in sleep masks.

Overcoming considerable initial resistance, LaBerge managed to publish his scientific findings in peer-reviewed scientific journals, and in 1985, he published a book called *Lucid Dreaming*. Now in its ninth printing, the book has sold more than 120,000 copies, according to LaBerge, and more than 10,000 readers have written to him to relate their experiences or ask for more information. Inspired by this success, LaBerge and writer Howard Rheingold wrote a follow-up book in 1990: *Exploring the World of Lucid Dreaming*.

In these books, LaBerge asserts that with practice, virtually everyone can learn how to have lucid dreams and even to control their dreams. At the very least, LaBerge says, the skill can provide thrilling entertainment. He likes to compare lucid dreaming to virtual reality; the major difference, he says, is that lucid dreaming employs "the best computer you can get—your brain."

Lucid dreams also provide a way to tap the mind's creative powers, according to LaBerge. In *Lucid Dreaming*, he notes that many scientists, artists, writers, and musicians find inspiration through their dreams. The British poet Samuel

The British poet Samuel Coleridge, for example, claimed to have composed his great poem "Kubla Khan" in a dream, and chemist Friedrich Kekulé said he discovered the structure of benzene while dreaming.

Indeed, LaBerge claims that lucid dreams can deliver a treasure trove of riches, from more self-confident sales pitches to cosmic consciousness. He also believes the ill may accelerate healing by envisioning themselves well in a lucid dream.

In 1967, LaBerge founded the Lucidity Institute, a for-profit company that distributes information and training in lucid dreaming, including a newsletter, books, and instructional tapes.

In 1990, the institute began marketing the DreamLight, an electronically equipped sleep mask designed to induce lucidity. The concept is relatively simple: When two infrared sensors in the sleep mask detect eye twitches characteristic of REM sleep, the device switches on a flashing light. Ideally, the flashes serve as a cue, helping the dreamer reach lucidity without waking up. (Light, LaBerge discovered, works better than olfactory, auditory, or tactile stimuli.) LaBerge estimates that he has sold about 1,000 DreamLights so far for \$1,000 each.

Last year, the Institute introduced a product that performs the same basic function as the DreamLight without all the bells and whistles (the DreamLight contains a microcomputer that stores data about the wearer's sleep patterns). Priced at \$275, the NovaDreamer sleep mask detects REM sleep and offers either visual or auditory cues to the dreamer.

LaBerge's scientific work has impressed some researchers. In 1992, the *Skeptical Inquirer*, normally a scourge of marginal scientific research, favorably reviewed the work on lucidity by LaBerge and others, noting that it "forces us to ask questions about the nature of consciousness, deliberate control over our actions, and the nature of imaginary worlds."

J. Allan Hobson of the Harvard Medical School, a psychiatrist and an authority on dreams, seconds that judgment: "I think [lucid dreaming] is very important, and LaBerge has done the best work on it," Hobson says. "I admire Stephen for hanging in there when he's had so little support from the sleep research community."

Yet even his supporters accuse LaBerge of hype. "I like some of his work, but he tends to go overboard,

saying it can save the world," remarks Ernest Hartmann, a psychiatrist at Tufts University. Hartmann also contends that LaBerge underestimates the difficulty of learning lucid dreaming, with or without the DreamLight.

Becoming Lucid

I had the chance to judge LaBerge's work firsthand when he invited me out to Palo Alto for a weekend crash course on lucid dreaming. In addition to sitting in on the oneirologist research group, I would try to have a lucid dream in a sleep laboratory at Stanford with the help of the DreamLight.

I can recall having exactly one lucid dream when I was six or seven years old. I was sitting on a stoop with several friends when it dawned on me that we were all in a dream—my dream. When I pointed this out to my pals, they told me I was crazy. I woke up thinking, "I told you so."

"How well do you recall your dreams now?" LaBerge asked me over the tele-

phone several weeks before my visit.

LABERGE RECOMMENDED

THAT I GET IN THE HABIT OF CONDUCTING
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phone several weeks before my visit.

"Not too well," I replied.

"How long do you usually sleep?" he asked.

"About six and a half or seven hours a night."

LaBerge sounded disapproving: "Studies have shown that most dreams occur at the tail end of a good eight- or nine-hour stretch of sleep." I would probably recall my dreams better if I slept longer, he said. I should also try to remember my dreams every morning and describe them in a journal.

Once I've boosted my dream recall, LaBerge added, I could try to become lucid by practicing a technique he developed called mnemonic induction of lucid dreams, in combination with a special morning nap. It works this way: I should wake up an hour or so earlier in the morning than usual, recall my last dream, and then stay awake for an hour before going back to sleep. As I fall back asleep, I should review my last dream and vow to myself that in my next dream, I will remember to notice

that I'm dreaming. LaBerge also recommended that I get in the habit of conducting reality checks, asking myself, as the T-shirt says, "Is this a dream?" If I keep asking this question while awake, he said, I'm more likely to ask it in my dreams. Then I should check my environment for what LaBerge calls "dreamsigns," phenomena that can't occur in real life. Flying is an excellent dreamsign. Anything with writing on it can also do the trick; in a dream, the writing will appear different every time you look at it, according to LaBerge.

By the time I went to Palo Alto, I recalled at least one dream a night. To my chagrin, none of them were lucid.

During a talk at an outdoor café near the Lucidity Institute, LaBerge acknowledged that many people interested in dreams have "what may unkindly be called superstitious beliefs." Like most dream investigators, he has been unable to obtain federal funds for his research. "It's not a disease nor a bomb,"

he says with some bitterness. LaBerge sometimes sounds like a politician trying cautiously to navigate between two mutually antagonistic constituencies. "On one side, you've got hard-headed scientists who don't seem to understand the value of dreams," he explains, "and the other extreme is the dreamwork movement that sees dreams as the voice of God that knows all and is

all wise. From experience, I've got an intermediates point of view."

In Our Next Episode . . .

LaBerge, naturally, was a dream prodigy. He began having lucid dreams regularly at the age of five. His dreams resembled episodes in an adventure series, picking up where they left off the previous night. "It was like a Saturday matinee," he says. Yet he grew up wanting to become a physicist or chemist. "I had no interest in the mind," he insists.

He obtained a degree in mathematics from the University of Arizona in just two years and entered a graduate program in chemistry at Stanford in 1967 when he was only 19. Then, after noting that "this is a somewhat delicate subject," he acknowledges that "psychedelic drugs opened my mind to the inner world." In fact, LaBerge left Stanford in 1968 for the University of San Francisco, where, with funding from NASA and other sources, he concocted hallucinogenic drugs he hoped

could be used to probe the mind.

Eventually, his funding dried up, and he returned to Stanford determined to do doctoral research on some other aspect of consciousness. He first proposed to model abrupt changes in mental states with catastrophe theory, a highly mathematical precursor of what today is called chaos theory. When his advisors suggested he find something a bit more "empirical," he finally hit on lucid dreaming. "Believe it or not," LaBerge says with a smile, "when I came up with lucid dreaming, I was being practical." He set out to read everything he could find on lucid dreaming—and found little.

So LaBerge began his work in the subject. His initial study proving that lucid dreams occur during REM sleep was inspired by a study in which a polygraph showed a subject's eyes moving back and forth rhythmically during REM sleep. When awakened, the subject reported he had been dreaming about a Ping-Pong game. Dream eye movements apparently correspond to actual eye movements.

LaBerge and his colleagues then delved into more complicated experiments. One debunked the belief that dreams occur in an instant. This bit of lore originated at least in part from the report of a nineteenth-century French scientist who had reported a long dream culminating in his decapitation by a guillotine. When he awoke, he found that his headboard had fallen on his neck; he concluded that the whole dream had unfolded in an instant.

LaBerge had his subjects signal with eye movements that they were lucid, count off ten seconds, and then signal again. Thirteen seconds elapsed between signals, roughly the same amount of time that passed when the experiment was performed with the same subject when awake.

One of LaBerge's most intriguing experiments examined eye-tracking ability. When waking subjects watched an object move at a constant speed across their field of vision, their eyes also moved smoothly, but if they closed their eyes and tried to track an imaginary moving object, their eyes moved in abrupt jerks. Lucid dreamers who repeated this experiment showed the same results—even though their "real eyes" were closed the entire time.

Such findings, LaBerge says, have led him to believe that lucid dreams could have therapeutic value. Growing evidence suggests that "visualization"—imagining a desired outcome—can lead to various benefits, from improved athletic performance to accelerated healing. Practicing visualiza-

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ARTICLE BY DENNIS STACY

COSMIC CONSPIRACY: SIX DECADES OF GOVERNMENT UFO COVER-UPS

PART SIX

Editor's note: In the final installment of our six-part series on alleged government cover-ups and UFOs, we look at the most controversial case of the 1990s.

The sun sinks beyond the jagged Groom Mountains like a bloated red basketball. As temperatures plummet in the thin desert air, we make our way up a narrow arroyo to the base of White Sides, a towering jumble of limestone ledges overlooking the super-secret air base below, our hiking boots making crunching sounds in the growing darkness.

We've been whispering and walking side-

by-side. Now our guide, a young mountain goat by the name of Glenn Campbell, takes the lead. "Damn!" he suddenly hisses, "they've erased them again," referring to the orange arrows spray-painted on the white rocks a few days earlier. "They" are the anonymous individuals Campbell refers to as the "cammo dudes." Thought to be civilian employees of the Air Force, they patrol the perimeter of the unacknowledged base in white all-terrain vehicles, monitoring electronic detectors and, by the way, erasing signposts like those on the rocks. When

ILLUSTRATION BY ATILA HEJJA



interlopers cross the military boundaries or haul out their cameras, it's the cammo dudes who call in the local constabulary, the Lincoln County Sheriff's Department, to confiscate the film.

Campbell assures us that we don't have to worry, though. For one thing, we all agreed to leave our cameras locked in our cars at the bottom of White Sides. For another, we're still on public property, well outside the restricted zone which comprises part of the vast Nellis Air Force Range complex and stretches more than halfway from here to Las Vegas, 100 miles away. "Besides," he says cheerfully, "I'll take the sheriff 40 minutes to get here. By that time we'll already be on top, and he'll have to wait for us to get down."

Still, White Sides is no cake walk. Beginning at about 5,000 feet, it rises in altitude for another 1,000 feet. From here, however, you can peer down on one of the world's longest runways and one of the Cold War's most isolated inner sanctums. It was here, vainously known as Groom Lake, Area 51, Dreamland, or simply the Ranch, that sophisticated black-budget (that is, off-the-record) projects like the U-2, SR-71 Blackbird, and F-117A Stealth fighter first earned their wings in secrecy. And it was 15 miles south of here, at an even more clandestine (and controversial) base of operations known as Area 54 at Papoose Lake, that shadowy physicist Robert Lazar claimed to have helped study captured flying-saucer technology.

Because of its remoteness, spying on alleged Area 54 is out of the question, which leaves Groom Lake as the next best UFO mecca, assuming the many rumors surrounding these remote outposts are rooted even in half-truths. We break out our binoculars and sweep the runway, clearly outlined by a string of small red lights. At one end, backed up against the base of the Groom Mountains, squats a collection of radar arrays and giant hangars, feebly illuminated on this Saturday night by fan-shaped rays of yellow light. "Looks like they're shut down for the weekend," Campbell whispers.

Still, the thrill of visually eavesdropping on this country's most secret air base sends a certain chill up the spine, where it mingles with the growing desert chill and the memory of the signs at the bottom of White Sides authorizing the use of deadly force. All remains eerily silent, however, not so much as a cricket, cammo dude, sheriff, or UFO disturbs the night. After a

few hours of fruitless surveillance, fingers and toes numbed by the cold, we start back down.

Campbell, a retired computer programmer, explains why he left the comfy confines of his native Boston and moved lock, stock, and Mac Powerbook to Rachel, a hardscrabble community of 100 smack in the middle of the Nevada desert. "You go where the UFO stories are," he says, "and in the fall of 1992, when I first came here, Dreamland was where they were." Campbell had read an article published the year before in the monthly journal of the Mutual UFO Network (MUFON) detailing some of the exploits of Lazar, who claimed to have actually been aboard one of nine recovered flying saucers sequestered at Area 54 while helping reverse-engineer their apparent antigravity propulsion system (See *Cnn*, April 1994.) In a series of November 1989 interviews with then-anchorman George Knapp of KLAS-TV, the Las Vegas CBS affiliate, Lazar went

his first visit, Campbell returned to Boston, packed his belongings in a rickety Toyota camper, and in January of 1993 moved to Rachel, setting up shop in the dusty parking lot of the Little A-Le-Inn, a combination bar and restaurant turned UFO museum, joint jumping-off point, watering-hole headquarters, and sometime conference center for UFOlogists hoping to repeat the earlier Lazar sightings. Campbell began his own investigation and was soon desktop publishing the *Area 51 Viewer's Guide*, of which he estimates he has now sold more than 2,000 copies.

As reports of UFOs in the area soared, so did Campbell's reputation as de facto onsite guide. In the last year alone, virtually every major media outlet in the country, from CNN, NBC, and ABC News to the *New York Times*, has beaten a path to Campbell's door. Despite the temptation to turn tabloid, Campbell seems to have kept his head on straight. "I am still interested in the UFO phenomenon," he says, "but the

evidence has to speak for itself. I've been living here night and day for over a year now and still haven't seen anything that couldn't be explained." He's also seen satisfied believers come and go. "But most of what they report," Campbell warns, "is ordinary military activity, from Russian MIGs to parachute flares. You pretty much see what you want to see, depending on what kind of expectations you bring to the table."

A case in point is so-called Old Faithful. In the wake of Lazar's allegations, observers were soon reporting a brilliant UFO adhering to a rigid schedule at 4:50 every weekday morning. Campbell, a UFOlogist who readily admits he likes his sleep, nonetheless routinely roused himself—until he became convinced that what he was seeing was nothing more than the landing lights of an approaching F37. Methodical by nature, Campbell purchased a radio scanner and began monitoring flights outside McCarran Airport in Las Vegas. It turned out that Janet, a private charter airline, routinely flies into Groom Lake from Las Vegas, transporting workers as Lazar had previously alleged. Old Faithful was their early morning flight, and in the next release of his *Viewer's Guide*, Campbell published the airline's complete schedule.

But stories of alleged alien involvement at or near Area 51 continue. On the evening of March 16, 1993, William Hamilton, director of investigations for

CAMPBELL PACKED HIS
BELONGINGS IN A RICKETY TOYOTA AND
MOVED TO RACHEL,
SETTING UP SHOP IN THE DUSTY PARKING LOT
OF THE LITTLE A-LE-INN,
A COMBINATION BAR AND UFO MUSEUM.

public with his claims. Dreamland, at least, was now in the public domain.

Though Lazar's credibility has recently taken a nosedive, even with UFO insiders, Knapp, now senior vice president with the Altamira Communications Group, an independent video production company, notes that "stories of captured or acquired alien technology have circulated in the area since the mid 1950s and the very beginning of the base." His best source, among the 14 he has interviewed to date, is a member of a prominent Nevada family who will not allow his name to be used, although he has supposedly videotaped a deposition to be given to Knapp upon his death. According to Knapp, his source occupied a position of senior management at Groom Lake during the late Fifties and early Sixties, and admitted that at least one extraordinary craft was being test flown and taken apart "It's the totality of the accounts, not any specific one, that I find convincing," says Knapp.

Spurred by the local lore following

MUFON Los Angeles, and a companion were parked alongside Highway 375 near the popular Black Mailbox viewing area when a bright light winked into view to their right. "I looked at it through binoculars," Hamilton remembers, "and it seemed to be on or near the Groom Road and casting a beam [of light] on the ground." As it drew nearer, according to Hamilton, "the light appeared to be an object the size of a bus with square light panels lifting off from the ground. The panels appeared to glow amber and blue-white."

A bus does travel the dirt road leading into Groom Lake, transporting civilian workers who gather every morning at nearby Alamo for the 30- to 40-mile ride, returning in the afternoon. But this bus was clearly out of the ordinary, says Hamilton. As he watched, "the lights rapidly resolved into two glowing orbs or discs of brilliant blue-white light, so bright they hurt my eyes." The two baby suns rapidly approached the parked car and confusion reigned. When Hamilton looked at his watch, approximately 30 minutes of time were missing. Hypnotically regressed later, both Hamilton and his companion had memories of being abducted aboard a UFO by now-traditional little gray beings with large dark eyes, the leader of whom in this case referred to himself as Quaylar.

Campbell was at the Little A-Le-Lint when the couple returned. "I can attest; they were both visibly shaken," he says, "but neither had any memory of an abduction at that time. I don't know what to think. I've spent many a night in Tikaboo Valley, where the sighting occurred, and as far as I know nothing like that has ever happened to me. I've never seen or experienced anything that I couldn't explain."

It may be that the remote desert interface between alleged extraterrestrial technology and known or suspected terrestrial technology predisposes or inflames the human imagination to see flying buses where only earthly ones exist. Light can play tricks in the thin air, making determination of distance and brilliance doubly difficult at best. Or it could be that the latest generation of Stealth and other secret platforms being test flown out of Groom Lake demonstrate such odd performance characteristics that they are easily misidentified at night as one of Lazar's reputed H-PACs—Human-Piloted Alien Craft. Rumors have long circulated of a hypersonic high-altitude spyplane,

code named Aurora, designed to replace the recently retired SR-71 Blackbird. Both the Air Force and Aurora's alleged manufacturer, Northrop's secret Skunk Works facility at Palmdale, California, deny any knowledge of such a platform. Another potential candidate is the TR-33A Black Mantra, an electronic warfare platform widely rumored to have flown support for the F-117 Stealth fighter during Operation Desert Storm. Other advanced airforms could be in research and development, too, their operating expenditures buried in the Pentagon's estimated \$14.3 billion per year black budget programs.

Even with the Cold War apparently successfully concluded—and the strategic necessity of much of our black budget presumably obviated—the Air Force can't be happy campers at Groom Lake. They certainly don't relish the prospect of a growing number of UFOlogists and media types, increasingly armed with sophisticated video cameras and night-vision equip-

Bureau of Land Management. Not surprisingly, White Sides is contained within the new acreage, as is another lookout point discovered by Campbell and dubbed Freedom Ridge. The additional land was needed, the Air Force claimed, "to ensure the public safety and the safe and secure operation of activities in the Nellis Air Force Range complex." No mention by name was made of Groom Lake, the air base that doesn't officially exist.

By now, Campbell had become a professional prickly-pear in the Air Force's exposed side. He formed the White Sides Defense Committee and publicized the public hearings the Bureau of Land Management was required by law to hold. The Air Force request is currently on hold, awaiting an environmental assessment and final approval. In the meantime, Campbell formed Secrecy Oversight Council to market his *Wewer's Guide* and an assortment of Area 51 souvenirs, including topographical maps, bumper stickers, and a colorful, self-designed Groom Lake sew-on patch. More recently, he took out an address on the electronic highway and began publishing a series of regular digital updates, "The Desert Rat," including a map detailing the location of known magnetic sensors. And he tweaked a few local noses with a defiant fashion statement, updating his own apparel to match the desert camouflage suit of the cammo dudes, shade for shade.

Such pranks aside, Campbell insists he's a serious civilian spy. "The difference between me and the Air Force is that I don't have any secrets," he says, "and everything I do is legal." On at least two occasions Campbell and visiting journalists were buzzed by low-flying helicopters called in from Groom Lake, both times while clearly on public property outside the restricted zone. "The rotor wash throws up a tremendous amount of dust and debris," he notes, "endangering us and the helicopter crew, too." Indeed, the Secrecy Oversight Council tracked down the appropriate Air Force regulation and found that pilots are restricted to a minimum of 500 feet altitude except when taking off or landing.

But if the Air Force is peeved or perplexed by Campbell's activities, they aren't saying so in public. "We know who Mr. Campbell is," admits Major George Sillia, public affairs officer at Nellis AFB, Las Vegas. "He keeps us

**ADVANCED AIRFORMS COULD BE IN
RESEARCH AND
DEVELOPMENT, THEIR OPERATING EXPENDITURES
BURIED IN THE
PENTAGON'S ESTIMATED \$14.3 BILLION PER
YEAR BLACK BUDGET.**

ment, all on the prowl for H-PACs or UFOs, stumbling across a plane while they've gone to a great deal of trouble to keep secret from both Russian and American citizens, presumably in our own best interests.

But previous attempts to seal off Groom Lake from public scrutiny have met with just partial success. In 1984, the Air Force seized (or withdrew, in their vernacular) some 89,000 acres on the northeast quadrant of the Nellis Test Range in order to provide a better buffer zone for the base. Due to a surveying error, White Sides and a few other vantage points were overlooked. But then, in the wake of the Lazar story, Campbell and other UFOlogists began making the trek up White Sides, triggering security perimeter alarms and forcing the cammo dudes out of their white vehicles.

Subsequently, on October 18, 1993, the Air Force filed a request in the Federal Register seeking the withdrawal of an additional 3,792 acres, presently public property under the control of the


8 July

The June bug Jackson Pollocked my windshield. And as I looked at its innards, I saw substance which made me think. Is there still room in a society of disposable razors, disposable cars and disposable marriages for anything with substance? Or is the American mind so completely closed that it can no longer digest anything but cerebral cupcakes? Mental junk food filled with a lot of air. And as another June bug adds to the painting on the windshield, I glance at the radio dial and think, Yes. There are a few places where substance still matters.



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FROM NATIONAL PUBLIC RADIO® NEWS WITH SUBSTANCE.



FICTION BY PAT CADIGAN

Paris in June. . . *If* there's a
good time
to be homeless in
Paris, it's June.

PAINTING BY DI MACCIO

It's warm enough during the day to stake out a spot by the Seine and wave at the tourists on the Bateaux-Mouches, cool enough at night to be—well, okay, damned cold, especially without blankets. Wind blowing off any water can be cold, and only in Paris can you get weather that is hot and muggy with cold breezes.

But if I had made it easy on myself by choosing June—or July—it was still somewhat hard because I spoke almost no French, and understood even less. A few words—*merci, au revoir, est-ce que je peu regarder, bonjour—but is it okay if I look?*, while suitable for the shops on the rue de St. Andre des Artes, isn't what you hear from the person rifling through your clothes while you're still in them.

I wanted to speak French, understand. I found myself failing into French-ish cadences when I spoke, fancied that I heard a lifting quality in my voice that I hadn't had back in London or Scarborough. But I just couldn't manage the tongue.

Nonetheless, I got by. What I do is a language, whether you do it on a beach in a quaint British resort town, or on the last tube of the night rocketing under Big Ben, or on the paved banks of the Seine where no stars shine except the ones you bring with you.

I liked it by the Seine best, even without amenities. In Scarborough, I sometimes saw the inside of one of those pretty-as-a-picture hotels, like the Hotel St Nicholas, and once even

the Grand Hotel. Although I did have to leave before dawn could even light the water because the man's wife was driving up from Sussex to join him and he had to air out the room.

In London—fabulous London—I had a good, if brief, thing with two gentlemen who loved each other so much that they had no love left for anything or anyone else. They let me be part of it for awhile but ultimately I had to go and leave them to each other.

Then there was the couple in Queen's Gate Gardens—I didn't get the exact address. Even briefer with them: one little night. But every night spent under a real roof was one more victory. And they were responsible for sending me to Paris, at least indirectly. It was because they took me to the tube in their own car, bought me a little card to ride all day, and wished me good luck. And lo, as they say, I got some.

People fantasize more than they know in situations like that—riding on the tube, I mean—and it was like being in a candy store with a blank check or something, a real embarrassment of riches. I binged. When I stopped to think—or reflect, or maybe just gloat—a lady executive with a beautiful briefcase and a rich overnighter bought me a ticket to Heathrow and took me aboard her Air France flight. She liked me well enough to kiss me good-bye at Customs.

I napped on the Roissybus into town in spite of its being my first time in Paris (everyone needs a little downtime). The driver came back to wake me at L'Opera, where everyone

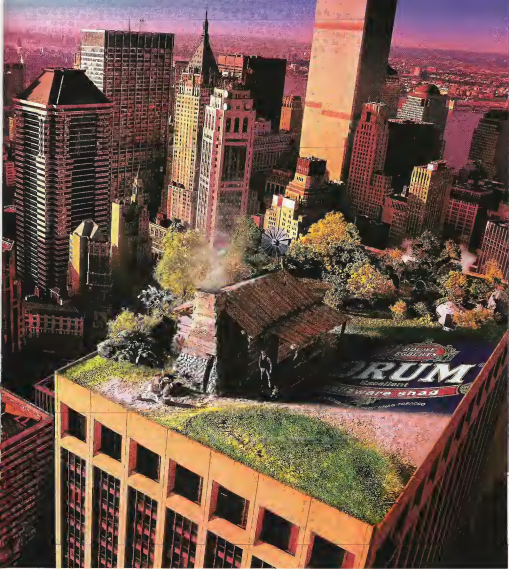
else got off and I discovered that in spite of my binge on the British tube, I seemed to have run out of something important.

Luck shifts all the time, so I didn't worry. I wandered around and the weather held. Pretty town, Paris, Paris in July, anyway.

But yes, I did see the beggars. I think their children must have been drugged to sleep so much. There were also the homeless like me, who had no fixed address. Not so bad, really. You may think the tourists on the boats wouldn't care for the view of us there on the banks of their pretty Seine. But all you have to do is smile and wave. Then they smile and wave back, figuring you must be all right after all.

The Batobus Edith Piaf passed by full of people hooting and hollering, and most of them weren't tourists. Then I saw her. She was pulling her clothes back on and giving them all what we used to call the "international symbol of disdain." She was a filthy, skinny blonde with hair cut short the way they do in some hospitals to forestall the lice. She was not, by any stretch of the imagination, a young, pretty little thing and I could tell she was completely bewildered by having to get dressed. The Batobus people were obviously yelling for her to leave it off, and she looked such hate at them that I half-expected their gas tank to suddenly explode and engulf them all in a fireball. But nothing happened. She kept struggling into her dirty shirt and jeans. I was tempted to go down and see about her. Even at this distance I could tell

The skinny blonde's face
was pinched, defiant. Hers
would be an old story: Don't
hurt me. Don't hurt me much.



Drum. Your Own Rhythm.

that she was what I was, but she didn't seem to know it.

"Va te faire foutre!"

She was pelting some stupid tourist with pieces of rock or brick and he was completely confused. He had obviously meant to take some shots of the Seine and he'd had the misfortune to pick her spot for it. All he had to do was move maybe ten steps in any direction and that would have cured it. But he was too stupid to remember where he was—that is, not in his own country—and was trying to argue with her. It was quite a show. Yelling, she drove him back a step with a piece of rock, stooped to pick up another and flung it at him with all the strength in her skinny arm. It bounced off his leg and he howled in both pain and fury. She got him in the shoulder with another rock and he howled again, louder. People were stopping to watch, the locals laughing, the tourists looking fished and unhappy the way tourists do when they see people being themselves rather than on display for their entertainment.

The fourth rock got him just above his right eyebrow. Then he didn't want to talk any more. He held his camera off to one side and went for her, so she let him have it smack in the chest with

another piece of rock. I was behind him and as he took another step toward her, I pulled him back. At the same time, someone else popped out of the crowd and did the same to her. She scrambled and fought like something feral, but the group closed up around her as efficiently as an automatic door.

The stupid tourist twisted away from me angrily. "Kesker say?" he demanded in his unbearable hick accent, as if he would actually understand the answer if I gave it to him in French.

"You were on her spot," I told him in English.

He brushed back his stringy brown hair. Too much hair tonic; he must have been one of the last fifty people on the planet using Vitals. "What spot?"

"Her spot. The one where she lives. How would you like it if she stomped into your living room—no, better, your bedroom—and began taking pictures of whatever struck her fancy?"

He looked like he was going to argue with me and then took a second look. "And what the hell are you supposed to be—the fuckin' beggar police?" I was still wearing the Knights Templar coat I'd come over from the States in because it made me look less like a vagrant and more like an old hip-

pie or just an especially affected eccentric. "Haven't you been to the Louvre yet? You don't recognize me? My picture hangs in there," I said, gesturing at the building visible through the trees from where we were. I still have no idea why I told him that. Perhaps I thought he'd be impressed, or scared. The crowd hiding the little blonde roared with laughter, the sort of noise French royalty must have heard just as the guillotine came down. It was a bad moment, because I wasn't sure who the laughter was meant for.

Fortunately, the stupid tourist wasn't so stupid that he didn't know he was supposed to be scared now. Clutching his camera with one hand, he backed away from me making stay-there motions at me with his other hand. I stayed, but the crowd started to creep toward him on the other side. Panicked, he turned and fled up the steps to the street, while the crowd roared more of that scary laughter at his back. They all watched him go and then as one turned to look at me. Some of them shifted position and I saw her, now firmly in the grip of a copper-haired boy and a piss-yellow-headed woman who could have been his mother or his madame.

The skinny blonde's face was

G R E A T M O M E N T S I N SCIENCE

April 8, 1851: Fellow evolutionists Charles Darwin and T.H. Huxley enjoy an evening of debauchery.



Although his strides in primate eugenics were indeed remarkable, it was at that moment Professor Torse truly regretted not having chosen research in the botanical sciences.



SATIRE BY JAY DECETIS

pinched, defiant but also somehow pleading, or maybe just wary. Here would be an old story. Don't hurt me. All right, don't hurt me much. All right, don't hurt me much without paying twenty francs in advance, okay?

I went toward her and held out my hand, unsure if the rabble would let her come with me or if she would even want to. But I managed to pull her away, it felt exactly like uprooting a weed. It wasn't the explaining that took so long but persuading her to believe it. If you need someone to believe something, make them go for a walk with you. Walking takes up most of the energy they'd use to disbelieve you. You have to be thorough and convincing, of course, but that shouldn't be a problem if you're telling the truth. And if you're a liar, goddamn you to hell, who needs you?

With the blonde, the language barrier was against me. Her English was spotty and my French was worse. Then there were her—to put it mildly—emotional problems.

"But who are they?" she kept asking me in French. "Who?" Apparently even what I told her was not enough to alleviate her revulsion at their pure inhumanity. But why shouldn't they be inhuman, since that is exactly what they were.

All right, I'll confess: I love this. Once I discovered that I was a data-gathering device rather than a true human, I embraced my nature—if nature is a word you can use for a manufactured thing—and fully cooperated with my *raison d'être*. You are what you are and while it may be pointless to hate it or love it, it's easier to function loving it than not, yes?

(Still feeling fine and français, you see.)

So I walked the skinny blonde homeless thing along the banks of the Seine and told her the facts of our life. And yes, she thought I was a psycho, trying to put one over on her so I could lure her to some place where I could rape and murder her.

I took her to a public facility and I showed her how it was impossible for me to rape anyone. When I discovered my true nature, you see, I decided to dispense with the frills and dodges and I carved off anything I didn't think was absolutely necessary.

It wasn't hard, or even painful. You see, what pain really is, is a failure to understand. My complete understanding was something I can only describe as an *über-sation*—my understanding

was not only an embracing of my true nature but a conquering. And let's face it, most humans would regard the complete conquest of pain as unconditional victory within the human condition of being alive.

And then there's most of us, who are compelled to partake of the human experience without ever becoming human. Maybe that was supposed to make me care more about real humans. It didn't.

She tried to beat me up.

She tried to make me believe it was for these outrageous paranoid-schizo lies I was telling her but I knew by the bleak look in her eyes that she not only believed me but my telling her had cleared up the mystery of why she was the way she was as nothing else ever had—her fucking gut was telling her I'd spoken the truth. And her gut also told her to beat me up. I countered her fists with my forearms and when she got too active on me, I just held her by her wrists until she tired. Eventually she

kind of figured what to expect after that and she didn't disappoint me. The one she sent was named Gaston—I swear—and he was infuriated with me. Who did I think I was to tell the *chérie* she was nothing more than a *poupée*, and what odious cult was I proselytizing for, or had I just drunk too much antifreeze during the last pressing in some cheap vineyard. I admitted to nothing and denied nothing. Gaston was certainly not like us and could never understand. But what he lacked in knowledge—of any kind—he made up in heat. She had obviously decided to bring her formidable talents to bear on him, to make him take her side. Which, ironically, proved I was right. Only we can exert such power over humans, since our chemistry triggers their own obsessions.

Do I sound unbearably smug? I should.

I had to kill Gaston. He pulled a knife on me.

Even if it was a sad, rusty excuse for a jack-knife, I had to kill him to prove my point to her. He still could have killed me, after all, if I'd been weaker, if I'd been some scared tourist, say, or new to this kind of life. And as I'd suspected, when I was tending to the remains, I discovered that Gaston had killed two people in his time. If I reveal that one of them was the man who had raped a person who had once been

his woman, would you feel bad for him and terrible anger for me? How about if I tell you that the other was the infant that was the issue of this crime? Will you then see me as Gaston's justice caught up to him at last? How is it that you insist that your lives, all your lives together, do not mean nothing?

It was only after I found that I had been manufactured for the sake of information-gathering that I actually felt free enough to gather some. I thought my little blonde would come around to the same point of view, but when Gaston's body bobbed to the surface of the Seine with the features and other important parts carved off and scared the Bateau-Mouches tourists, she called the police. But what the hell, she came to us there under the impassive Louvre, and they questioned us, those of us who would allow ourselves to be questioned, and she accused me. Pointed her finger, said I did it, said she could prove it—if they would just undo my *cuillottes*, they would find that the parts that should have been there had been

ONCE I DISCOVERED
THAT I WAS A DATAGATHERING DEVICE RATHER
THAN A TRUE
HUMAN, I EMBRACED MY NATURE, IF NATURE IS
A WORD YOU
CAN USE FOR A MANUFACTURED THING.

was crying into my front and wanting to know *Qu'est-ce que je fais*? over and over between sniffls.

"Well," I told her, "that isn't too hard. You fare the way you'd fare, regardless." Her English wasn't good enough to appreciate the pun, but some things I find irresistible even when I'm the only audience for them. Perhaps that's part of the conquest of existence, too.

"No, seriously now, listen. *Ecoutez*," I said to her mixing a little bad French with sign language and English. "I'll show you all the things you can do voluntarily that you didn't know you were doing all along. There's no way you can't do those things because the mechanism works too well. I'll show you how to yield your information at times more convenient for you so that you can do whatever you want. Almost, anyway, close enough for government work, certainly."

She didn't get that either.

In the middle of my explanation of how to yield, she clapped both hands over her ears and ran away crying. I

carved off in just the very same fashion as Gaston's.

The police knew her as the woman who often entertained the tourists with her nude sunbathing, besides, they had no desire to see me or any other of the vagrants sans culottes. They talked to me, although no more closely than they talked to anyone else, and there was a story in the papers and some pictures. She got herself a knife and threatened to use it on me if I came near her again. She also got herself a couple of protectors and threatened to use them on me as well, though the way it actually went was, they used her and smirked at me over their shoulders while they did.

I shrugged, continued to gather information, and June continued to be beautiful.

When I was full of experiences, it was time to yield to those who had made me. I had the strong sense that they would not come to the Sene, that I would have to find some other place where they could take from me. I didn't understand why, but my understanding was not required.

I took a little walking tour in ever-widening circles, rode the Metro, found L'Opera again. Something about the arrangement of the steps and the statues.

I climbed to the third step from the top and settled in to wait. I hated being in sight of the beggars who worked the streets and the entryways to the Metro but those who created me don't argue or bargain—I would yield, or I would cease.

I stayed on the steps for two days without moving. Their sense of time is different from ours, so I didn't know how long it would take—two days, five days, a month, whatever. People went up and down, refusing to see me, the police came and made me move to one side during the day. And the weather held, and held, and held.

On the third morning, clouds moved in just about the time the sky began to lighten and the air became heavily humid. I had been asleep or passed out, I went from oblivion to a state of being completely alert, sitting up on the hard stone steps. It took a few moments for me to understand why: there was no sound. I could see cars moving, some of them glided right past me where I sat, but it was like watching a silent film.

Overhead, the clouds were boiling, also in silence. I laid myself down on the steps spreadeagle. It wasn't comfortable, no, but that wasn't the idea, after all. I watched the clouds continue to boil and then to swirl slowly and unevenly clockwise. Appropriate to the

CONTINUED ON PAGE 83

How to take care of a pesky little problem, with...

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THE MEDICINE LABEL... THE FIRST STEP TO GETTING BETTER.
A MESSAGE BY THE COUNCIL ON FAMILY HEALTH AND THE FOOD AND DRUG ADMINISTRATION.



As a boy, Joe Jacobs remembers his mother, a full-blooded Mohawk, giving him mysterious herbal potions when he was sick. He's not sure the potions worked, but he accepted them as something a caring mother did for her children.

Today, as head of the Office of Alternative Medicine, Jacobs can't afford to be so nonjudgmental. His new office, a tiny but controversial part of the hallowed National Institutes of Health (NIH), is expected to pass judgment on an enormous range of

INTERVIEW

JOE JACOBS

THE HEAD OF THE
NIH'S OFFICE OF ALTERNATIVE
MEDICINE WOULD
RATHER CALL IT "OFFICE FOR THE
STUDY OF HEALING ARTS".

PHOTOGRAPHS BY PETER LIEPKE

popular but unproven medical therapies: not just herbal medicines but acupuncture, bee-pollen treatment, intercessory prayer, meditation, massage therapies, bioelectrics, and more. The creation of the office two years ago, under congressional prodding, marked the first time that medicine's huge and, some would say, stodgy federal research establishment has officially recognized the promise of alternative therapies.

A handsome, heavyset man of 48, Jacobs has the reassuring bedside

manner of an experienced pediatrician—which he is. His voice is deep and resonant, gaze direct; his grin is easy and appealingly lopsided. Jacobs' manner, self-effacing and unflappable, is an asset for someone suddenly walking a professional gauntlet. On one side are the medical mainstreamers, a number of whom fret that Jacobs' office is splurging tax dollars on pseudoscience and giving encouragement to quacks. On the other side is a large and bewilderingly diverse community of alternative medical practitioners, from chiropractors to mind-body healers. Of these, some expect Jacobs to work a bureaucratic miracle by bestowing respectability and government approval on their favorite practice. Others worry that Jacobs is a pawn of the entrenched health bureaucracy and is poised to summarily judge and condemn their novel healing techniques.

Jacobs himself doesn't hedge: He's a card-carrying member of the mainstream, with an M.D. from Yale and an M.B.A. from the University of Pennsylvania's Wharton School. Before coming to the NIH, Jacobs served as medical director for research and program development at Aetna Insurance in Connecticut. Second-hand anecdotes about miracle cures don't impress him. But his belief that orthodox physicians aren't solving the problems they'd like to solve is shared by at least one in three Americans—the number who have reportedly visited an alternative practitioner in the last 12 months—and, he says, by a large and growing number of AMA types.

Jacobs spent part of his childhood living on an Indian reservation near Montreal, where the family had neither central heating nor indoor plumbing. Of the family's four children, he is the only one to finish college. He was 27 when he finally earned a biology degree from Columbia University in 1973. To help pay his medical school bills, he later spent several years as a pediatrician with the Indian Health Services at a Navajo reservation in New Mexico. People with health problems there



PROFESSION:

M.D., Pediatrician

JOB:

Director of the NIH's new Office of Alternative Medicine

ONE OF FIRST GRANTS AWARDED:

To study the therapeutic effect of intercessory prayer, to the University of New Mexico

ALTERNATIVE MEDICINE FROM AN M.D.'S PERSPECTIVE:

Physicians are guided by a code of ethics that makes it difficult to send somebody to an unconventional practitioner if the therapy is unproven

ON CONVENTIONAL M.D.s:

"Personally, I avoid physicians like the plague."

HOW TO MAKE ALTERNATIVE MEDICINE LESS APPEALING:

Clone Marcus Welby a million times

RECOMMENDED READING:

Doctors, Patients, and Placebos, by Dr. Howard Spiro

FAVORITE QUOTE:

Nothing is so firmly believed as that which is least known—Montaigne

often sought second opinions; his and a medicine man's. Jacobs' exposure to Native American healing practices, first from his mother, later from the Navajo, has taught him that healing is more than a biochemical process. Interacting with children and families as a pediatrician, he claims, places him at the holistic end of the orthodox medical spectrum.

Jacobs jokes about the puny size and budget of "my little office," in part to deflect expectations of the public or his congressional overseers that he and his staff are going to run around the country turning up off-beat cancer cures. He sees his office not as an issuer of judgments. In any case, but as a mediator bringing together two often noncommunicating camps. He also sees his role as that of a consumer advocate, compiling information gathered from a huge number of little-known studies of alternative medical treatments around the country. Once sifted and sorted, the information could help the public learn which unconventional practices can be effective and for whom.

Interviewer Doug Stewart found himself racing to keep up with the fast-moving and unpredictable doctor-turned-bureaucrat. Jacobs' somewhat casual approach to time is coupled awkwardly with a tendency to overschedule his frenetic workdays. Conversations took place at his carton-filled Bethesda office, while phones rang and fax machines whined nonstop. They continued during a midafternoon foray to pick up his seven-year-old son, while weaving in and out of rush-hour traffic in Boston to meet a close-packed lecture schedule, and later during a high-speed night drive through Rhode Island in a race to make yet one more meeting.

Jacobs lamented med school experiences that teach students to view patients as bags of enzymes. He lambasted the Westie-best bias behind much ethnomedicine-bashing. And he reserved special scorn for those who smugly argue that medicine decision-making is purely scientific, like physics. But his criticisms weren't the carping of a cultural outsider. Rather, they were the

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observations of a member of a mainstream that is itself undergoing a massive if gradual shift as it seeks to carve out a new course.

Omni: What kind of medical practices do you classify as alternative?

Jacobs: Those things not taken seriously by the medical profession. But it's difficult to define that way because so few alternative practices don't relate to some research going on in the conventional medical community right now.

About six weeks into my job here, for example, I had a visit from someone from Maharshi International University in Fairfield, Iowa. After talking with him for awhile, I said, "You know, I really don't have much money." And he said, "I'm not here to ask you for money. We already have a big grant from the Heart, Lung, and Blood Institute." It turned out the Institute, a part of the NIH, was funding his university to the tune of well over \$1 million—more than half my office's first-year budget—to study the use of transcendental meditation to help control high blood pressure. I almost fell off my chair.

Omni: So the creation of your office wasn't the first time the federal health bureaucracy opened its doors to alternative medicine?

Jacobs: No, although I really hadn't known that. In fact, if you believe David Eisenberg's study in the *New England Journal of Medicine* suggesting that 34 percent of the United States population used some form of alternative medicine in the past year, and when you consider that 15,000 people work at the NIH, it's likely that at least 5,000 NIH employees use some form of alternative healing. A cynic might say the percentage here is higher than elsewhere because NIH people are more intimately aware of the limitations of biomedical research.

Omni: If an alternative therapy proves effective in clinical trials, does it stop being alternative?

Jacobs: Right. The best example is Dean Ornish's cardiac rehabilitation program. Its four elements are a temperate fat diet, use of support groups, moderate exercise, and meditation. Ornish has shown that patients with coronary artery disease who follow his regimen can actually reverse the plaque buildup that causes coronary occlusion. If they can use those four elements to avoid surgery, I think that's tremendous. It lends support to the notion that mind-body control plays a role in health and well-being. At least one insurance company is seriously looking at reimbursing patients for Ornish's program. When that starts to happen,

it's one sign a practice is becoming part of conventional medicine.

Nutritional therapy is another example. For years advocates argued that healthy doses of nutritional components can help mitigate disease, but no good studies really showed that. Then a recent study in China by the National Cancer Institute (NCI) discovered that adding various vitamins and minerals to the diet seems to prevent cancer of the esophagus and stomach, which people in this province have a predisposition for developing. Although their problem may arise from extreme nutritional deficiencies in the local diet, the observation is still important because it shows a causal link between nutrition and cancer. I wouldn't call these treatments alternative, by the way. I'd call them novel.

Omni: Are you happy with the name, "Office of Alternative Medicine"?

Jacobs: No. Alternative is a terrible word. It connotes up mutually exclusive choices. The British term is complementary medicine, which I think is kinder and gentler. If I had my way, I'd call it the Office for the Study of the Healing Arts.

Omni: What does the NIH expect your office to accomplish?

Jacobs: The NIH didn't create my office purely out of scientific curiosity—it doesn't usually do things like that. The job Congress gave us is to evaluate various alternative medical practices to see if there is any clinical benefit to their use. I should add that I'm not a proponent of alternative medicine. I don't even want to call alternative treatments an option until they've been clinically proven to be beneficial. But I am a proponent of the fair evaluation of alternative medicine.

My office is really the brainchild of Senator Tom Harkin of Iowa, who chairs the Senate appropriations subcommittee overseeing the NIH and so is in a powerful position to guide the research end of the NIH. Harkin and many of his constituents were concerned that conventional medicine wasn't offering solutions to many of today's health ills. He and others in Congress were particularly concerned about the slow pace at which unconventional cancer therapies were being evaluated.

Omni: Are the politicians looking for magic bullets?

Jacobs: In principle, there's nothing wrong with looking for magic bullets, because the mortality rate for cancer is still terrible. But people in Congress who've pushed for this office are a little naïve if they imagine we're going to comb alternative medicine for miracle cures. Alternative medicine's real value

probably lies in its serving as an adjunct to conventional primary care. Unfortunately, we're sort of set up by Congress to challenge conventional therapeutic medicine instead. The NCI, with its budget of \$2 billion a year, hasn't been able to find a cure for cancer. I don't expect my little office can do what the NCI has been unable to. My budget was \$2 million last year; it's \$3.5 million this year.

Orn: And how do you characterize that figure?

Jacobs: Pairy. The congressional committee really must believe in alternative medicine because it gave me a homeopathic level of funding to run this office! One of our main activities is awarding grants aimed at fostering collaboration between conventional medical and alternative communities. Originally, we planned to award 20 grants of \$30,000 apiece, but we got an amazing response: over 800 letters of intent and 473 actual grant applications. We ended up awarding 30 grants and holding over 12 more to the current fiscal year.

One of the first was to researchers at the University of New Mexico to study the therapeutic use of intercessory prayer—praying for someone to get better without the person knowing about it. I got some hate mail from the quackbuster community. The letters said, "How can you fund a project on the use of prayer and religion?" I asked a staff person to go to the NIH's computer database and pull out all the existing projects supported by the NIH related to religion and spirituality. There were 42 listed. Ours was the forty-third. I found interest in alternative medicine already cuts across many, if not most of the institutes.

Orn: Has your office zeroed in on particular areas?

Jacobs: No, we've chosen not to target specific diseases or treatments for study. Our latest solicitation of grant proposals focuses on funding projects at various medical schools around the country to look into alternative medicine much like my office is doing. These centers will collect information about all the practices being investigated at institutes considered alternative. The National Institute of Mental Health is supporting research in biofeedback, hypnosis, and Navajo spirituality. The National Institute on Aging is looking at Chinese *T'ai chi* in the elderly with movement disorders. Other institutes fund separate studies for acupuncture in the treatment of substance abuse and nerve problems in AIDS patients. At the NCI, the natural-product branch does nothing but

screen botanicals for their medicinal value. The idea that nutritional supplements can have disease-fighting properties isn't coming as a lightning bolt to NIH people—they've been studying this for years. But their findings are spread out, not integrated.

Orn: Outside the NIH, what kind of reception has your office had?

Jacobs: The big surprise has been the absolutely phenomenal degree of interest shown by the mainstream medical community. Most of my speaking engagements have been to them, and few, actually, to the alternative community. I've had calls from insurance companies, state licensing boards, research foundations, and the American Medical Association's council on scientific affairs. In March, a lecture I gave for the NIH was standing room only. I doubt it's my sparkling personality that's driving this—it's demand within the medical community to learn more about alternative medicine.

Orn: Yet some still complain that your office is a casting call for quacks.

Jacobs: It's not. I'm impressed with the sincerity of so many people who call or write in. The real problem isn't quacks; it's that people in the alternative medical community typically lack sophistication about data collection and analysis. They're not researchers, they're practitioners. And practitioners aren't used to doing rigorous testing—any practitioner. Few mainstream physicians collect data as rigorously as a researcher would. If you have a problem with data collection, you'll have a problem with data analysis. We want to help alternative practitioners improve in collecting data so we can monitor their results more effectively.

When an alternative practitioner comes with a claim, I'll ask tough questions: "What's the hypothesis you're trying to prove? If you tell me you can cure cancer, I don't believe you, for starters, unless you can tell me what the proof is you're basing the conclusion on." If someone purports to have a cure for cancer, they've first got to prove that their patients had cancer. If a healer says a breast-cancer patient used prayer to dispel recurrence of her tumor, how do they know it was a recurrence? There was a lump, and it went away. Well, if they didn't do a biopsy this time around, how do they know it wasn't a fibrocystic lesion that came and went?

For people with claims about unproven treatments, it becomes an educational discussion. I tell them if they can withstand my scrutiny, they can withstand the scrutiny of the conventional medical community. Evaluate be-

I. ASIMOV: A MEMOIR

BY ISAAC ASIMOV

Review by Andrew Wheeler

Though I never managed to meet Isaac Asimov while he was alive, I was lucky enough to attend his memorial service. There, many people—famous and no-so—got up to speak of Isaac's generosity, his sense of humor, and, most of all, his powerful work ethic and all the marvelous books that he wrote because of it. I realized then that he was one of those very rare people who is truly *beloved* by the whole SF community.

This is Isaac's 470th book (counting from the handy list at the back) and will be just about the last. Though it's an autobiography, it isn't a sequel to *In Memory Yet Green* and *In Joy Still Felt*, the two long autobiographical books he wrote in the 1970s. *I, Asimov* instead covers Isaac's whole life through thematic chapters, from birth to his last years, filled with his memories and opinions on everything from college politics to Gilbert and Sullivan to SF conventions. The 166 chapters are fairly short—just long enough to cover their chosen subjects—but together they make up a mosaic of his life. It isn't a conventionally exciting life, since Isaac never really went anywhere or did anything except write, but anyone interested in his books or the history of SF will find it enthralling.

I hope those who actually knew him will not be offended that I've referred to him so familiarly here, as "Isaac." Through his writings over the years I feel I've come to know him personally. Major SF figures are usually known by their last names—Heinlein, Clarke, Simak—but he was always just Isaac, to me, and to the millions of others who knew him through his hundreds of books.

I, Asimov is available from *The Science Fiction Book Club* on p. 16.

fore you advocate, I always say.

Omn: Isn't Congress expecting your office to evaluate off-beat therapies?

Jacobs: Yes. Senator Harkin wants us to make on-site visits to investigate specific practices. We can't do that with real scientific rigor, but we try to do it nonetheless to placate Congress. That's our *Star Trek* role—to go out and deal with Klingons and whatever.

Omn: Harkin believes bee pollen cured his allergies. Didn't he ask your office to investigate and possibly validate that treatment?

Jacobs: Yes, we visited the man who markets this treatment, Royden Brown. Now, if someone gives you several hundred anecdotes about people benefiting from a treatment, you shouldn't ignore that. But Brown reeled off laundry lists of things he purported to cure with bee pollen—everything from leukemia and asthma to schizophrenia. It was totally off the wall—the claims so outrageous we decided they weren't worth exploring further.

Omn: Harkin's fellow Iowan, ex-Congressman Berkeley Bedell, thinks cow's whey might cure Lyme disease. Requiring a five-year clinical trial of cow's whey is ridiculous, he says, and many citizens would probably agree.

Jacobs: Serious questions exist about

whether many people diagnosed with Lyme disease have it at all. Problems with the diagnosis will give you problems with the treatment. Bedell is giving a politician's view on an extremely complex issue.

Omn: So the question isn't, "Will cow's whey hurt you?" It's "Should a company be allowed to market this as a cure for Lyme disease?"

Jacobs: Right. There's also a concept in business called an opportunity cost: what it costs you not to do something. There are opportunity costs in medical care, too. If a patient walks into your clinic feeling really crappy and exhibiting a bull's-eye lesion—classic symptoms of early Lyme disease—is it ethical to give the patient cow's whey instead of antibiotics, which is usually effective in treating the organism causing Lyme disease?

Omn: I certainly wouldn't be happy taking cow's whey.

Jacobs: I wouldn't either.

Omn: Should unconventional remedies be more accessible to consumers?

Jacobs: It's really not sensible for my office to be a tool for opening up access to alternative medicine. Our real purpose should be to generate information enabling policymakers such as the Food and Drug Administration to

make decisions about regulating or deregulating various products. We try to work cooperatively with the FDA. We just co-sponsored a meeting on the safety of using acupuncture needles, which are still officially classified as investigational devices. The FDA, I think, would like to change that. Some states already license acupuncturists, so it doesn't make sense to say it's still a quasi-experimental technique.

Omn: You like to quote Montaigne: "Nothing is so firmly believed as that which is least known." Who's that [Jibe aimed at]?

Jacobs: Critics of alternative medicine point out there's not a lot of science behind it. There's not a lot of science behind conventional medicine either. It purports to be a science, but it's really just as much an art.

Dr. Paul McCarthy of Yale did a study of fever in infants, finding that experienced nurses were better than physicians at predicting whether the infection was bacterial or viral. So experience—seeing babies all day in various stages of illness—gives a strong advantage. But it's difficult to discern just what is making experienced people's conclusions more accurate. The signs they're picking up are often so subtle, they're judging how playful the babies are, how easily they cry, how clingy they are with their parents.

Omn: Double-blind trials repeatedly show that placebos, substances having no known biological activity, often produce benefits. What's behind the placebo effect?

Jacobs: A complicated series of interactions occur between a patient's beliefs and the course of a particular disease. Stanford University psychiatrist David Spiegel studied the use of support groups by women with breast cancer. Spiegel didn't believe the use of support groups had any effect on long-term survival but decided to test it anyway. When he compared women using support groups to those who were not, he found, to his astonishment, women using them lived on average 18 months longer. What mechanism might explain this—who knows?

The point is that your belief system seems to affect your survival. Nobody knows why. You can discuss why the sky's blue, too, but does it really matter? Some years ago, the military sent up a rocket that dispersed some material to neutralize ions in the upper atmosphere, and it turned the aurora borealis off for a while. I mean, they turned the goddamned aurora borealis off! Who the hell did they think they were? I'd have jailed them for ten years. We can carry the pursuit of sci-



entific knowledge too far. Rather than funding research into looking at why support groups work, as Spiegel found, I'd rather put money into supporting support groups.

Omni: There will always be people out there who want to plumb the mysteries of the universe.

Jacobs: Yeah, and many of them are just trying to line their pockets with grant money. Joe Sipeack doesn't want to know why. He wants to know: Does it work? We don't understand a lot of things about conventional medicine. No one disputes that access to prenatal care tends to lower infant mortality, but nobody knows what it is about the encounter between mother and caregiver that lowers infant mortality. It's difficult to test. Yet nobody suggests we stop funding prenatal programs because we don't know why they work. For years no one knew the mechanism of how aspirin relieved pain, but they had a pretty good idea what the effect was. So that never posed any problem for the medical profession.

Omni: Homeopathy, which your office is investigating, involves not an unknown biological activity but apparently no biological activity at all.

Jacobs: Yes, that's more complicated. Some people feel statistically significant results emerge from well-controlled studies of homeopathic remedies. I have difficulty believing any medication diluted to a concentration of one divided by Avogadro's number—six times ten to the twenty-third—can have any biological activities. But you can't let the implausibility of that reinforce your negative bias. One should be willing to be surprised.

Omni: Have you been surprised since starting the office?

Jacobs: I haven't seen any home runs.

Omni: Do you find traditional folk remedies more promising than New Age therapies like healing with crystals?

Jacobs: Folk therapies are often better candidates for study because they may represent several thousands of years of trial and error. To ignore the long traditions of indigenous healing systems—acupuncture, Chinese and other herbal medicines, East Indian Ayurveda, Native American healing methods—reflects a degree of technological arrogance. Our alternative medicine is the Navajo's conventional medicine. What we call conventional medicine in this country is used by a minority of the world's population. Acupuncture is used by half a billion people, so it's not really alternative.

Omni: Is the growing western fascination with mind-body healing partly a re-discovery of these age-old therapies?

Jacobs: For physicians, it's actually a rediscovery of many of the principles we learn in medical school. At Yale, we were taught to look at our patients' emotional and spiritual aspects, their relationships with other people—at the patient as a whole person, not just as a disease entity. Now are the various elements of your patients' lives contributing to the problems bringing them to your office?

Traditional Native American healers talk about patients not being right with themselves, about the spirits being in disarray. Well, how different is that from the situation where a high-powered executive from a Fortune 500 company comes into my office complaining about headaches or high blood pressure? I do a physical and take his history, which involves finding out what he does for a living and how satisfied he is with his job. What it boils down to is

nothing about the practitioner.

Omni: When you worked on a Navajo reservation, did you have contact with traditional medicine men?

Jacobs: Not really. I just had to understand that my patients were also going to use medicine men and forms of healing different from what I learned at Yale-New Haven Hospital. The Navajo healing traditions in part define what a Navajo is. It's not as though you're suddenly going to be privy to treatments heretofore not identified by the white men. It's more that these practices are part of what the tribe believes in, and their beliefs help reinforce who they are, in the same way their language does. If I were asked to evaluate the clinical benefit of having a patient go through a Navajo healing ceremony, I wouldn't start by saying to the healer, "I need to break down your ceremony into a series of two hundred steps." If I made that a condition, I'd probably be thrown out. These things are impossible to separate from the culture's religion and beliefs. I certainly wouldn't send a baby to a chiropractor for infantile colic, which some chiropractors allege they can cure. A sort of modern-day folk remedy for curing colic has you drive the baby three times around the block in a Cadillac convertible. To me, that's as valid as sending the baby to a chiropractor.

In general, though, physicians are more open-minded about unconventional medicine than they've given credit for. When patients have chronic debilitating diseases like arthritis where conventional medicine is limited in what it can do, physicians tend to support what their patients choose to deal with their condition, whether it's acupuncture or cognitive therapies.

Omni: Do some controversies arise because orthodox M.D.s focus on curing the disease while alternative healers may be talking about improving the sick person's quality of life?

Jacobs: I think so. Some people purport to have miraculous cures when, in fact, they may not be cures but do enhance the quality of patients' lives. I'm hard-pressed to believe that coffee enemas can cure cancer. They supposedly enhance the elimination of toxins from the liver. But perhaps coffee enemas can help patients with severe constipation, which is sometimes a side effect of pain medications. So they may enhance the patients' quality of life.

Omni: How many patients who turn to

THE REAL VALUE OF ALTERNATIVE MEDICINE LIES
IN ITS SERVING
AS AN ADJUNCT TO CONVENTIONAL
PRIMARY CARE.
UNFORTUNATELY, WE'RE SET UP TO CHALLENGE
CONVENTIONAL MEDICINE.

that there is a disruption in his life resulting in the expression of a disease—hypertension, gastric ulcers, or what have you. Part of the treatment is: relax.

Omni: When did you first become interested in alternative medicine?

Jacobs: You could say I was born into alternative medicine because my mother, a Mohawk, used herbal remedies for me and my siblings when we were sick. She also took me to long-house ceremonies and engaged in both Mohawk and Christian prayer. It was something I took for granted. She also took me to a couple of Oral Roberts' prayer meetings when I was a kid. I remember him putting his hands on people's heads and "healing" them. But really I didn't think much about any of this at the time.

Omni: Have you ever referred a patient to an alternative healer?

Jacobs: Never. People fail to realize physicians are guided by a code of ethics, making it difficult to send somebody to an unconventional practitioner if the therapy is unproven, or you know



ANTIMATTER

AT LONG LAST, PROOF?

Mental telepathy, a phenomenon rarely demonstrated outside of horror and science-fiction films, has long resisted efforts to prove its existence in the lab. But according to some scientists, that may now change. In a paper published in the January, 1994 issue of the *Psychological Bulletin*, Daryl Bem and the late Charles Honorton argue that they have indeed found "replicable evidence" for "anomalous information transfer." The paper is the result of a collaboration that began in 1983 when Bem, a Cornell psychologist, visited Honorton's Psy-

chosocial Research Lab in Princeton, New Jersey. Honorton had been conducting telepathy experiments with reports of surprisingly positive results, and Bem, a trained magician, was asked to evaluate the procedures.

The experiments, based on the so-called "ganzfeld" procedure, involved a sender who concentrated on a specific visual image while a receiver in a separate, acoustically sealed room, sat with Ping-Pong ball halves taped over the eyes and headphones over the ears. After half an hour in this altered state, the receiver was asked to pick one of four images. Ordinarily, he or she would have a one-in-four

chance of picking the same target that the sender "sent." In Honorton's studies, however, receivers guessed right about one-third of the time, a "statistically significant" result.

Is this, at last, the long-sought proof of ESP? Not yet, says University of Oregon psychologist Ray Hyman. Although he finds the ganzfeld studies more rigorous than previous parapsychological experiments, Hyman argues that "they still leave us at square one. Everyone agrees that this work needs to be replicated, which is exactly where psychic research has remained for the past 150 years."

—Steve Nadis

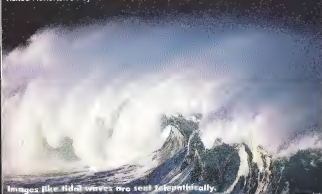
NOT NECESSARILY NESSIE

The most famous photograph of the best-loved monster in the world is a hoax. If you don't believe it, ask Alastair Boyd and David Martin of the Loch Ness Project in Scotland. They have obtained a detailed confession.

When first published, the picture of the Loch Ness monster caused a worldwide sensation. Robert Kenneth Wilson, the eminent London gynecologist, supposedly took the picture on April 19, 1934, after one of his companions reportedly saw a commotion in the water and shouted, "My God, it's the monster!"

Now, more than half a century later, the truth has emerged. The confession came from Christian Spurling, who admitted his role in the hoax before his death last November at the age of 90. Spurling said he built the model for the famous photograph using the keel of a toy submarine on which he had fitted a sea serpent's neck and head made of plastic wood.

Spurling claimed the hoax was masterminded by his stepfather, Marmaduke Wetherell, a filmmaker hired by the



Images like tidal waves are sent telepathically.



Daily Mail to hunt for Nessie in 1933. Also involved, according to Spurling, were Wetherell's son Ian and friend Robert Wilson, whose credentials made him the perfect front. All the conspirators are now deceased.

The new revelation is unlikely to change many beliefs. "Nessie is the most photographed monster in the world," notes Mark Chorvinsky, editor of *Strange Magazine*. "So those who want to believe can still look to other photographs and films."

—Patrick Huyghe

MANDALA ARCHITECTURE

In Tibetan Buddhism, the mandala is a ritual instrument, much like a mantra, used to assist meditation and concentration. Throughout history, these pictorial temples—intricate, two-dimensional, multi-colored patterns of concentric circles, squares, and other shapes—have signified the human need for wholeness, order, and balance. But while

many people of the West accept mandalas as representative of a cosmic force, few understand they are meant to be blueprints as well. Indeed, a Tantric Buddhist meditator studies a two-dimensional mandala like an architect, building up in his mind the image of a palace encompassing the sacred principles of Buddhist philosophy.

Now, graduate students and faculty at Cornell University are bringing the three-dimensional palace of the mandala to life. Working with Tibetan Buddhist monk, Pema Losing Chogyen, the team has created, on the computer, a gorgeous geometric palace that blooms from a two-dimensional sand mandala like a flower in a time-lapse film. "We write software that makes synthetic images, enabling us to visualize how new buildings look before they are built," explains senior research staff member James Ferwerda.

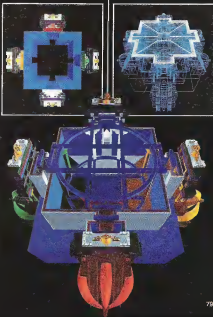
Toward that end, Ferwerda explains, "we model the process of light reflection. We create a geometric model, then we study the materials that go into the building, exactly the way physicists and chemists analyze material. Then we simulate the way light reflects

and refracts and is transferred by these materials, and that's how we make an image." For instance, a cornice of intricately sculpted gold glints as though struck by the sun, jewels glow, and ornate silken banners hang heavy around the crown of the palace.

To some, the realism is richly ironic since mandalas are meant to depict the ultimate Buddhist truth that nothing has inherent existence. But

Chogyen believes the effort at Cornell may be the first of many computer graphics projects to be undertaken with Buddhists.

Already the computer graphics department at Cornell has established a scholarship for Tibetans. And to whet appetites for the rest of us, the Cornell mandala is now even available on videotape from Snow Lion Publications of Ithaca, New York. —Thacy Cochran



LUCID DREAMING REVISITED

CONTINUED FROM PAGE 51

tion techniques in a lucid dream might yield still greater benefits, according to LaBerge, because dreams involve the brain and body more directly than do mere imaginings.

Could lucid dreaming have any adverse side effects? Susan Blackmore, a psychologist at the University of the West of England, has raised this possibility. While acknowledging that lucid dreams "can enrich your life," Blackmore has become concerned by anecdotal reports of people losing the ability to discriminate between dreams and reality as a result of having "too many lucid dreams."

A theory of dreams proposed by the eminent biologist Francis Crick, a co-discoverer of DNA's double-helix form, lends weight to Blackmore's concern. Crick and a colleague speculated some ten years ago that the brain sheds spurious memories during sleep to prevent itself from being overloaded with data; the neural firing resulting from this process gives rise to dreams. Their theory predicts that recalling dreams should trigger mental instability.

Noting that no evidence exists for Crick's theory, LaBerge rejects the claim that lucid dreaming might cause psychosis or other problems. If anything, he says, learning the techniques of lucid dreaming can help one distinguish between dreams and reality.

Still, LaBerge reveals that he has "a view of dreaming and waking which is probably the opposite of the usual view." In fact, he believes that dreaming is the basic function of the brain in understanding the world. We are always dreaming, he says—that is, we are always constructing "simulations of reality" out of the firing of neurons. "That's what we're doing right now," he says. "The difference is, the dreams were being right now are constrained by sensory input."

To Sleep, Perchance to Dream

The day after the oneironaut workshop, I was in the Stanford sleep laboratory with LaBerge and several assistants. The lab consists of two rooms, one containing a bed and the other crammed with computers, polygraphs, and other electronic equipment. A print of Escher's drawing *Night and Day*—which shows a sunlit landscape dissolving seamlessly into a dark mirror

image—hangs on one wall of the equipment room.

LaBerge had decided that rather than spending an entire night in the sleep chamber, or "oneirodrome," I should take an afternoon nap. Two assistants pasted electrodes to my chin, temples, and scalp. When I climbed into the oneirodrome, I felt like I was entering a spaceship.

I was quite drowsy at first. Of course, as soon as I lay down, I felt wide awake. The video camera hanging above my head, staring rudely down at me, didn't help.

I thought about the itchy feeling of the electrodes and how hot it was getting in the tiny chamber. I repeated a mantra that sometimes helps me go to sleep. When that didn't work, I thought about the Mets and a large red sailboat tacking south down the Hudson River. ...

A red light flashed repeatedly in my face. I was startled, confused, and then I remembered the DreamLight. I moved my eyes back and forth four

times to signal to the researchers that I was awake, not dreaming.

I awoke sleep again. I felt intermittently drowsy, but I never fell asleep, or so I thought. I heard LaBerge's disembodied voice ask softly, "John, are you awake?" Yes, I replied, and I asked him how long I'd been in the chamber. "About two hours," LaBerge said. To my surprise, he told me I'd slept for about half that time.

I tried to remember a dream but couldn't. Maybe I had had a dream and just couldn't recall it. No, LaBerge said, my polygraph record showed that I had never entered REM sleep, remaining instead in dreamless phase 2 sleep. Strange that LaBerge, by watching a machine in the other room, knew more about what had happened in my brain than I did.

That night I had dinner in a Chinese restaurant with LaBerge and a few other oneironauts. To encourage me, they related their own experiences. Jennifer, one of LaBerge's research assistants, described how she had

learned to go through walls in her lucid dreams by slowly pushing a finger through the wall, then an arm, and finally her entire body. "I bounced off at first," she said.

Daryl, a freelance computer consultant, said he often had lucid dreams involving aliens, probably because he liked to read science fiction before going to sleep. He said he had once had such a dream while serving as a subject in the sleep laboratory. After flying across a shimmering, golden plain, he arrived at an alien city filled with bizarre futuristic buildings and sculpture. He flew about the city, chatting with its humanoid inhabitants for almost an hour before waking up—an unofficial record for the longest laboratory-recorded lucid dream.

As for LaBerge, he has vowed to make lucid dreaming more accessible to congenitally nonlucid types like me. Right now, in fact, he's conducting tests to make the DreamLight more effective and he's trying to establish whether lucidity comes more often at the end of a night's sleep or during an afternoon nap.

He's also searching for drugs that might increase the intensity of dreams and thereby the likelihood of lucidity. In fact, many of the oneironauts in his workshop have been testing a chemical named dimethylaminoethanol (DMAE) sold in some health-food stores as a memory enhancer, or "smart drug." There is some work showing that DMAE may be a precursor to the neurotransmitter acetylcholine," LaBerge explains, "and we know that REM sleep is associated with high levels of acetylcholine."

He also plans experiments that will reveal the neurological basis of lucidity more precisely. Such experiments, he hopes, may lead to even more effective methods for inducing lucidity.

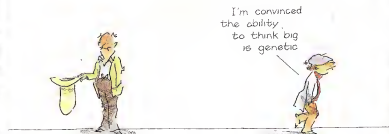
As the waiter brings our fortune cookies, LaBerge hands me a manifesto on "the promise of lucid dreaming." It proclaims that the world is in a state of crisis and that lucid dreaming can help provide solutions: "Ideas in business, politics, ecology, athletics, or indeed any endeavor can be tried in the model world of dreams."

Athletics, fine. Business, maybe. But politics? I tried to imagine Bill Clinton thinking, "Is this a dream?" during a summit conference or strapping on a DreamLight, determined to dream a solution to the federal deficit. Hmmm. What could it hurt? **DOO**

BLACKMORE HAS BECOME CONCERNED BY
ANECDOTAL REPORTS OF
PEOPLE LOSING THE ABILITY TO DISCRIMINATE
BETWEEN DREAMS AND
REALITY AS A RESULT OF HAVING "TOO MANY
LUCID DREAMS."

The Artist

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Paris in June

CONTINUED FROM PAGE 57

hemisphere, I thought dreamily. A fragment of newspaper caught on my foot and then flew up into the sky, mirroring the motion of the clouds as it did. Far inside, lightning flickered almost too fast for the eye to see and too bright to bear, a harshness that turned the clouds into a negative image of themselves.

The spiral in the sky became tighter, narrower and I felt the familiar pulling from within myself. It felt like what I imagined a tide would, or love.

My two English gentlemen passed before my inner eye, and then the business lady who had brought me to France. She had been hoping for that, I realized now; she had been hoping for love when I had come to her on the Underground, backed her up against that smeared, graffiti'd rear wall of the carriage rocking and swaying and put my mouth against her eye, I had been bringing love—bringing something, anyway—rather than taking away.

Perhaps knowing she had simply broken even was what had made her kiss me good-bye. It isn't often that human compromise doesn't involve some kind of loss. And all that went up to that flickering, spinning cloud-flower in the sky, too. Feeling what she'd felt, I cried a little or at least tears ran from my eyes, because I was an emotion machine as well, when the information called for that kind of context.

The cloud-flower seemed to grow larger and to lower as well; I thought I could feel the cold vapor swirling on my face, the cold wind doing strange things to my eyes. There was the sensation of hard stone at the back of my head suddenly overridden by a more powerful pulling than before, as if I were about to be turned inside out.

And then nothing. I was lying on the steps with the rain pouring down from the dirt-gray sky, though above me was one now shadow. Just a blur at first, it resolved itself into a familiar figure, soaked completely through and miserably angry and curious at the same time. She had my forelock in her dirty fist. She pulled me up to a sitting position. Something about the rain she yelled into my face, barely audible over the sound of it beating down on the pavement, making a fist of her free hand, threatening me, then pointing at the sky. I tried to shake my head and then settled for just looking bewildered. "What?" I asked her. "What are you saying? *Qu'est-ce que tu dis?*"

"Rain! Clouds!" she bellowed. "I

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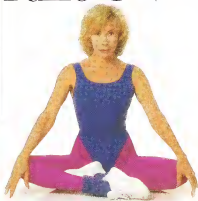
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saw you!" Did she think I'd brought the rain? Most vagrants I've known are superstitious as hell.

"The rain is not my fault," I said carefully, close to her ear. She pulled back, looking supremely irritated.

"I saw you. Sky come down and kiss you!" She stared at me, her eyes hard and demanding and expectant. I burst out laughing. The one person who might have appreciated what she'd said had been dead for almost a quarter of a century and had nothing to do with either one of us anyway.

"Sky comes down to kiss you, too, soon," I said, poking her breastbone with my finger. She slapped my hand away, but not very hard, and blinked at me in the rain, which was becoming an honest-to-god pavement-clearing and gutter-clogging downpour. I got up and hustled her across the street to a Metro entrance, but she balked at the top of the steps, holding onto the railing with both arms and kicking out at me.

"Okay, okay, I get it: you're a claustrophobe." I pushed her into a doorway just big and deep enough to keep the worst of the rain off us. "Or something bad happened to you down there. More likely, eh?"

She looked up at me, puzzled. I smoothed both hands over her face,

letting my fingers slide into her hair. Her body stiffened but she didn't try to get away. In her life, there was always something like this. Living through it was important, how, less so.

I had never tried to yield to a human or to another of my kind before. The idea had never even occurred to me until now. I wasn't even sure I could, although there certainly was enough left in me. They never took everything, maybe because there are so many similar things, or maybe because some of the things just aren't to their taste.

In any case, once the idea was in my head, I wanted to try it. It would be an experience that was mine alone. I'd never thought in terms like that before and it was like the notion was tickling me with an urgency all its own.

The rain was machine-gunning on the sidewalk, splattering us with mist from the impact as I pulled her face close and put my mouth over hers. Her lips were cold and thin like the rest of her, though not entirely unpleasant. Things weren't quite right—I moved her jaw so that her lips encircled my mouth instead. She wasn't sure about this and started to pull away, but I had one fist braced against her upper back and the back of her head cupped in my other hand. She had no organ of taking the

way they did, or rather, no specific organ, but what she had should serve.

She struggled a little more, and I could feel the panic start to rise in her. The noise of the rain was almost unbearable now, the kind of white noise people must hear in the depths of madness, I thought, and wondered how long I'd be able to tolerate it myself.

Then I felt it give, the place inside me reserved for them opened gently, sensing the nearness of a recipient, and found her in a matter of seconds. It was not what I or the ability was accustomed to and I had some bad moments when I thought she might reject what I had to yield. But then some instinct took over and she accepted in the same way she had been accepting everything else in her life.

Some time later, we just stood holding onto each other. The rain pounded as if it meant to pulverize the cement. Used transit tickets dissolved into aquea pulp and then disappeared altogether.

"You bastard," she whispered to me in French. "You abortion. If you were human, the best part of you would have run down your father's leg."

I pulled back from her, not understanding. She was radiating a sadness that didn't go with her words.

"Some would say I carved off the best parts, or at least the most useful," I said, "but why do you?"

"You put. Are you really going to give that to these—whatever, these things that live in clouds?"

"They don't live there," I said.

"Shut up. Fuck you, you don't understand. You betray your own kind, surrendering to them when we could be doing this for each other." She stared up at me, her no-color eyes moving so very slightly as she searched my face. "Now do you get it, you stupid robot? You stupid slave!"

She clamped her mouth over mine again, but there wasn't much left and after a few moments she pushed me away. "C'est bien. I know what to do now," she told me. "And not as somebody's dog to look, either. How about it, you want to walk on your hind legs for a change?"

That didn't sound so bad, even though I knew I'd done something very wrong and precipitated something even more wrong. But, I thought, what was it to them anyway? Did they even look at me until they wanted what I had? Did they protect me, did they find me any place to go? For all I knew, they thought as much of me as a maid thinks of a vacuum cleaner when the inside bag needs to be changed.

"Come on, pet," my blonde spat at me. "Let me show you what it's like to be something real, if you think you can face it." She pulled me out of the doorway into the rain, which was still heavy, though not as bad as it had been. I wiped my face with my forearm and she laughed at me. "Bêlé! Stupidet!" But she didn't run very far ahead of me before coming back to lead me along.

The word ripped up and down the paved banks of the Seine faster than a tourist-borne chance. I waited to see what this would bring, who would come forward and either denounce us or beg to join in. Well, nobody did. She and I were the only ones of our kind there, it seemed. If others were in the city, they were far away and/or uninterested.

My little blonde ran a come on that made all the joints hot and bothered to the extreme and then, just before they would have nailed her by force, she came across. To one of the ones she had originally enlisted to protect her from me, no less, the experience totaled him. He agreed to pimp for both of us for no more reward than to be allowed to partake again.

That she and I would pleasure each other that way was understandable, but what could humans find so enthralling about the human experience? And if they had no natural method or

organ of accepting the yield, how did they do it?

She only laughed when I said anything, spoke rapid, incomprehensible French at me, and trotted away to some tourist waiting for what he'd been told would be the ultimate in delectables, unusual even for unseen Paris.

"She says you ask a slave's questions," one of her new bodyguards told me helpfully. "She says you may talk to her directly again when you have evolved a backbone." He thought this was hilarious, I was simply amazed that he knew what it meant. He was a dirty pervert who had evolved a belly to balance off his own backbone. I meant to spit on his pants but for some reason I couldn't get enough wet in my mouth.

I suppose she got rich, by vagrants' standards. I hid out closer to where the tourists took the dinner boats. Many drank themselves into near-stupors, enough to allow themselves to be lured away for interludes they never remembered afterwards. It was more dangerous, though, because the boat owners and the police cared more about who was hanging around there, and less satisfying because it was on the fly and in secret—not like finding people who will take you in, talk to you, and give you a little help when they throw you out again. I was not working right. So much for my hind legs. I wondered what they would think when I yielded again. And then I wondered if they would even notice.

The big bellid pervert was the one who came to get me in the middle of the night. I woke up over his shoulder in a familiar though distasteful position, not understanding at first that I was being carried off. He had to let me down to explain that there was something wrong with her and she had been calling for me.

"A good trick," I said, "since she doesn't know my name."

"Nobody knows anyone's name," he told me, "but we all knew who she meant, and we all knew where you were." I let him lead me up the Seine to where she was, on her old spot where she had once confounded the Batobus people with her nude sunbathing. The moon was full, or nearly so, and there were a lot of people with her. Some seemed to be trying to tend to her, while others were grouped around a man who was apparently waiting with great and graceless impatience for something. I knew, of course, what that was.

She lay on the pavement like a used rag and I thought she was unconscious. But she must have smelled me; I saw her push herself up on one

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elbow. Croaking something in French, she pointed at the man who didn't look all that thrilled to see a creature like me come on the scene.

"She says you're the only one who can take care of him and they'll both die if you don't." This from her pimp/protector.

"Just give him back his money and tell him to go home," I said, squatting down in front of her and lifting her face to the moonlight. Her skin looked bruised. I thought the john had beaten her up but I was wrong; she'd done this to herself, straining to yield what she no longer had.

"I can't," said the john wanly. "We have a problem here. What are you, her keeper?"

"Not hardly," I said. He spoke English well but in a slow and deliberate way that suggested he wasn't comfortable with the language.

"Her partner, then?" He didn't sound hopeful about it.

"What if I were?" I asked him, standing up and facing him. "What if I were and you had to do the thing with me if you wanted to do it at all?" His eyes narrowed and I laughed at him. "Go home, monsieur. Give it up. Hit the road, Jacques."

"I told you, I can't," he produced a handkerchief, the blood on it looked black, which was how I knew it was blood. Blood always looks black in the moonlight. "You want to see, I'll show you." He took a few steps back and I saw it happen. He was crying blood.

"It feels worse than it looks," he said, moving toward me quickly. "And pressure in my ears. Any further, I'll bleed from those, too." He dabbed at his face, shaking his head. "I am not a superstitious man or a bad man. But she came to me—"

"Yes, yes, the woman tempted you," I said. "It's going around, eh?"

"She came to me," he said, as if I hadn't spoken, "and sometimes I am a weak man. But what did I do so bad to cry blood?" I looked down at her and she looked back at me, breathing in deep, shuddery gasps. Probably no hope for her, unless there was something I could do—

"I don't want to do a thing with anyone now," the john said. "Especially you. But to end this—" he shrugged. "Is there some other way?"

I had to shake my head.

He spoke through a painful breath. "Then we do this quick, if we can." I could see that he wanted to ask me if

that was possible, but he couldn't quite because he was afraid that the answer would be no. I didn't know if we could do it quick or not. I wasn't really ready to yield yet, I didn't know how long it would take me. Especially with an audience. I looked around. Such a big audience, too, every Seine rat seemed to be in on this tonight, and maybe a few regular citizens in vagrant drag as well, for all I knew.

I had a few moments of pity for this weak man and for my blonde, also weak, and for myself, perhaps the weakest of all. I might have wanted to blame her rat's greed and lust, but this was my fault. Careful to stay within a certain distance of her, I pushed the john into the shadows of the willows along the wall.

"Here," I said, backing him up against the stone. He stiffened as I took him by the throat, but he didn't try to push me away. At least he knew that it was going to be something other than an especially adept handjob.

BUT, I THOUGHT, WHAT WAS IT TO THEM
ANYWAY? FOR ALL
I KNEW, THEY THOUGHT AS MUCH OF ME AS
A MAID THINKS OF
A VACUUM CLEANER WHEN THE INSIDE BAG
NEEDS TO BE CHANGED.

I had thought to make it as quick and painless as possible, but after five minutes fading in and out of a half-assed trance state, I knew I couldn't do it for him. Quick, mine or hers? Either mine for being unable to do a human, or hers for being able to?

"She—" he croaked, and then began coughing. I loosened my grip on his throat, realizing he was right. She, indeed. She would have to complete the circuit before anything could happen.

I pushed him back against the wall and gestured for him to stay, and then went to get her. Lifted her up one-handed. She'd been siphoning off her own substance so that now her very bones must have been hollow tubes. Hollow tubes with a little soft-chewed leather stretched over them, she dragged along under my arm, her feet bumping the pavement but no complaints about it, none whatsoever.

As soon as he saw me coming back with her, he knew it was right. "What do I do?" he half-whispered to me

I put her hands on each of his shoulders. "Hold her," I said. "Lean back so she can stay up on you without trying." Her head propped forward and nestled under his chin, so that they really did look a lot like lovers. I yanked her head back by her hair and man-aged to maneuver his face into position, so that finally her mouth was on his eye. It was difficult, given our height differences and her limeness, but I was able to position my own mouth on her eye.

I had barely done so when her need seized on me and ran all through me, searching for the best and the most substantial that I had. This would not be a yielding, I realized, no matter how passive I was to it, to her. What there had been in her to gather information had mutated into a drive rapacious, hungry, and without intelligence or compassion.

I found the issue from the dinner boat patrons I had lured: a man who had had the experience of loving one person but being bound to another for many years, until the one he had been bound to had died; discovering, once he was free to join the other that it had been the barrier and not the hope of consummation that had kept that love alive;

a woman who had filled her emotional needs with material goods so that objects were passions for her now while other people's

passions were messy and distasteful,

a man who had done terrible things to his children in the sincere belief that it would prepare them to live in a world that would do far worse;

a woman who stole things without understanding that she was trying to recover something she believed had been stolen from her long ago;

a man who was a man by accident and a woman by intention;

a woman who had carved off in spirit what I had carved off in fact;

a teacher who had never learned a single one of her own lessons;

a priest whose faith had failed when he realized that he loved another priest.

Each was seized, examined, gobbled up, digested, and claimed. I relived each one, felt the explosion of knowledge in the pivotal moment and then felt it ripped away from me and absorbed by my skinny blonde, who then applied it to the man with such force that I thought she might be purposely trying to kill him.

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She couldn't help it, I saw; this had become something she had to do, or die. I felt him trembling under the onslaught, unable to produce enough will in himself to want to refuse her. Her need would kill him, and probably me, too, while leaving her alive, though just barely, and still in need.

I didn't want to do it just then but there was no good time, while his body was in spasm, I pulled up both my hands and snapped her neck.

The sudden absence was deafening, blinding, dizzying; we swayed from side to side with her still pressed between us, and I heard him sob, or groan, or just make meaningless noise. He did it again and I realized he said Gaston—in the act of saving us from her, I had let that come through and he knew now what I had done.

I stepped back and let her fall to the pavement. "You can go safely now, I think," I told him.

He was clutching his head with both hands but he managed to nod.

"Don't even think about telling anyone what you know," I said, "or what you think you know. And don't come down here again looking for anything, or I'll eat you alive myself."

He promised, wiping quite ordinary tears from his eyes, and staggered up the steps to the rue whatever-it-was.

The Seine rats weighted her body with stones and dumped it in the water. One of them bet that it would dissolve down there before it had a chance to float. I cleaned up and gorged myself at the Louvre and at Notre Dame. All tourists, of course, nothing but tourists, who spoke French to me in accents of varying atrociousness and gave me more information about themselves than I had ever thought of asking for. I kept hoping one of them would take me home, wherever that was.

I couldn't stand the smell of that river any more. It was as if the rat had been right and her body really had dissolved, poisoning the entire body of water and everything it touched. The essence of her seemed to be in the air; I didn't understand how the tourists didn't choke, or how the rats themselves could stand it. Till the end of June, then, I lived in the Metro with the beggars, emerging when I thought they should come again for my yield.

They didn't. I waited at L'Opera, near the Louvre, below the Eiffel Tower and finally on the banks of the Seine, but they didn't come. They weren't coming—not just taking a long time about it, but really not coming. I went a little crazy, and then a lot crazy. The Seine rats, sensing my trouble with that bizarre and unerring instinct for hurting

someone by helping, directed her old Johns my way, telling them I was the sole surviving practitioner of her odd art.

Her art. It's a laugh.

I held on as long as I could, but I was made to yield and I did, choosing those as clean as I could find for it. I could do it without her now, the circuit, once completed, stayed completed. Humans did not have much capacity, so it took more of them to yield to, and they weren't as good at it, but they were better than ceasing to be.

Or maybe they weren't. I just didn't have the nerve to test that out.

It's because I turned from them to her, of course; I chose her to yield to and whether they consider this is some unforgivable sin or just a dirty, unethical act, I'll never know, because they have left me here to go on or to cease on my own, and I can tell by the great empty sky that they will never be there again for me. I'll never even see them come for another of my kind.

(Maybe it was her. Maybe she was defective and they consider me tainted because of my association with her.)

So everything is a little bit looser and messier than it used to be, but the world being what it is won't notice, so I don't imagine it will ever really matter. And since it won't, I tell what I know promiscuously, to anyone, everyone within my range, wherever I am. I've learned to do what she should have, to siphon off here and siphon off there, and I have a Seine rat's instincts as well now, so that I only dispense the exact knowledge nobody wants at the exact moment they don't want it.

This is my indirect message to them, if they still come for the others like me that they made. The information they take is imbued with the mess I've made in it. So they can do something about me, or they can live with their poisoned knowledge.

As for me, with nothing to lose, I will go underground again for the worst of the summer heat and then the onset of cold weather. When spring comes, I'll poke my head up with the other things from under the earth. And when it is June once again, I will go back to the Seine, to her old spot, drive away anyone who might be on it before I strip off my clothes and lie down for the entertainment and edification of the commuters on the Edith Piaf Balabus, and I will drink in whatever essence of humanity that I find under the sun.

And when it gets dark and the rats draw close, I will tell them everything. Everything. Everything. And if I'm still alive when the sun comes up, I'll do it all again. ☐

informed as to what he's up to. Beyond that, what can I say? He's an American citizen, and they have a right to certain activities on public property." The Air Force is more mum about the existence of Groom Lake itself. "We can neither confirm nor deny the existence of a facility at Groom Lake," Sillia adds, "and if we can't confirm its existence, we certainly can't say anything about it."

A more vocal Campbell critic is Jim Bilbray, a Democratic congressman from Las Vegas who sits on both the House Armed Services Committee and the Select House Committee on Intelligence. Without mentioning Campbell by name, Bilbray says that "these people are persistent, and if they're taking pictures, they're breaking the law. But that really isn't the problem, there's even a Soviet satellite photo of Groom Lake in circulation. The problem comes when you have to shut down operations and secure the technology, which is time-consuming and costly, and which they have to do every time someone is up on the mountain. And believe me, they make sure they know when you're up there."

Bilbray also doesn't subscribe to the argument that now that the Cold War is apparently over there is a concurrent corollary that reduces the need for secrecy in general and secret high-tech technology in particular. "The Nellis Range is one of the few secure areas in the country where you can test these new technologies," he says. "And most people in the intelligence community will tell you that the world is a more, not less, dangerous place, now that the old system of checks and balances between the two superpowers has seriously broken down."

Still, Bilbray admits that he, the Air Force, and other government agencies are caught in a classic Catch-22 situation vis-a-vis UFOlogists. "I can't name them," he says, "but I can tell you that I've been on virtually every facility in the Nellis Range and that there are no captured flying saucers or extraterrestrial bodies out there. I've heard all the rumors. But the minute I say I've been to one valley, the UFOlogists are going to ask, what about the next valley over, or claim that everything has been moved. Well, what about the next valley over? We used to test atomic bombs above ground here and some of the valleys are still so hot that a Geiger counter will start spitting the

moment you turn it on. Doesn't sound like a very good place to test flying saucers or hide alien bodies to me."

But researchers like Campbell say they're in a Catch-22 as well, because they know the Air Force routinely denies things that do exist, beginning with the big secret base on the edge of Groom Lake. If it didn't exist, why would they need more space to keep you from seeing it? And if Groom Lake exists, then why not Aurora, the Black Mantra, and possibly even a UFO or two?

Nature abhors a vacuum, and where a lack of openness and a penchant for secrecy persists, rumor and rumors of rumors are sure to flourish, even in the middle of the desert. "You just keep shaking the secrecy tree," an unperturbed and determined Campbell advises, "and, hopefully, something drops out."

That may prove increasingly difficult to do, at least from White Sides or Freedom Ridge. Bilbray, who supports the latest withdrawal of land around Groom Lake, advises that Congress, while it has the opportunity to object and call for a review, does not have to give approval, and the Bureau of Land Management will most assuredly approve the Air Force's request, "probably within this year." □

I am curious...



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INTERVIEW

CONTINUED FROM PAGE 75

unproven treatments do so out of desperation because orthodox medicine can't offer them a cure?

Jacobs: Not that many. Demand seems to be coming from people looking for solutions to everyday problems. Those people want results right away. The tremendous public demand for information about alternative therapies is partly a desire for quick fixes. People want pills to cure the common cold and vitamin supplements to prevent cancer and coronary artery disease while avoiding doing exercise and following ten-percent fat diets. Those are the wrong reasons for being interested, but add to the demand nonetheless.

At the same time, the public is more skeptical than it used to be, and that complicates our jobs as physicians. We're no longer viewed in the godlike way we were 30 or 40 years ago. In the Sixties, everyone wanted Marcus Welby as their family physician. If you'd clone Marcus Welby a million times, you'd probably put a major dent in alternative medicine in America. Today people are dissatisfied with what they're getting from the medical pro-

fession, and they're willing to work to find information about other approaches. **Omniv:** Is there a link between health-care reform and the alternative medicine movement?

Jacobs: I think so. Attention to alternative medicine today isn't just a fad, much is driven by economics. Conventional medicine is expensive. Pressure for health-care reform is making us look more closely at cheaper alternatives—like the Ornish program, or, if it can be shown to work, massage therapy or acupuncture instead of orthopedic surgery for low back pain. A health-maintenance organization or insurance company that avoids sending patients into surgery can increase its profitability. Also, by introducing some of these novel options, you attract people who'd prefer less-invasive options. Personally, I avoid physicians like the plague. If I have to see a doctor, I make sure what's done to me is not invasive.

Omniv: You'd stay on a ten-percent fat diet for the rest of your life to avoid one-time surgery?

Jacobs: Absolutely, if I were faced with really bad cardiovascular disease—which I probably am. But if I were on a ten-percent fat diet as part of the Ornish program, though, I'd probably require a support group. **CO**

INTUITION

CONTINUED FROM PAGE 33

shown, with a clue given. Score four points for arriving at a solution without a clue, score two if a clue is required.

17. Look at a maze for seven seconds. Score four points for identifying the correct way in and out.

18. Have someone show you an object or plant that ultimately finds its best application in technology. A rubber tree is a good example. Score four points for identifying the best application.

19. Have someone assemble a group of pictures of individuals in their youth and then in adulthood or old age. Match the young with the old. Score four points for matching all of them correctly, and two points for matching half of them correctly.

20. Have someone show you an object that has meaning or significance to them, but not to you. Study the object for seven seconds. Score four points for correctly identifying its significance.

An approximate index of your intuitive skills is shown here:

Total range: 74+ points (for all 20 skills); 72 points omitting number 4) to 0 74/72 – 64/62: Highly intuitive

63/61 – 43/41: Intuitive
42/40 – 32/30: Average
20/18 – 0: Nonintuitive

This is a verbal interpretation of the image-based IQ2. The complete, disk-based IQ2 yields not only aggregate scores, but also disaggregate scores for specific skills.

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GAMES

REFLECTIONS ON THE MAGIC MIRROR: An ancient Asian curiosity continues to puzzle us

By Scot Morris

The mirror below is one of the strangest objects I've ever seen. On the back is a raised design, as shown, but the front is a bronze disc 7 centimeters in diameter, polished smooth and slightly convex, and it reflects light just as a good mirror should. There appears to be nothing unusual about it. But if you aim the mirror at the sun and cast its reflection on a wall, you'll see an image of the Buddha (right).

The mirror was made in China in a process whose roots date back to the Han dynasty (100 B.C.). Typically, the molten bronze is poured into a mold that creates a picture in relief on the back of the mirror. The same image appears on the wall. Seeing the result must have seemed like magic hundreds of years ago. The Chinese called this a "light-penetrating mirror" because they believed light had to go through the

surface to reflect off the back of the mirror!

Mirrors similar to these but made in Japan were first seen in the West in 1832. It took a full century, but Sir William Bragg, a British crystallographer, finally published the accepted scientific explanation in *The Universe of Light* in 1933. The pattern in relief on the backside provides the key to the reflected image by creating areas on the disc where the thickness of the bronze varies, Bragg said. When the mirror-maker



On the back of the Magic Mirror (left) is a raised design. On the front is a disc of polished bronze that seems to be an ordinary mirror—until you reflect sunlight off of it. Then, the Buddha appears (above).

scratches and scrapes the surface to smooth it, "the thinner parts of the mirror bend and give to the tool more than the thicker parts which lie over the prominences of the pattern. When the pressure has passed, the thin parts recover and rise slightly above the average level of the face," becoming more convex than the thicker portions. The imperceptible irregularities on the front cause the image in the reflection.

The same explanation was accepted by Joseph Needham, author of *Science and Civilization in China* (1962), by Robert K. G. Temple in *China: Land of Discovery* (1966), and most recently by Derek Swinson, a physicist at the University of New Mexico, writing in the May 1992 issue of *The Physics Teacher*.

The problem is that my magic mirror doesn't work that way. The design on the back is a circle of Chinese zodiac symbols, not a Buddha. The backside has nothing whatever to do with the image cast on the wall.

Ron Edge of the University of South Carolina's department of physics and astronomy examined a mirror like this one and agrees that accepted explanations are "definitely wrong." He and a student, Tom Brockson, directed a fine beam of light at it and determined that the face was covered with very slight ridges (rather than indentations), each with a slope of only 0.1 degree to the rest of the surface, so they're

invisible to the naked eye. Each line of the reflected image is dark, sandwiched between two bright lines, as we would expect from a ridge. The disc's slight convexity is important because it magnifies the reflected image and makes even minor irregularities visible.

James Dalgety of Britain, who obtains these mirrors from China, has theorized that the zodiac signs were added to the backs, over the Buddha design, to mislead people and to keep secret what the reflection will be. Edge thinks the Buddha ridges were cast on the face of the mirror and then polished down until they just vanish. I tend to believe that either these mirrors are made a whole new way or perhaps that Western science, from Bragg onward, has been fooled by a deliberate trick played by the ancient bronze-workers—who made the backs match the images cast only to give the false impression that the one caused the other (I'll expand on this next month after presenting another Chinese bronze mystery, the "spouting washbasin.")

Dalgety will sell these mirrors for \$75, postpaid, and will accept checks in U.S. dollars from U.S. banks. Write: Enigma Designs, James Dalgety, Manmead, N. Barrow, Yeovil Somerset, United Kingdom BA22 7LZ. If he receives a lot of orders, he'll have to obtain more mirrors from China, and it could take two or three months to fulfill all orders. **DO**

