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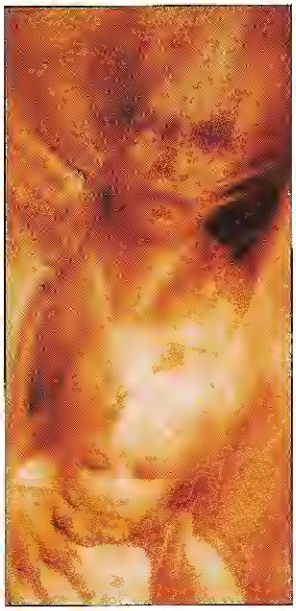

When the inner mind is pushed to its outer limits, the resulting harvest can cause both awe and horror. A peek into the minds behind television's strangest new series. Cover art by Tsuneo Sanda. (Additional art and photo credits, page 90.)

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FIRST WORD

WORDS TO WONDER:
When reading really matters

By Daniel Pinkwater

Author of many books for children of all ages and a commentator for National Public Radio's *All Things Considered*, Daniel Pinkwater looks at learning to read.

I can remember the exact moment when I broke the code and became able to read. It was during the second semester of first grade. I had purchased a Batman comic—the first brand-new comic I had ever owned. Having invested a whole shiny dime, I was determined to read every word in the thing. And I did. I can even remember some of the dialogue: Batman was talking about scaling a building, something he and Robin could do because of their athletic prowess.

Dick and Jane, some other literary characters with whom I was familiar at the time, never scaled anything—and their athletic prowess appeared limited to chasing that insipid dog of theirs, who was always making off with the red ball.

Dick and Jane. Batman and Robin. It didn't matter. "I can read this!" I said. "I can read anything!" And I did, from then on.

Even before I picked the lock of the printed word, I had been participating in semi-organized games in my middle-class Chicago neighborhood. These games consisted of reenactments of historical events of a certain kind: Pickett's charge, the battle of San Juan Hill, Belleau Wood, Iwo Jima. I suppose these games had gone on in the backyards and empty lots, the details handed down by generations of older brothers and sisters, since the wars we portrayed were current. We also played Ivanhoe, The Three Musketeers, The Hunchback of Notre Dame, Mysterious Island, and Twenty Thousand Leagues Under the Sea. Captain Nemo was a choice role, I remember, and D'Artangnan was to be played with plenty of Errol Flynn swash and buckle.

Someone told me that people who probably can't read sing songs in the streets of South American cities about the characters in Gabriel Garcia Marquez's *One Hundred Years of Solitude*. Our backyard dramatizations were something of this kind. I, for one, did not know that these were books, and only later did I encounter them, first as Classic Comics, and then in full-scale.

It needs to be said that we were not encouraged or supervised by benevolent adults in these exercises. All the grown-ups knew was that we were making a racket, waving wooden sticks around, and getting dirty. These were days when there was no such thing as a media specialist. Librarians were not kindly guides to the world of letters, they were severe figures who told you not to make noise, get fingerprints on the books, or fail to bring them back on time.

The preceptors and authorities I remember from my early days struck me as people who showed up to do a day's work—as we pupils did. The goal was to get through the reader and the arithmetic book, and learn some spelling and geography. Whether we wound up well-rounded or well-adjusted was our own business anyway, not theirs. It was up to each of us, and our imaginations, to see to it that culture was allowed to take care of itself.

I wound up as a writer of, among other things, books for children and young adults. As such, I get a fair amount of mail. Some of it comes from libraries and schools, inviting me to participate in the "Celebrity Auction," and its variants. Children are given credits or play money for every book read during a given period. At the end of this period, children can use their earnings to bid on autographed books, posters, T-shirts, chewed pencils, cigar stubs, and other artifacts donated by the likes of me. Sometimes, local merchants have participated, and the kids can cash in their chits for pizza.

This is a bankrupt practice, and I decry it. The message from adult authority seems to me to be, "Look, kids—reading is a drag. I don't like it myself, (which is why I can't communicate any enthusiasm to you,) but if you'll do it, we'll pay you." What's suggested is that, in too many cases, the wrong people are representing books to the young—and maybe that they're representing the wrong books, (but the state of the children's book-publishing industry is too big a topic to tackle here. All I'll say is that a two-year moratorium on juvenile publications would do no harm—except to me—what am I thinking?)

These matters would depress me, except that I get other mail—from better schools and libraries that serve their clients well. And I hear from actual kid readers, who, having read something of mine, are ready to share their own efforts. "I read your book about the Blue Moose," wrote in one reader. "It was pretty funny the way he moved into that guy's house. Have you ever seen a moose? I have not. Do they really like clam chowder?"

What these kids have discovered is that in putting words together they have their own questions to ask and their own observations to make. What a relief. Culture may be taking care of itself yet.

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APRIL

COMMUNICATIONS

READERS' WRITES:
Welcoming the aliens, growing our own rolling paper, and going with the flow

The Sounds of Silence

Steve Nadis' interesting Sounds column on the effort to record sounds made by animals (December 1994) pointed out the speed with which we are losing species. The main reason we're losing wildlife—and all the distinctive sounds—is the destruction of habitat. That will continue unless we find a way to persuade landowners to keep portions of their property in natural or seminatural condition. The Wilderness Society is proposing tax incentives and other inducements to create a national network of "Lifelands," made up of ecologically significant private and public lands. We need to act before the only sounds you hear come from backhoes and chain saws.

G. Jon Roush, President
The Wilderness Society
Washington, DC

Greeting the Little Green Men

The replies from influential persons were extremely interesting (What Would You Say to an Alien?, January 1995). It seems that the most useful and engaging came from a fictional television character (Tom Servo), a comedian (Steve Allen), and a science fiction writer (Harlan Ellison). Conspicuous by the absence of their comments were the top political leaders. Speaking of politicians: After reading some of their remarks (election speeches?), God help us if they get hold of these visitors first. What would I say? "Live long and prosper, let's touch butts, and beware."

Mike Chandler
Fort Walton Beach, FL
AOL: Ent wine

The general collective consensus of the respondents indicates we won't be gracious hosts. Sadly, the harsh reality of our species is not one of open arms. When the aliens come, who will represent our species?

Jim Swift
Corpus Christi, TX

I'd love the opportunity to ask aliens for advice on how to fix our planet's problems. Many people have made reasonable, intelligent suggestions for fixing the ills of earth. The problem is, nobody listens. Suggestions coming from an extraterrestrial race would make front-page news. Maybe that's what it will take to bring our world back to a safer, saner, and more loving condition.

Sarah Brunswick
Gresham, OR

Weed All About It

The kudzu article (Continuum, December 1994) raises an issue many are concerned with: deforestation caused by paper manufacturing. There is an alternative. There's a plant which can grow wild in all 50 states and doesn't need pesticides as other cash crops do. One acre of this plant will produce as much pulp for paper as 4.1 acres of 20-year-old trees, and the paper is of higher quality. Best of all, this plant contains so little lignin that poisonous dioxin-producing chemicals aren't needed in the paper-making process. It's *cannabis*. That's the real reason marijuana is illegal.

DeLani Bartlette-Hunt
Springdale, AR

Seeking Flow

The article on Professor Csikszentmihalyi and "Flow" (Interview, January 1995) was an interesting one, but what he spoke so eloquently about, and spent so much effort researching, has been taught and studied for thousands of years. It's Zen, and Buddhist monks and martial artists have been pursuing the "flow" that derives from it for centuries. "Flow" can be reached by martial arts exercises, as well as the activities that the professor mentions. In searching for "flow" one should be reminded of the ancient Zen koan, "Seek it, and you cannot find it . . ."

A. G. Burnett
Reno, NV
AOL: Rattle811

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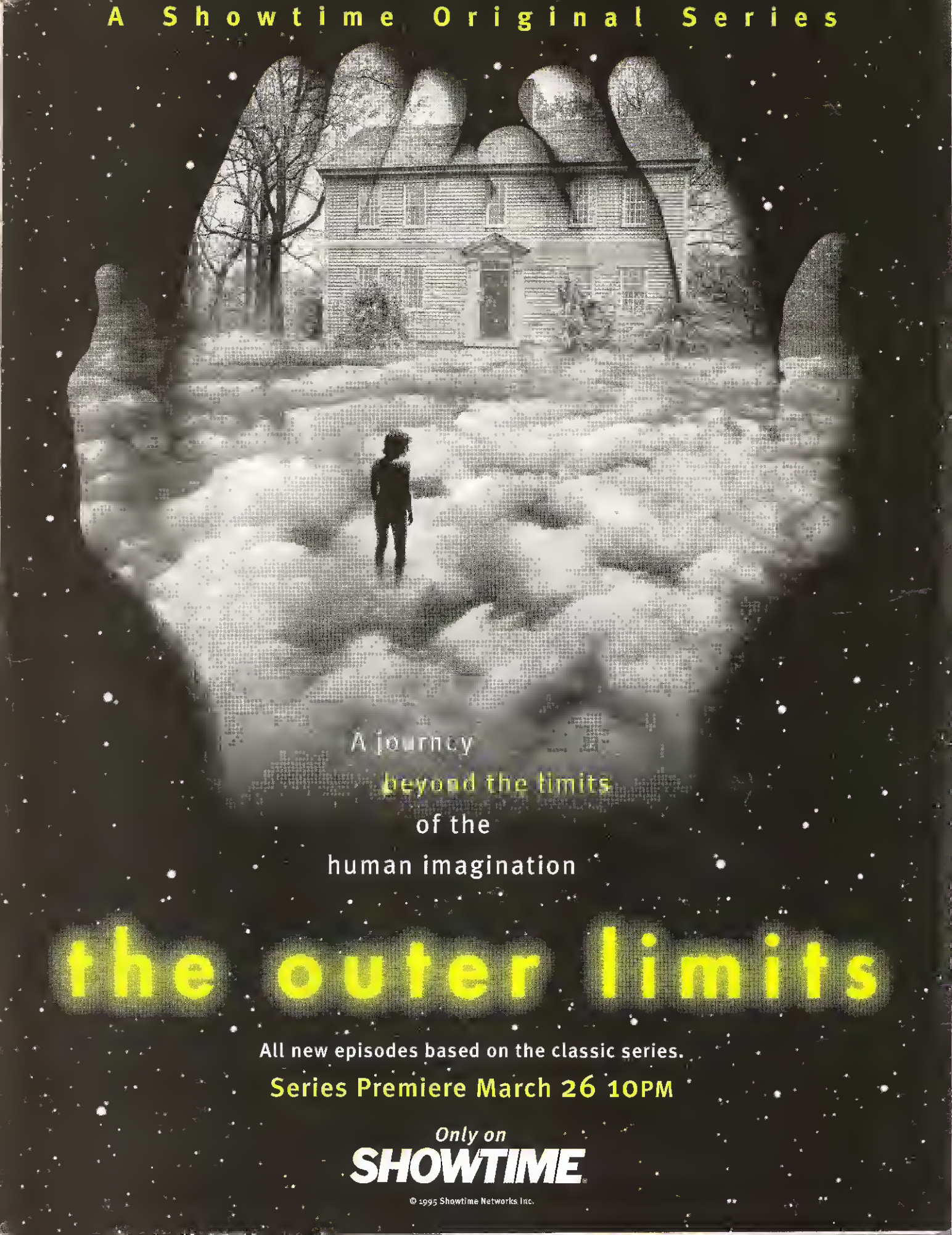

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MIND

THE CENTRALIZED MINDSET: Do we really need any bosses at all?

By Steve Nadis

Mitchel Resnick is not terribly ambitious. He just wants to change the way we think about most everything. A computer scientist at MIT's Media Lab, Resnick believes there is a tremendous prejudice in society—a tendency to look at the phenomena around us, both natural and artificial, and assume a dominant control where none exists. When watching a flock of birds fly in formation, many people assume the bird in front is in charge. But the front bird is not a leader in any meaningful sense, Resnick argues; the bird just happens to be in front at that particular time.

Migrating colony of army ants in a Costa Rican rain forest: Who's in charge?

Is "leadership" an overrated concept, and is it even necessary?

People make similar assumptions upon observing, and attempting to explain, the inner workings of ant farms, termite colonies, or traffic jams. According to this view, patterns exist because someone or something creates them. Everything can be traced to a single cause.

This way of thinking can be dead wrong, Resnick maintains, calling this mentality the "centralized mindset." He has made it a life's mission to try to counteract it, writing a book, *Turtles, Termites, and Traffic Jams*, and a programming language, StarLogo, to help people experiment with "self-organizing systems" in which orderly patterns arise without a "conductor" orchestrating it all. Scientists are finding increasing examples of this phenomenon—called emergent behavior—but the concepts can seem counterintuitive. Resnick's focus is not so much on self-organizing systems per se, but "on helping people think about these things."

Before vanquishing this centralized mindset, it's instructive to note why this worldview is so pervasive. Why do people cling so tenaciously to the notion of a single, controlling factor, a centralized boss? "To some extent, it's a bad habit," says Tufts University philosopher Daniel Dennett. Resnick elaborates: "The idea of one thing in charge telling others what to do is easier to think about than a system with lots of coordination between lots of autonomous parts. It's also comforting for people to think that someone is in charge. That suggests there might be a reason for things being the way they are." It can be a self-reinforcing spiral, he adds. "There are many examples of centrally controlled systems—factories, schools, and families. When we design new technologies or organizations, we draw on the most familiar models, so the world becomes even more full of centrally controlled things."

StarLogo provides an opportunity to create and explore different models. The program was originally designed to run on a massively parallel computer with thousands of processors controlling thousands of objects/creatures. After programming the objects to obey simple rules, the person can observe whether any large-scale patterns result from the individuals' combined behavior. Boston area high school students used StarLogo to model traffic jams, predator-prey dynamics, the spread of fire through a forest, and the chain reaction of uranium atoms undergoing nuclear fission. The "decentralized" learning he is encouraging parallels the interactions played out on the screen.

One program developed with a student mimics nest construction in a termite colony. The simulation begins with 50 termites running around among thousands of wood chips, following simple rules: Run until you find a wood chip, pick it up, when you find another, place the chip you are carrying next to it. After a few minutes, half a dozen wood piles begin to take shape. After another ten minutes or so, all the wood chips lie in a single pile. "Real termites don't do this exactly," Resnick admits. "We still don't know the exact rules they follow, but at the core it's probably not that different. Besides, I'm less interested in simulating what's out there than stimulating what's in here," he points to his head.

Another StarLogo program simulates the periodic clustering of slime-mold cells, now considered a classic self-organizing behavior. For years, scientists thought this process was regulated by special "founder" cells triggering aggregation. In 1970 Evelyn Fox Keller and Lee Segel showed how cells might cluster without such founder cells. But it was a struggle getting most biologists to forego prevailing theory for the decentralized slime-mold point of view, says Keller, who's based at MIT. "We encountered real resistance among biologists accustomed to having a cause located in a specific agent."

"This new idea is more threatening than most," Resnick notes, "because it's not just about slime-mold cells. It's about how people make sense of the world around them."

NEED A HELPING HAM?

An old hobby tackles today's communications demands

By Ed Juge

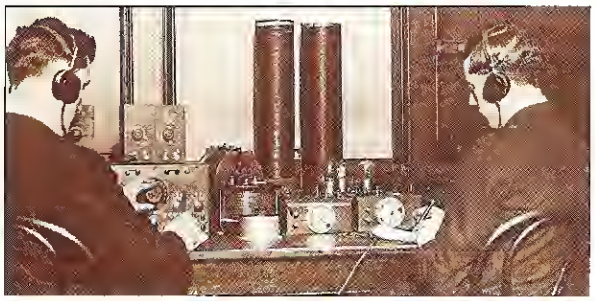
When fighting in Bosnia created gaps in communications, the only workable bridge was found in a hobby that may seem antiquated by today's standards—ham radio. Yugoslavian amateur radio operators, or "hams," moved their radios into devastated areas, passing hundreds of thousands of messages safely between local communities and refugee camps on behalf of separated families, without regard to religious or ethnic prejudice.

It may seem ironic that a decades-old hobby should continue to play an important role in this age of satellites, television, E-mail, and instant worldwide communication. Yet ham radio remains unique in its ability to get through in emergencies where other modes are disabled. For example, when Hurricane Andrew devastated Dade County, Florida, knocking out even cellular phone circuits, amateur radio was there to serve a population grown dependent upon communications.

A fascination with amateur radio has led thousands of young experimenters into engineering and science careers since its official sanctioning by the Communications Act of 1934. Many went on to play key roles in developing the communications advances we enjoy today. In 1961, a group of American amateurs built and launched the world's first nonmilitary satellite. Since then, 16 currently active communications satellites have been launched by amateur groups in the United States, Japan, and Russia.

Hams also established a worldwide computer-controlled network for automatically forwarding packet data years before radio frequency (RF) data transmission was "pioneered" by Apple Computer for its Newton PDA. These days computers are an integral part of modern ham stations. Digital PC-based communications, using a variety of modes with curious names like RTTY, AMTOR, PACKET, and CLOVER, is the fastest-growing segment of ham radio.

David Sumner, amateur call sign K1ZZ, is executive vice president of the largest amateur organization, the American Radio Relay League, founded in 1914. (The hobby existed long before the laws were written.) According to Sumner, the worlds of hi-tech and amateur radio share similar orbits. "For the last 10 years, amateur radio has been an integral part of many space shuttle missions, and the astronauts are especially enthusiastic about talking from space to students in classrooms around the country," he says. "In fact, the United States astronaut corps probably has the highest concentration of licensed hams of any profession you can find."



Nights spent hunched over home-built collections of vacuum tubes, coils, capacitors, and resistors are no longer necessary for modern ham radio operators.

Adding to the appeal are compact and immensely capable ham radios to replace the heavy, clumsy rigs of years past. Operating in the very high frequency (VHF) and ultrahigh frequency (UHF) ranges, tiny, shirt-pocket-size FM handie-talkies (HTs) have revolutionized personal and public service ham communications. An estimated 15,000 "repeaters" scattered across the country extend the range of HTs to 50 miles or more. In some cases, linked repeaters can span several states.

Understandably then, the U.S. community of 630,000 licensed amateurs is growing faster than at any time in history. In 1991, the Federal Communications Commission opened the doors even wider by removing Morse code proficiency as a requirement for the Technician class license. Frequencies authorized for technicians include the immensely popular FM repeaters, on-the-air bulletin boards, amateur television, satellite, and "moonbounce" communications.

The codeless license, plus universal availability of HTs and repeaters, has significantly extended ham radio's appeal for those interested in personal, noncommercial communications. A written examination is still required to get licensed, but study materials and free, club-sponsored classes are widely available.

Undeniably, many more kids today would rather operate personal computers than radios. Computer bulletin boards, the Internet, and online services indeed offer compelling communications options. "However," says Sumner, "if you want to learn what makes communications *work*, there is no better experimentation lab going than amateur radio."

Free information on amateur radio is available from the American Radio Relay League, 225 Main Street, Newington, Connecticut 06111-1494

ARTIFICIAL INTELLIGENCE

ARTIFICIAL ASSISTANTS:
Can software agents find what interests you?

By J. Blake Lambert

As we enter the age of *too much* information, researchers are looking for ways to use computers to assist with managing the overload. Software assistants can act as electronic screeners, searching for information that you'll find informative and entertaining, and saving you the trouble of reading through hundreds of messages in an effort to find the one or two you might find interesting.

Software assistants use a technique called social filtering to make recommendations to their users. As Paul Resnick, assistant professor at the MIT Center for Coordination Science explains, social filtering works on the assumption that "people who agreed in the past are likely to agree again." Thus, if a group of people who have expressed interests similar to yours have found particular information useful, chances are you will as well.

Software agents are growing quickly in popularity; music-selection agent Ringo's community grew in two months to 2,100 users, who filled its database with ratings for 9,000 albums.

A variety of software assistants are available on the Internet. One free service, Ringo, uses social filtering to recommend music. When a new user E-mails a message containing only the word "help" to *ringo@media.mit.edu*, or connects to *http://ringo.media.mit.edu* via the World Wide Web, Ringo returns a list of musical artists to rate numerically.

When it gets your ratings, Ringo looks for a peer group of other listeners with similar tastes. It then finds artists that these peers like which you have not rated. Ringo recommends these artists, providing a ranking and confidence score. You can update rankings and give low scores to recommended artists you don't like, which helps improve Ringo's predictions.

An experimental project much like Ringo uses content and social filtering to recommend movies (send E-mail to *videos@bellcore.com* with the subject "new user"). After you eliminate certain categories (horror, comedy, and so on) and rate a central core of movies, you'll receive a list of peers and video recommendations.

Another free service, the Stanford Information Filtering Tool (SIFT) uses content-based filtering to provide a clipping service that searches through the thousands of messages posted to Usenet newsgroups each day. SIFT reads all the text in its daily newsfeed (about 40,000 postings) and analyzes the contents. It then regularly sends E-mail showing the first few lines of every message meeting interest criteria you specify when subscribing to the service.

SIFT is reasonably fast despite heavy use, handling almost 14,000 profiles per day. Watching the number of users grow and seeing positive responses has been exciting, says Tak W. Yan, a doctoral student in the Department of Computer Science at Stanford University and creator of the SIFT netnews service. "Many said that through the service they discovered 'gems' in newsgroups that they would have never read." (Send the message "help" to *netnews@db.stanford.edu* to get started.)

While these systems rely on explicit user input, more advanced systems will employ learning agents—software programs that watch while you work, noting new trends and forgetting old ones. In effect, you effortlessly program the agent by example. When such an agent sees something entirely new, however, it may perform poorly.

Information filtering and software agents have broad implications for interactive media. As Yan explains, "We are not far from the age of personalized, interactive newspapers." Ken Lang, a computer science graduate student at Carnegie-Mellon University and creator of NewsWeeder (a Mosaic-based content/collaborative newsreader), sees "the first real tests of the viability of a widespread, automatic, information filtering market" in the coming year.

Will Hill, a senior research scientist and creator of *videos@bellcore.com*, explains that his company is evaluating agent-mediated virtual communities "for videos, books, restaurants, home-shopping, and digital music. Imagine a home-shopping channel where you surf with your remote control just as you do now, but the amount of time that you spend on any given item for sale is taken as an implicit suggestion of interest for that item."

Other applications in the works for agents include scheduling meetings and making travel arrangements. Consumers will eventually come to rely heavily on software agents, claims Upendra Shardanand, a former MIT graduate student who developed Ringo (with assistance from Lee Zamir and based on a concept by Pattie Maes). "As the information barrage continues to accelerate, agents will be as indispensable as E-mail," he says.

WHEELS

HIGH-TECH HIGHWAYS:
Technology helps police keep a watchful eye on drivers

By Jeffrey Hsu

Police are using more than old-fashioned radar guns to watch over today's motorists: Violators may be caught in the act by lasers, cameras, or photo radar.

The battle between police and motorists has been raging for decades. Police armed with their radar guns are pitted against drivers and truckers with their radar detectors. In many ways, the entire affair has taken on somewhat of a romantic nature, with high-speed car chases along highways and city streets frequently depicted as thrilling adventures.

Traffic accidents, however, are far from romantic, and each year in the United States, there are millions of traffic accidents, claiming thousands of lives and injuring many more.

To combat traffic violations, law-enforcement agencies use a wide variety of speed-detection technologies which vary in capability, purpose, and acceptance. These include radar, laser, and videotape technologies.

Radar has been used for many years to detect speeders, and there are two main kinds: down-the-road and across-the-road. Down-the-road radar, which projects a wide radar beam into oncoming traffic, is designed to take readings from a location overlooking several lanes of a road and is probably the most widely used technology. The problems with this device include the difficulty of accurately targeting a single vehicle and its susceptibility to interference from AM/FM transmitters, patrol car ignition systems, and other sources. As a result, an officer ends up targeting one car, and obtaining the reading for another. These inaccuracies have allowed motorists and truckers to effectively challenge many speed violations in court. Not only that, but some police unions have charged that radar guns can cause cancer after long-term use. These problems have frustrated both the police and motorists, causing some law enforcement officials to look to other, less troublesome methods of measuring vehicle speeds.

An alternate method, across-the-road radar, is designed to take readings from the side of the road. This allows officers to better target a vehicle on the road, and it overcomes some of the shortcomings of the down-the-road method. Because this method uses a narrow radar beam, it targets individual vehicles more exactly and is less likely to provide inaccurate readings.

Kustom Signals of Lenexa, Kansas, and Laser Technology of Englewood, Colorado, have both introduced down-the-road laser devices which allow an officer to point a laser beam at a vehicle and instantly get a speed reading. This hand-held device focuses a narrow laser beam at a target vehicle and computes its speed. Unlike radar, it avoids identifying more than one vehicle and is generally immune to most forms of interference. While laser-based devices have the advantage of not being detectable by most radar detectors, they do have the shortcoming of working best while stationary. (Laser Technology worked with NASA to create a modified version of this technology for use with the Hubble Space Telescope.)

Video cameras installed behind police cruiser windshields, coupled with laser or radar speed guns, can record whether a car is speeding, a vehicle's response to a siren, and the offender's actions when approached by an officer. Cameras are also used to keep a watchful electronic eye on motorists in the red-light monitoring system marketed by LeMarquis International of Boca Raton, Florida. It accurately records, on film, vehicles running a red light, therefore producing a permanent record of each incident. Through the license plate, the violator is identified and sent the photo together with a ticket.

This has been well received, especially in New York City, where drivers who run red lights are responsible for thousands of deaths and injuries each year. In fact, close to 60 percent of all accidents in the city happen at traffic-light intersections. "The fact that people know they are being monitored helps to reduce the number of offenses. People like it and feel it is a fair system," remarks Bernd Rind, president of LeMarquis International.

However, not all attempts at using photo radar technologies have been successful. In 1992, the State of New Jersey's attempts to implement a photo radar system, which recorded on film the faces and license plates of speeders and then automatically sent tickets to their homes, was met with bitter opposition, as motorists voiced protests against the state's alleged "Big Brother" tactics. New Jersey Governor Jim Florio later signed a bill banning use of the system.

So, next time you're on the open road and think that no one will notice you going a few miles above the limit, think again. These new technologies mean there doesn't even have to be an officer around the corner to say "Gotcha!"

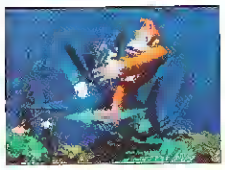
ELECTRONIC UNIVERSE

CLASSICS REBORN:
Seminal videogames are back, updated for today's gamers

By Gregg Keizer

Classics such as Activision's *Pitfall* are coming back to life on modern gaming platforms. Hold on to your seat, though, because this is definitely not your father's *Donkey Kong*.

Bring out your dead! No, we're not going to resurrect Elvis or dig up some old president to confirm an untimely demise. Software publishers are reviving some once-dead-and-buried hits of the 1980s. Unlike film zombies, these creatures don't always shuffle. In some cases the updates are just as good as when they first walked the earth.



The rationale behind this trend is the same as the one which drives filmmakers to return to the sequel well: Good content is hard to find. Strike the motherlode once with a top-notch game concept, characters, or play mechanics, and things should pan out a second time. At least that's what some software publishers are praying will happen.

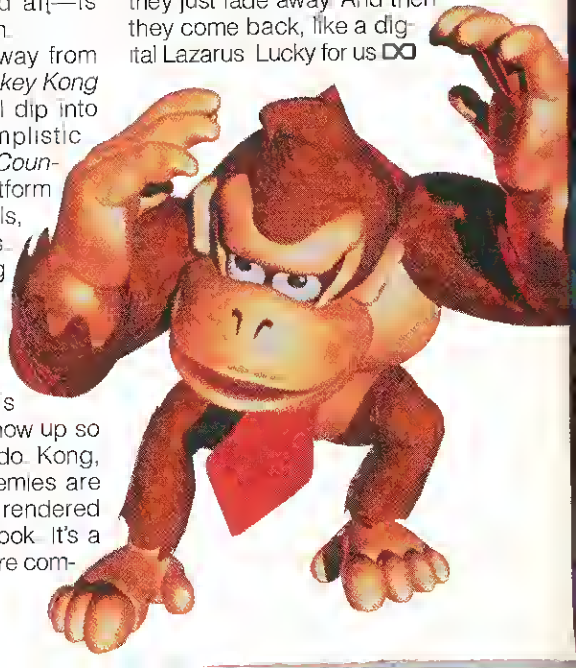
One of the easiest ways to revisit the past on the PC is with *Microsoft Arcade*, a five-pack collection of ancient games mutated to work in *Windows* and on the Mac. The combo includes *Asteroids*, *Centipede*, *Missile Command*, *Battle Zone*, and *Tempest*. (The first two are the best of the bunch.) Unlike other classics, these titles look the same as they did 10 or more years ago: no added graphic bells and whistles here. *Asteroids*, for instance, still shows its Etch-A-Sketch rocks and rocket ship built from lines. The big change is that all the games are customizable. You can make modifications—reduce the bonus points necessary for another ship in *Asteroids*, add more cities to your *Missile Command* world—for easier play or just a change of pace. And since the games run in *Windows*, you can easily switch from work to play without closing down that spreadsheet. (Turn off the sound if you don't want the boss to hear pings and zaps from her office.)

You won't be able to cruise through Activision's *Pitfall: The Mayan Adventure* at work (unless you've got a Sega Genesis, Sega CD, or Super Nintendo squirreled away under the desk), but you'll have fun playing this modernized version of the old Atari 2600 game from the early 1980s. The plot remains the same: Pitfall Harry (or in this case, Harry Jr.) runs through jungles, swings on vines, looks for treasures, and jumps over alligators. In this 14-level platform game, though, Harry Jr. and the rest of the scenery look gorgeous. Harry's got some swift moves, too, like bungee-style vines to move vertically, and a nasty whip to keep the creatures at bay. As an added bonus, the complete Atari 2600 game—dinky-pixel Harry and all—is buried within this version.

If you can grab it away from the kids, Nintendo's *Donkey Kong Country* is another cool dip into history. Unlike the simplistic original, *Donkey Kong Country* is a modernized platform game with multiple levels, lands, and characters. This time, though, Kong joins forces with a whole family of compadres as he stalks through forests, mines, mountains, even factories. This is the best animation to show up so far on the Super Nintendo. Kong, his friends, and his enemies are visually stunning, finely rendered characters with a 3-D look. It's a kid's game at heart—more complex than a typical Mario game, but not any tougher than the most recent Sonic games on the Genesis. It's a treat to see the classic come back looking so sharp.

Sierra's *Lode Runner: The Legend Returns* is another great blast-from-the-past that's been updated recently. Long ago, when it was one of the best games for the Apple II, *Lode Runner* used a Lilliputian character built from just a few pixels. He raced up ladders and across platforms collecting objects and avoiding mad monks. The game's charm, though, came from its editor, which let you build new levels. Now running under MS-DOS and in *Windows*, *Lode Runner* looks a lot better (the characters remain small, though, especially if you're running *Windows* in a high-resolution mode) and retains its editor. That's the best thing about bringing this one back from the dead. The editor lets you create custom levels, one gamer recreated all the levels in the original *Lode Runner* and posted them to the online networks.

Old electronic games never die; they just fade away. And then they come back, like a digital Lazarus. Lucky for us. ⌧



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WINGS

SPY SAUCERS:
Remote-controlled vehicles keep a watchful eye

By Peggy Noonan

Government entities may soon be flying their own saucers over American cities, but in this case the UFOs are actually UAVs: Unmanned Aerial Vehicles.

If you see a flying saucer, it may not be an alien UFO. It could be one of ours. One of our UAVs, that is. Unmanned Aerial Vehicles.

In 1988 the Defense Department was directed by Congress to centralize the development of UAVs. It created the Joint Project Office (JPO) to oversee the program. Creativity flowed freely as inventors came up with a variety of shapes, from a slightly modified but ordinary-looking airplane configuration like the Pioneer—which proved useful for reconnaissance in the Persian Gulf War—to flying saucers, bumblebees, doughnuts, peanuts, and cigars, according to Department of Defense UAV-JPO spokesman Ray Colemon.

Sikorsky's doughnut-shaped Cypher UAV, for instance, is a 1.6-foot-thick ring with shielded spinning rotors in the middle. Cypher's ducted fan design offers stability and control, and it makes the UAV safer to operate—no exposed propeller blades to catch the inattentive or to tangle in rigging.

The Cypher and everything it needs, from replacement fuel to spare payloads and parts, can be carried into land battle by a Humvee pulling a trailer. A two-man crew can set up, launch, and recover the 6.5-foot-diameter saucer in any clearing twice Cypher's size—or aboard ship, using 52 square feet of deck. Using Cypher is much faster than waiting for satellite pictures, according to Colemon. When a battlefield commander needs to see what's over the next hill, the UAV can get instant data.

UAVs can go into areas too hazardous for humans. Aerobotics, a subsidiary of California's Moller International, has two UAVs in advanced development. The ES20-10 Aerobot is already proving its value in tests by the California Department of Transportation which plans to use the 30-by-20-inch flying duct to inspect highway bridges, overpasses, and elevated freeways.

This tethered Aerobot can hover a few feet from a suspect bridge section and transmit real-time video or infrared images to ground handlers. The UAV is powered by a generator linked via a 200-foot umbilical, and it operates with a patented self-stabilizing system. The handler directs and positions the Aerobot using a joystick mounted at the waist of a vestlike control unit while an inspector monitors the screen-displayed images. Like the Cypher, the Aerobot's rotating blades are contained safely within the protective confines of its duct-shaped body.

UAV's have many nonmilitary applications which will "far outstrip military value," JPO spokesman Colemon says. The Atlanta native suggests that UAVs would be a great help during the 1996 Olympics when officials have to transport athletes from their residential quarters through rush-hour traffic to events. Boring, tedious, or dangerous work such as inspecting pipelines or remote power lines could be managed by a UAV. Sports events could be televised from a hovering UAV instead of a blimp. A single forest ranger could cover thousands of acres watching for fires or poachers via UAV sky eyes. Traffic monitoring could be simplified, and police UAVs could be used to film accident sites.

One small UAV has already demonstrated how effective sky spies can be. Although AeroVironment Incorporated's Pointer mini-drone experienced problems in Operation Desert Storm (it can't fly in winds that exceed its 20 to 40 miles per hour speed), it has proved its worth on civilian operations. The tiny Pointer weighs in at eight pounds and has a nine-foot wingspan. It can be launched with a javelin-type throw, according to Colemon, and carries a videocamera that transmits real-time images.

A Pointer was loaned by the Defense Evaluation Support Activity to Oregon's National Guard and State Police last February prior to their raid on a suspected drug compound. Where agents had expected one fence, a couple of dogs and cars and a few buildings, the Pointer's silent spying revealed two fences, many dogs, and more of everything else. The raid was successful.

However, as JPO spokesman Colemon points out, nonmilitary use of UAVs raises as-yet unresolved questions of invasion of privacy and illegal search and seizure. And there's the matter of "deconfliction" that FAA and military representatives are trying to work out. "Pilots are horrified to think of vehicles flying with nobody in them," Colemon says, suggesting they'll need an electronic warning akin to aircraft collision avoidance systems.

"I'm convinced there is no problem the engineers cannot solve given enough time and money," Colemon states. Except maybe what to do about all those people who'll call to report UFOs when UAV saucers are flying.

LEARNING

BREAKING AWAY FROM THE AGRARIAN SCHOOL CALENDAR: Can 30 more days make a difference?

By Mary Ann Tawasha

Number of public elementary schools in the United States: 59,680.

Number of year-round elementary schools in the United States: 1,508.

Number of mandatory public extended-year schools in the United States: 1.

That one is Brooks Global Studies Extended-Year Magnet School in Greensboro, North Carolina. What's the difference between year-round and extended-year schools? Most year-round schools merely reorganize the traditional, 180-day school calendar, while extended-year schools (such as Brooks) literally extend the year by providing more days of instruction. This extension means that by the end of their elementary school careers, Brooks' students will have one extra *year* of education under their belts. Tony Meachum, Brooks' principal, describes it this way: "We give you thirty more reasons to like us, because we give you thirty more days a year."

As "prisoners of time," students and teachers took for an alternative to the traditional school year.

Julia Anderson, deputy director for the National Education Commission on Time and Learning, says the extra month of instruction provides additional learning opportunities which contribute to Brooks' success. The federal government directed the commission to conduct an examination of the relationship between time and learning. The nine-member group released a report in April 1994, "Prisoners of Time," which concluded that, "... learning must become the fixed goal. Time must become an adjustable resource."

More schools like Brooks are needed if American students and teachers expect to ever "break out" of the constraints of time, according to the commission. Change is inevitable, says Anderson, and schools are going to be forced to modify their programs accordingly. "I think that we're finally realizing that we can no longer allow students to fail at the rate that we have been."

While the commission cited Brooks as a benchmark in education, Frederick Morrison, head of the psychology department at Loyola University in Chicago, selected Brooks as the basis of his research in educational reform. Morrison launched his study on the effects of an extended-year program on average elementary school children when Brooks first opened its doors in 1991. Julie Frazier, a Ph.D. candidate and Morrison's assistant, started the research project—aimed at comparing Brooks' students' academic achievements to those of students who attended traditional schools—by administering standardized tests to each group.

After three years, the team found that Brooks' students did "significantly better" in areas of reading, general knowledge, math, and vocabulary than "a stringently matched control group of traditional students." Professor Morrison says, "Young children, even kindergartners and first graders, are making twice the progress, in terms of raw score, than kids in traditional programs." The 30 extra days make a difference. Morrison explains, "The summer layoff is a critical period of achievement loss, and school-year extension helps to reduce, and in some cases eliminate, that loss."

Anderson feels that extended-year programs are just one of the ways that schools can make better use of time. Other recommendations include a more flexible time schedule and longer school days. She says the commission has received tremendous response to the report from such groups as the Education Committee and the NEA (National Education Association).

So why aren't there more schools like Brooks? "I think the biggest barrier is financial," Anderson responds. A study by the North Carolina Public School Forum found that lengthening the school year to 200 days in all North Carolina schools—still 10 days fewer than Brooks—would mean spending an additional $180 million by the year 2001. Jo Ann Norris, associate executive director for the forum, says that kind of money makes state legislators wary of initiating new programs statewide. She says, "More instruction means more staff and salaries. That's where your dollars are." Principal Meachum understands, but questions: "In the long run, what's *really* more important? Dollars . . . or the future of our children?"

WORKING DOWN UNDER:
The Kansas City experiment in underground architecture

By Fred Hapgood

The residents of Kansas City like to boast they have more fountains than any city but Rome and more boulevards than any city but Paris. No doubt these are worthy attractions, but their city also has at least one point of distinction second to none: It is the first to site a substantial fraction of its industry underground.

Many believe that moving our transportation, industrial, and commercial infrastructures underground is the only hope of reconciling the conflict between industrial development and the preservation of the environment. As early as 1972 the American Society of Civil Engineers (ASCE) pointed out that such a move would permit large populations, high levels of development, and ambitious engineering projects to co-exist with natural ecologies, gardens, parks, conservatories, and preserves. The ASCE was hoping for a government program to push the transition, but other visionaries and futurists have speculated that as environmental concerns drive the price of building on the surface up, and technology drives the cost of underground construction and operations down, market pressures alone will do the job. Kansas City is a test of this theory.

The city's supply of underground space is a result of two large limestone ledges which run under the metropolitan area close enough for direct access from the surface. For decades the building materials needed for roads and concrete mixes have been quarried out of the ledges, leaving dozens of passages running horizontally under the city. In the Fifties these cavities started to be developed into industrial and commercial spaces, primarily for distribution, storage, and light manufacturing.

Since the raw space is secondary to the mineral extraction, it is essentially free, development costs are low, and rental rates are roughly half those of surface rents. Heating and cooling bills are as much as 90 percent lower than in surface buildings exposed to the extremes of heat and cold that sweep the Great Plains. Other favorable variables include physical security, mechanical integrity, low maintenance costs, tight control of noise and vibration, and protection from the weather.

The results, as of 1994, according to Bill Seymour of the Underground Development Association (UDA), are that 20 to 25 million square feet have been developed and leased to about 300 businesses. Vacancy rates average about 5 percent, and a million more square feet are created in the mining process every year making available new space for further development. At present, about 4,000 employees are commuting into the Kansas City underground every day.

Twenty million square feet sounds like a lot, but the total KC industrial real estate market is 165 million square feet. It is possible to wonder why the benefits of dirt-cheap occupancy costs and tightly controlled manufacturing environments have not drawn in much more of the market. After all, there is plenty of room down there. Don Woodard of the UDA says that the industry could add another 20 million square feet in three to six months if the customers were to appear.

The members of the UDA have naturally given this question a lot of thought. Many suspect there is something about the psychology of the underground that disposes people entering these parks to think they are separating themselves from the community of human souls. "I have had truck drivers come in for a delivery," says Ernie Hook, distribution manager of Price Candy, "and they stop their trucks outside the entrance, climb out, and walk in and look around, as if they thought maybe they might fall into a hole or something." Once a person actually sees lots of other people proceeding with their business, there is a shift of perspective. Then "people can become kind of cultish about it," observed a local real estate analyst. But that moment of revelation, of physically seeing the underground lit and clean and crowded with real people, seems to be the key. The UDA runs tours constantly, trying to show anyone with a couple of free hours that people can go underground without turning into bats. In the long run, as industry keeps racking up those million square feet per year, perhaps Kansas City will play that role for all of us. ▣

For the last century, cities have been building upward, creating skylines of skyscrapers. It may be time to take a look in the opposite direction.

MUSEUMS

THE HENRIETTA MARIE:
An underwater monument to a painful past

By Paul Kvinta

In the field of underwater archaeology, where discovering an ancient sailing ship usually means locating a heap of coral-encrusted timbers, researchers rarely find much to get emotional about. But in 1983 when David Moore hoisted a bronze bell engraved with the name "Henrietta Marie," he realized he had stumbled upon one of the most moving sagas in American history. The *Henrietta Marie* was a seventeenth-century slave ship, the only identified slave vessel ever found in the Western Hemisphere to sink in the course of trade.

"As an archaeologist you're trained to keep an objective approach," says Moore, who works with the Mel Fisher Maritime Heritage Society in Key West, Florida. "If you get your emotions involved, your analysis could become jaded. But with something as powerful as the *Henrietta Marie*, that's difficult to do."

Amid the wreck's muskets, colorful trading beads, elephant tusks, and English pewterware, Moore's team recovered over 190 pairs of hand-forged iron leg and arm shackles—large ones for adult men, smaller ones for women and children. Although archaeologists have discovered a half-dozen wrecks in American and Caribbean waters that suggest possible links to the slave business, the *Henrietta Marie*—located 34 miles west of Key West—offers clear evidence of her mission. More than 7,500 artifacts correlate to the three legs of the Triangular Slave Trade between Europe, West Africa, and the New World, and the name "Henrietta Marie" traces directly to commercial shipping records that document her voyages.

Those voyages are re-created in a traveling exhibit titled "The Wreck of the *Henrietta Marie*," a 14-city tour that began in Key West in January and features 200 artifacts and scholarly essays. Russell Adams, chairman of the Afro-American studies department at Howard University and one of the essayists, says the artifacts provide material documentation to a particularly cloudy portion of the slavery epic. "What we've had until now are verbal accounts of the Atlantic crossing," Adams says. "With this exhibit we're saying 'this is the ship's bell, these are the shackles.' You begin to realize we haven't been fantasizing the whole thing."

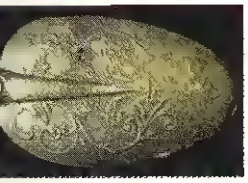
Using Moore's archaeological findings and the archival work of British historian Nigel Tattersfield, researchers have slowly pieced together the *Henrietta Marie* story. She was likely built by the French but captured by Britain's King William during the late 1600s and converted into a swift-moving slaver. On her maiden voyage in 1697, the ship delivered 250 Africans to Barbados, where agent William Shutter purchased most of the group for 19 British pounds apiece. She set sail for her next voyage from London in September 1699 loaded with the pewter dishes and glass beads coveted by chieftains up and down Africa's Guinea Coast. With more than 200 slaves wedged into a hold 10 feet deep and about 23 feet wide, the *Henrietta Marie* then embarked on a grueling, two- to three-month trip across the Atlantic. Captain Thomas Chamberlaine unloaded 190 slaves at Port Royal, Jamaica, in May 1700. Two months later, with a load of cotton, sugar, and indigo, Chamberlaine and a crew of 20 were heading back to England when a storm struck. Fierce swells smashed the *Henrietta Marie* into New Found Reef, and the splintered vessel sank to the gulf floor where it remained unnoticed for nearly three centuries.

In 1972 treasure hunter Mel Fisher came upon the wreck in 30 feet of water while searching for Spanish galleons. After some initial recovery work the following year, the site lay dormant for another decade until Moore and colleagues returned and began excavating the site.

Researchers realize that the *Henrietta Marie* tale deals with highly charged subject matter (a team of black divers in 1993 placed a monument weighing 2,700 pounds at the wreck site to commemorate Africans who died during the crossings), but Russell Adams hopes that, while not diminishing the horror of slavery, the exhibit will help audiences work past the moral issues toward an understanding of the important social and economic details of the trade itself. Adams's research, for example, focuses on the nearly 300 slave-collection points along the African coast stretching from Senegal to Mozambique, and he examines a number of intriguing questions. How long were slaves confined before ships arrived? Why were particular individuals assigned to particular ships?

The recovery of the *Henrietta Marie* may help to provide answers to some of these questions. The exhibit, as Adams notes, is a way to give a comprehensive view of this history to the public.

In addition to slaves, African chieftains traded ivory and gold dust for valuable metals, including



European flat iron. In negotiations, 13 bars might be traded for an adult male, 10 for a female.

CONTINUUM

DISCOVERING WOMEN:

Television attempts to alter a cultural bias. Plus, a guide for blind shoppers, and helping the disabled reach the beach

Most schoolkids have probably heard of Marie Curie and her pioneering discoveries in chemistry, but she's a rare exception—by and large, women are a little-recognized minority in science. Science has long been a predominantly male endeavor, and that gender bias becomes a vicious circle. Without more visible female scientists as role models, most girls still grow up thinking that science is for boys. It's no accident that even after the strides women have made in so many areas of society over the past few decades, they still represent only 16 percent of all working scientists and engineers in the United States.

Discovering Women, a new public television series, aims to change some of that. Debuting Wednesday, March 29, and continuing on April 5 and 12, the series profiles the lives and work of six women scientists making significant contributions in various fields today, from biochemistry to neuroscience to geophysics. All six are smart and successful, and their stories are certainly inspirational. They cling to their dreams, overcome adversity, and establish themselves as authorities in their male-dominated fields. But perhaps the most interesting thing is how different their stories can be. There's archaeologist Patty Jo Watson, born in the Midwest during the Dust Bowl years, who's been working at the top of her field for decades; 30-year-old Misha Mahowald, an adopted child from Minneapolis, already a rising star in computational neuroscience; biochemist Lynda Jordan, who grew up in one of Boston's meanest neighborhoods and went on to become the first black researcher at the Institut Pasteur in Paris. Certain common themes emerge—hard work, for instance, and passionate dedication—but the differences between these discovering women prove that there's no one path to success.

Discovering Women emphasizes the personal as well as the professional, woven between scenes from the lab are episodes from childhood, interviews with former teachers, glimpses of home life, and daily routine. We watch molecular biologist Lydia Villa-Komaroff of Harvard Medical School preparing a Mexican dinner with her parents and sisters. We learn that physicist Melissa Franklin, who helped build the ultrasensitive particle detector at Fermilab, once hosted a late-night avant garde music program on a small California radio station. We empathize as geophysicist Marcia McNutt of MIT recalls her husband, who died suddenly several years ago, with a distinct catch in her voice.

Inspirational as these women are, strident feminists may find a few things to dislike about the series. When the question of time for having children comes up in the very first episode, we have to wonder whether it would have been an issue in an interview with a male scientist. And the personal focus sometimes threatens to overwhelm the science, as though we couldn't accept women scientists unless we see that they have fully developed personal lives: kitchens, kids, relationships. Would a series on male scientists make room for such discussions of the personal lives of its subjects?

On the other hand, maybe profiles of male scientists should find the room. The personal focus adds a welcome dimension to *Discovering Women*'s image of science and the people who do it. Science seems like a part of everyday life in this series—a passionate pursuit undertaken by real, recognizable people, who still have time for friends and hobbies and fun. Any aspiring scientist, male or female, should be encouraged to see that researchers still have a life outside the lab.

It's hard to say how much any television series can change a prevailing cultural bias, but the makers of *Discovering Women* are giving it their best shot. They've even set up an outreach program tied into the series—S.O.S., Seek Out Science—which encourages middle-school students to research and interview women scientists in their communities. But it's the six women scientists themselves, and the diversity of their backgrounds and experiences, that highlights the central issue of the series. Certainly, the courage displayed by such women as Lydia Villa-Komaroff, who rejected the traditional values of her New Mexico upbringing, or Lynda Jordan, who refused to give up even after her research notes were stolen, is impressive and needs to be recognized.

But it is, perhaps, the case of Marcia McNutt which may be the role model that this series hopes to foster. Having grown up with sisters and having attended an all-female college, she developed self-confidence as a matter of course. "Anyone who was doing anything in my life was female," she recalls, "so it never even crossed my mind that there would be something that I would not do just because I was a woman." It is an attitude and confidence which *Discovering Women* would like to perpetuate. —*ROBERT K. J. KILLHEFFER*

CONTINUUM

FRUITFUL FLIES

The pesky fruit fly, *Drosophila melanogaster,* known for its high reproductive capacity, is now bearing fruit of a different kind. Scientists are hoping genetic research with fruit flies will shed some light on the molecular events that occur inside human cells.

Molecular biologist F. Michael Hoffmann, Ph.D., and his associates at the McArdle Laboratory for Cancer Research at the University of Wisconsin Medical School in Madison have discovered two receptors or "docking sites" on the fruit fly's cell membrane that are activated by fruit fly *and* human growth factor proteins. The proteins, members of the group of 24 molecules known as the transforming growth factor-beta family, function similarly across all species, directing undefined cells in a developing embryo to become organized. In humans, the proteins are responsible for bone, tissue, and organ formation; in flies, the proteins are responsible for eye, wing, and leg formation.

Originally found in bone, the human growth factors can stimulate new bone formation to bridge fragments in severe fractures and even repair progressive tooth decay. Since the growth factors are also crucial to tissue and organ development, they have the potential to help regenerate damaged or diseased kidneys, hearts, and nerves; facilitate the healing of wounds; and heal macular holes in retinal tissue, a cause of blindness. The proteins are also known to play a specific role in breast cancer, and, Hoffmann says, scientists are hoping to find out just how proteins and docking sites are involved in facilitating the malignancy process.

The fruit fly has been "the genetic system of choice for the study of multicellular organisms," Hoffmann says, since about 1910. Studying the growth factor in the fruit fly's simpler system is easier and less expensive than mammal studies.

—Jill Booth

More than just a pretty face, this fruit fly is also a valuable tool in studying the molecular events which occur in human cells.

A SPIDER'S WEB IS SO LIGHT THAT IF ONE OUNCE OF THE MATERIAL WERE STRETCHED INTO A THIN STRAND, IT COULD STRETCH 2,000 MILES.

TRUE MIRROR

The True Mirror will show you what others see when they look at you. It will also show you *who* others see when they look at you, claims the product's inventor, John Walter, president of the True Mirror Company in New York.

Unlike a conventional mirror, the True Mirror doesn't reverse the image it displays. Constructed from two perpendicular mirrors, the $245 device superimposes both mirror images in the center, forming an image that's identical to the one others see when looking at you.

Although the concept of non-reversing mirrors is not a new one, Walter's claim that it will "reveal your true personality" is. Some psychological research has shown that the information coming from the right and left hemispheres of our brains is reflected in our faces. Walter feels that reversing the two sides, as regular mirrors do, translates into a changed and inaccurate message of who we are.

Walter asserts that, with the True Mirror, a person's inner self-perception—as well as his or her physical appearance—matches what others see. Ten percent of 4,000 test subjects perceived a different personality when looking at the True Mirror. According to Walter, a typical response from a subject who noticed a difference was "no wonder other people relate to me different from what I expect."

Walter points out that those with symmetrical faces may not see a notable distinction. "Some people will be uncomfortable when seeing this new image due to its unfamiliarity," he adds. "People have been conditioned to believe it is vain to look at yourself in a mirror, but seeing your true personality can be very valuable."

—Mary Ann Tawasha

"When we ask for advice, we are usually looking for an accomplice."

—Marquis de la Gauge

CONTAGIOUS DEPRESSION

If you think, as the song suggests, that having someone to lean on is a good thing, beware. "When people are close enough to begin to depend on each other, that can be a breeding ground for depression to be transmitted between them," notes Thomas Joiner, a clinical psychologist at the University of Texas Medical Branch in Galveston. In an article published last year in the *Journal of Personality and Social Psychology*, he argues that depression can be a contagious condition.

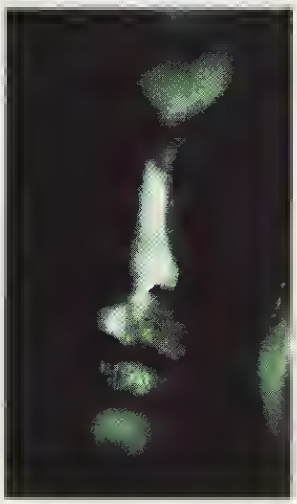
He bases this claim on a study of 96 pairs of college roommates who were evaluated over a three-week period. During that time, roommates of depressed students tended to become more depressed themselves. Though the study only involved college students, "contagious depression potentially applies to anybody in a close relationship," Joiner says.

Other symptoms, such as anxiety and negative affect (a state in which a person often feels upset and stressed), were not passed from one person to the next. Joiner has an explanation for this, too. "Both anxious people and those suffering from negative affect tend to stay interpersonally active," he says. "They don't shut down." Depression, on the other hand, removes people from the interpersonal sphere.

"That seems to be the key factor with contagious depression," he adds. "The other person may become depressed because the originally depressed person is no longer available." Dependent, so-called "reassurance seeking" individuals appear to be very vulnerable, because they are highly sensitive to the withdrawal of attention.

There is one bright spot in Joiner's report: "High reassurance seeking roommates of nondepressed targets became somewhat less depressed (and anxious) over the course of the study." In other words, the lowering of depression may be contagious, too. "We have some support for that," he says."

—Steve Nadis



Feeling down? The condition could be infectious.

This bite-size exerciser attacks facial sagging and creases from the inside, and may be what you need to keep your face in shape.

FACIAL FITNESS

Some people spend hundreds of dollars each year fighting wrinkles, getting collagen injections to fill the crevices, or opting for the more radical, surgical answer—a $10,000 face lift. Now there's another option: Facial-Flex, a bite-size "facer-ciser" produced by Facial Concepts of Blue Bell, Pennsylvania.

The device, which resembles a miniature shoehorn, fits horizontally between the subject's lips, resting in the corners of the mouth. The brochure accompanying the device suggests the following calisthenics regimen: "Press the corners of your lips against the resistance of Facial-Flex, while forming the smallest "O" that you can with your lips. After fully compressing the device, gradually release. Repeat this cycle about once every three to four seconds." The makers of Facial-Flex figure that two workouts a day of two minutes each should do the face a world of good. They've backed up that claim with pilot clinical studies demonstrating a 250 percent increase in facial muscle strength and 32-percent increase in skin elasticity following eight weeks of facial fitness therapy.

CHINESE GOOSEBERRIES ARE FRUITS THAT COME FROM NEW ZEALAND.

"Creams and gels sold by cosmetic companies only address the skin, not the underlying muscle layer," explains Linda Hellings, vice president of Facial Concepts. "Facial fitness is more of a systems approach. As facial muscles tone and strengthen, it gives the entire face a lift."

Though some may find this argument hard to swallow, a recent article in the *Journal of Geriatric Dermatology* supports Hellings' position. "External resistance exercise, performed twice daily through use of the Facial-Flex device, can noticeably improve facial muscle strength and decrease skin laxity," the authors write.

—Steve Nadis

CONTINUUM

FOREST WALL

To combat the impact of the fierce dust storms that howl south out of the Gobi desert, the Chinese began planting the first of 300 million 50-foot elm trees parallel to the Great Wall of China in the early 1950s.

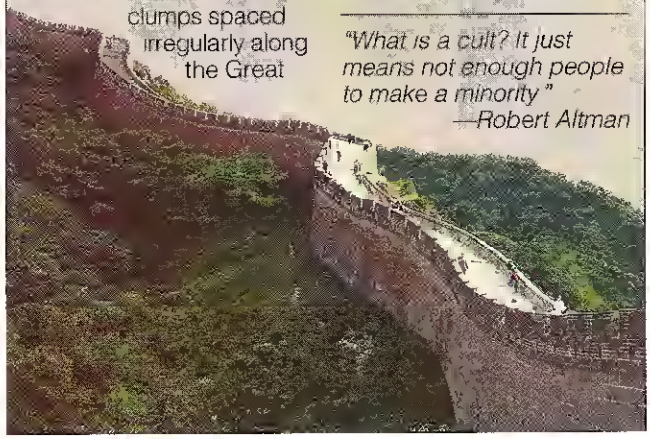
The results of the vast forestry project have been astonishing, according to Farn Parungo, a scientist with the National Oceanic and Atmospheric Administration (NOAA) in Boulder, Colorado, whose research team tracked the diminishing number of storms over the ensuing years. "Vast belts of forest planted across the arid northern lands of China are among the most aggressive weather modification programs in the twentieth century," Parungo says.

The Great Green Wall, as the trees are called, stretches along a 1,500-mile length. Parungo says the elms were planted either in several rows or in clumps spaced irregularly along the Great Wall. They form a windbreak that now helps the soil to retain moisture, allowing farmers to grow wheat, corn, and a variety of vegetables.

The NOAA team analyzed weather data since 1955 for Beijing, the capital, and the western cities of Jilantai and Bayinmaodao. It shows that the frequency of storms dropped from a spring high of 20 in Beijing to fewer than five because of the trees. Darkness that once engulfed the capital for 90 hours a month has been reduced to 10 hours.

Long-range atmospheric and environmental effects of the manmade forestry system are still being studied, says Parungo. Changes in cloud cover and precipitation have been negligible, although the average temperature has risen one degree in Beijing. Such data is important because dust storms from the Gobi and other Chinese deserts once swept sediment as far as Alaska.—George Nobbe

"What is a cult? It just means not enough people to make a minority."
—Robert Altman



INFLATABLE ROBOT

A low-cost robot, originally designed to pick up slippery chicken parts from conveyor belts with its squishy inflatable fingers, could bring robots into many new industries where they haven't been considered economically viable, according to the inventors of the "intelligent integrated belt manipulator" at the Georgia Tech Research Institute.

That's because their relatively unsophisticated $20,000 device does away with expensive vision systems and electric motors, which aren't what most small manufacturers are looking for anyway.

"A $70,000 piece of robotic machinery designed to position a part with extreme accuracy is not economically justifiable for them, so many of these industries now can't use standard robotics," says GTRI research engineer Gary McMurray. "In food processing and a lot of other manufacturing areas, what they need is a robot that will just pick up one object and place it somewhere else—a human-level device."

McMurray calls the no-frills system "the Lego of robots," explaining that it incorporates a computer algorithm which uses five inexpensive photocells to determine the object's shape and location on the conveyor. "It's not the most accurate technique as compared to traditional vision systems, but it's accurate enough for what we need," he says. "If you really don't need to be extremely accurate, that opens up some possibilities that people haven't considered before."

Among the possible applications for the pneumatic robot arm: a host of bagging, weighing, and stamping operations, product painting on conveyor belts, subdivision of goods for packaging, and any number of machine tool operations. "Anywhere you have a human doing a simple task, you have the potential for some kind of human-level performance robotics," says McMurray, who hopes eventually to produce a modular version of the robot that can be wheeled up to any conveyor belt and put to work the same day.—George Nobbe

WHILE SEVENTEENTH-CENTURY MAN HAD A LIFESPAN OF ABOUT 50 YEARS, EIGHTEENTH-CENTURY MAN HAD A LIFESPAN OF ONLY 45 YEARS. THE DROP IN LIFE EXPECTANCY WAS DUE TO EPIDEMICS.

"The search for truth is in one way hard and in another easy. For it is evident that no one can master it fully or miss it wholly. But each adds a little to our knowledge of nature, and from all the facts assembled there arises a certain grandeur."
—Aristotle

"A space strategy game to measure all others by."
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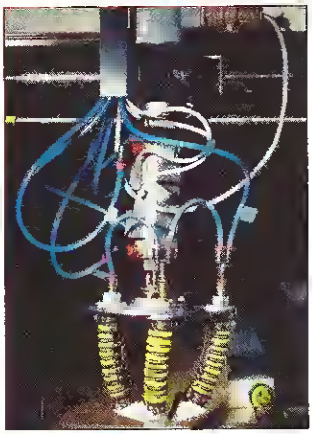
CONTINUUM

SHOPPING BLIND

How do blind people know what's inside the cans and boxes they purchase in supermarkets? Often they shop with a sighted friend who later makes Braille labels for each product. But now blind people can shop alone with the help of a talking, portable version of the Universal Product Code (UPC) scanners that cashiers use to tally store purchases.

Computers read UPC bars using a laser, translating them into two unique five- or six-digit codes that identify a product's manufacturer and the specific item. Compusult Ltd. and the Canadian National Institute for the Blind conducted the bar code-reader test project, which used the bar code information to create a voice-accessible database for blind shoppers. Compusult downloaded a supermarket's inventory database into a desktop computer, then set about designing a portable device called ScanTELL that contains a scanner, voice synthesizer, and the necessary computer technology needed to store the product database.



Portable laser scanners make shopping easier for the blind.

Paul Mitten, vice president of Compusult, says a blind person could begin by scanning a bar code at an aisle's end to learn what kinds of products it contains, then browse by zapping shelf codes. However, after picking up a specific item, Mitten warns, "there's no way to easily identify where bar codes are located on packages" with a pen-style wand. Compusult is testing a new portable omni-directional scanner.

After scanning a product, the device will query the supermarket's private database by radio for its price. Knowing a product's name and cost is a good first step. Future systems could read encoded ingredients and cooking instructions, giving blind purchasers the same information as their sighted counterparts.

THERE ARE MORE THAN 3,500 LIVING COCKROACH SPECIES.

WHERE NO CHAIR HAS GONE BEFORE

Mike Hensler, a 20-year veteran Daytona Beach lifeguard, wanted to find a way to give wheelchair riders easier access to the surf, sand, and sun. Sue Hensler smiles when she recalls the evening three years ago when her husband began tinkering with the first prototype beach wheelchair. "I drove up the driveway that evening to find our white PVC lawn chair furniture in pieces all over the driveway. I remember thinking, 'this had better be real good.'" Hensler's solution *was* good. His prototype beach wheelchair heartened the local Pilot Club and the Lifesaver Association to donate the seed money for Hensler to refine and build the chairs.

Hensler describes his patented invention. "The Surf Chair has been through a metamorphosis since the Neanderthal prototype of modified lawn chairs. Today we have two versions: high- and low-profile. Each can have options including removable armrests, fishing rod holders, different umbrellas, removable footrests, a carryall, and a brake. The chair is designed with a very friendly balance point, making it maneuverable in the softest or wettest sand."

Hensler wanted to get far away from the clinical look and feel of the stainless steel wheelchair. With huge, cartoonish wheels mounted on a PVC frame and a colorful umbrella flapping in the surf breeze, the Surf Chair elicits smiles as riders cruise by.

The physically challenged can hit the beach with comfort, style, and mobility, thanks to a concerned Daytona Beach lifeguard.

Maintenance of the $900 chair is simple. Use a water hose to remove salt and sand and make sure long-term storage is out of the direct sun. Surf Chairs are now available from many municipalities. On Daytona Beach, access to the beach and use of the Surf Chair is free to those with impaired mobility.

—A. W. Stegmeyer

THE NEW

OUTER LIMITS

THERE IS NOTHING WRONG WITH YOUR MAGAZINE

There's that damned oscilloscope on your TV again. "Do not attempt to adjust the picture," intones the Control Voice. White sine waves dance and sway on a sepia background. A flying saucer theremin-buzz hovers like a mechanical dream. "We are controlling transmission."

Eerie harp runs sweep into a herd of violins. This is musical culmination of the years from Gort and Klatuu and Them through Ray Harryhausen UFOs, Ed Wood, Jr., and Godzilla, flavored with a bit of *Psycho*. "You are about to experience the awe and mystery which reach from the inner mind to . . ."

An out-of-focus Earth shimmers into crystal clarity. Electronic hymns to horror battle on a paranoid mindscape of imagination. The title flashes on the screen: *The Outer Limits*.

What show will it be this week? "Architects of Fear?" "The Galaxy Being?" Or maybe Harlan Ellison's "Soldier" or "Demon with a Glass Hand," stories so recently Schwarzeneggered into the *Terminator* films.

The screen dissolves to titles. "'Sandkings.' Teleplay by Melinda M. Snodgrass. Based on the novelette by George R. R. Martin."

No, don't thumb manically through your David Schow *Outer Limits* guide. "Sandkings" isn't there. The story hadn't been written when the show first aired—it first appeared in this magazine in August 1979. Someone else, it would seem, has control of all that you see and hear. And, hopefully, we are all about to participate in a great adventure.

"*The Outer Limits* breaks all the molds of television," asserts executive producer Pen Densham, one-third of Trilogy Productions, the creative force tapped to usher forth this renaissance. "Which means you can come at a story every week with a whole set of fresh purposes. Each story, in a sense, is a mini-feature. Obviously, science fiction is something that gives you permission to be extraordinarily imaginative. We feel our video media of TV and video sometimes get very repetitive. This is an opportunity to constantly challenge and refresh ourselves with each show."

The original *Outer Limits* was baby-boomer catharsis. We Cold War mutants sopped up monsters and spaceships indiscriminately, and here was a black-and-white nailbiter every week. If *The Twilight Zone* was ironic folk music to our Sputnik-charged brains, then *The Outer Limits* was full-out thrash rock.

Archetypal images of the show linger in our heads, refreshed by constant late-night cable repeats. We remember David McCallum's skull ballooning into the thirty-somethingth century; Donald Pleasence twitching with psi power; Michael Ansara, plus helmet and atomic gun, blasted from a wasted future into the white-picket-fence present; Robert Culp wobbling from his spaceship for United Nations solidarity, horribly transformed into . . . yuck!; Adam West dodging sand sharks on Mars; Robert Culp again, leaping about the shadows of the Bradbury

Article by David Bischoff

***The Outer Limits* takes control of your TV once again with "Sandkings," a story that first appeared in Omni.**

Building talking to a robot hand, and finally hunkering down for a long, lonely wait to save humanity. These are just a few of the unforgettables that still shiver deep in our brain stems.

"I was frequently asking people about their memories of the show," says Michael Cassutt, initial co-executive producer of the new version. "The phrase I heard from everybody was, 'It used to scare the hell out of me.' I was like nine when the show was on, and I remember it being quite frightening. It had that noir feeling. Black-and-white film, mood, and music. That atmosphere. The first season was very scary. The second season, even though it was more science-fictional and less monster-oriented, was also successful. It's a perfectly valid way of telling a story. There aren't many people writing that kind of suspenseful science fiction right now." Cassutt has since moved on to his own project.

The show's journey into the rerun wastelands and its hard struggle back deserves note. A total of 49 episodes of *The Outer Limits* aired from 1963 to 1965. The show was produced by Leslie Stevens and Joseph Stefano of Daystar-Villa di Stefano Productions for United Artists Television. Metro-Goldwyn-Mayer absorbed United Artists, evolving into its present incarnation. The *Outer Limits* property was kicked around for years. Attempts were made to resurrect it in the early 1980s, but then MGM fell into troubles.

With the resurgence of both media science fiction (thanks to the success of shows like *Star Trek* and *Babylon 5*) and MGM, the notion of reviving *The Outer Limits* resurfaced. With the proven popularity of anthology shows like HBO's *Tales from the Crypt*, the Showtime cable channel snatched up the new series. MGM had a hefty feature deal with Trilogy—Pen Densham, Richard Lewis, and John Watson. The company was responsible for such hits as *Robin Hood: Prince of Thieves* and *Backdraft*, but also had significant television experience, including the TV film *Lifepod* and the late, lamented *Space Rangers*. MGM thought they might well fit the bill.

"Pen has wanted to do a science fiction- or fantasy-based anthology show for a very long time," says Mark Stern, the senior vice president of production for Trilogy Entertainment Group. "Originally he had a bunch of ideas which he was calling *Department Z*. It became a lot like *The X-Files*. Investigators in black who turn up all this weird and interesting phenomena."

"I grew up on science fiction," says Densham. "I ate the school library—every science-fiction book I could get my hands on. I'm a Heinlein fan from way back when *The Puppet Masters* was coming out. There is an absolute treasure chest of unviewed and unknown-by-the-general-public ideas and creativity that I want to tap. We're working very hard not to forget the legacy we were given.

"We've put together an extraordinarily good team. The challenge is to come up with fresh material and take the show into the Nineties and not necessarily look backward, but go forward with it."

Although the literature of science fiction has a huge spectrum, the audio/visual (and now, virtual) media have always emphasized special effects and visceral impact. Science fiction lends itself toward tales that frighten, even as they weigh issues and teach. If there is a significant single heritage of *The Outer Limits*, it is a penchant for noisy, melodramatic, and sublimely satisfying morality plays.

In picking George R. R. Martin's "Sandkings" as the two-hour premiere episode for Showtime's mid-March 1995 series kick-off, the producers seem to indicate that they've picked up the fallen torch of *The Outer Limits* and are now controlling its phosphor-dot vertical.

"'Sandkings' is the perfect story to start off a new season of *Outer Limits*," says the show's current co-executive producer, Manny Coto. Coto comes from a horror-movie background, writing and directing *Dr. Giggles* as well as episodes

Simon Kress (Beau Bridges) and his son (portrayed by Bridges' own son, Dylan) watch the sandkings. As readers of George R. R. Martin's original short story know, they're not your typical benign aquarium pets.

of *Monsters* and *Tales from the Crypt*.

Richard Lewis of Trilogy agrees. "Unlike Manny and Pen, I'm not a real devotee of science fiction. I enjoy watching it; I enjoyed reading it as a kid. There's something about this story that I found riveting. It terrified me. It's one of those stories that covers all media. It's science fiction, but it's a morality play of someone getting twisted in one direction—getting contaminated with power. It's a great piece and a great challenge."

"Sandkings," which won both Nebula and Hugo awards in 1980, tells the story of a rich and nasty man, Simon Kress. On an exotic planet, Kress buys intelligent alien bugs—sandkings—from a mysterious shop. As he breeds them, they create complex societies and elaborate architectures, they war with one another, and they worship Kress. He plays godlike games with them—and then they play ghastly sandking games with him.

"I was very interested in the question of whether science fiction and horror could be blended effectively," says author George R. R. Martin. "Could you use the symbols and traditional tropes and images and furniture of one of those genres to accomplish the goal of scaring the reader, the main thing that drives horror? I'd done a few earlier stories like that, 'Nightflyers' perhaps being the best known of them. 'Sandkings' was another attempt to mine that particular vein and write a story that worked both as science fiction and as horror.

"The particular kernel that gave me the idea for the story went back years before to when I'd been in college. A friend of mine lived off-campus in an apartment. We'd watch the Creature Feature every Saturday night—two horror movies. We'd put away several cases of beer. At one particular point John got a tank of piranha. He started to punctuate these Creature Feature get-togethers by throwing other fish to the piranha. Sort of an intermission thing. He'd throw in a goldfish or guppies or whatever. It was that real-life incident that formed the basis for Simon Kress's parties, with his friends getting together to watch the sandkings fight their wars. Obviously there was a large amount of imaginative extrapolation expended to transform one to another," Martin says.

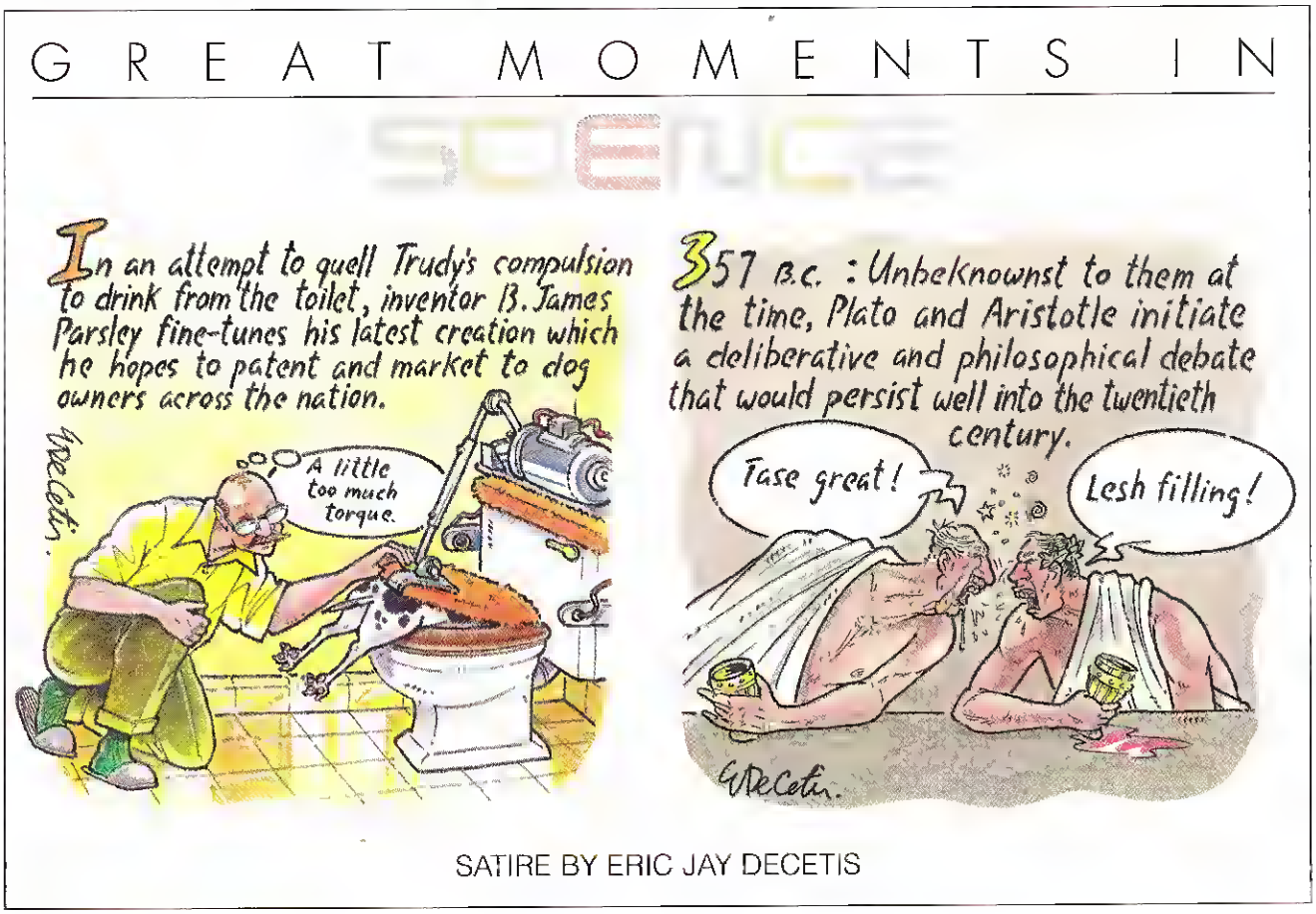
The story went on to eternal anthologization. It has never been out of print, nor out of the hands of filmmakers. It has always been under option from some company or another, and there have been a couple of screenplays written. Trilogy was interested in it even before *Outer Limits* came along.

"George Martin came to work with us in developing another TV show. He gave us this story as an example of his thinking," explains Lewis. "I showed it to other members of the community who swore at me later. They'd read it at night and couldn't sleep."

When Trilogy entered the *Outer Limits* development scene, Lewis suggested they use the story for the series, however, there was one large problem.

"A faithful adaptation of George R. R. Martin's 'Sandkings' is a very expensive feature film," says Cassutt. "We were forced to do a story in the spirit of 'Sandkings' rather than a faithful adaptation. As a piece of science-fiction TV, it will be perfectly wonderful. As a piece of science-fiction TV that satisfies the people who loved every minute of the actual story, probably not. But I would encourage them to wait for the feature film version. George also made a deal for a TV version and a film version."

The transmutation posed a number of fascinating problems. The solutions are classic examples of how teamwork and compromise work in television. The shooting script is a first-rate example of what *Outer Limits* (and science-fiction horror in general) does best: It scares you, leaving a thoughtful reso-



SATIRE BY ERIC JAY DECETIS

nance after the last tremble.

The process is an insightful gaze inside the process of worthwhile television shows.

"It was a collective decision," says Cassutt, who helmed the creative thrust. "I didn't see any reason to set the story on another planet. Clearly the sandkings themselves are the science fictional element of 'Sandkings.' If you want a simplified version, you want to find a way of having those little guys on Earth."

Cassutt did a preliminary two-page treatment while they were obtaining the rights and selecting a screenwriter. They chose Melinda M. Snodgrass, alumna of both science-fiction novels (*Circuit*) and science-fiction TV (*Star Trek: The Next Generation*). She did two outlines and two drafts of the script. Time at a premium, the script was then taken in-house, and given to Manny Coto.

"Melinda Snodgrass tackled the initial problems, and then Manny came in like a human tornado and really pulled together a lot of the loose elements," says Densham. "When we're working with writers we really try to create a creative think tank, where everybody's opinion can contribute to the imagination of the whole piece."

In *The Outer Limits* "Sandkings," Simon Kress (Beau Bridges) is a near-future scientist with a wife (Helen Shaver), a son (Dylan Bridges), and a military father (Lloyd Bridges) who favored a medal-winning son over Simon. Simon's efforts to show his worth find their voice in defense work involving work with eggs found in Martian sand samples. When the project is shut down, Simon steals a thermos full and sets up shop in his barn. The result: Sandkings in a terra-fied version of the Martin story, with a sandking-bitten, crazed Simon playing God while intelligent, belligerent bugs snack on the family dog and a rival of Simon's—and then generally menace the family and Earth.

"At first we played with the idea that they were designed as part of biological weaponry," says Cassutt. "That's where Simon's character came from. My thought was that there's something fascinating about guys who spend 25 or 30 years working in this black, shadowy defense world—then are suddenly cast out. I still think that would be a good way to go with the story, but as we looked at it, we had some strong disagreements as to whether that was plausible or necessary. So we said, 'Look, we've just got aliens.' I think it works fine."

"One of the movies we used as a model—for feeling, anyway—was *The Shining*," says Lewis. "I think that Beau Bridges has captured—and it's really Manny's writing that has put this on the

table—the sort of internal dialogue that Nicholson has where he wasn't just mumbling but almost talking himself into a logic of his madness. There's something so striking in the looks between Beau and Lloyd Bridges. They've both got these furrowed brows and these bushy eyebrows. Very intense eyes. Beau takes his character to a twisted darker side. It's startling to watch."

Martin admits that the original might have been subconsciously influenced by Theodore Sturgeon's classic "Macrocosmic God." Certainly it could also be said that this TV version is in the tradition of such shows as the *Outer Limits* episode, "The Zanti Misfits," which is equipped with intelligent insectoid aliens, equally belligerent.

Be assured, though, budget or no budget, we'll see more than a shift from black-and-white to color. The effects for shows like "Zanti" now look decidedly dated. Densham promises elaborate surprises in putting the sandkings in your face. "We're using a number of different techniques. Puppetry, CGI, real insects. (Scorpions, actually.) No one individual answer creates a living creature. You have to use every possible method to pull these things together and create the sense that these creatures have intelligence."

Trilogy is not going to be able to rest on its pincers. "The challenge for us is to use the feature relationships we have. For 'Sandkings,' it's the Bridges family. Michael T. Williams of *Forrest Gump* is going to play in one of the upcoming episodes. Rebecca DeMornay and Charles Martin Smith from some great movies will be directing episodes. We're working with Adam Nimoy to develop 'I, Robot' (from the original *Outer Limits* episode, based on the Eando Binder story, not the Asimov novel) for his father (Leonard Nimoy, who appeared in the original) to direct."

Other upcoming shows? "'Second Soul' (by Nebula award-winning science fiction writer Alan Brennert) is an absolutely incredible story of aliens who come to Earth from a ravaged planet of their own making," says Coto. "They need one simple thing. They need to occupy human bodies. The story is about the culture clashes that erupt from a human bigot who must get used to the fact that dead people are being reanimated and are now walking aliens on Earth. The twist ending involves the man's path to accepting this and discovering what the aliens are really up to. It's one of the best scripts I've ever read. Jonathan Glassner, the other co-executive producer, wrote a story about a female robot kind of in the tradition of (Lester Del Rey's) Helen O'Loy. It's called 'Prototype.' Every one of these shows is absolutely intelligent and well thought-out and based on character. There's no dumbing down at all. They're all done with an incredible amount of respect for the audience. Something you don't find a lot of in science fiction in features or for television."

Other stories slated for airing include a dramatic version of Dan Simmons' "The River Styx Runs Upstream," and another Alan Brennert script, titled "Dark Matters."

"They all have great science-fiction concepts," Coto continues. "There's one ('Under the Bed,' by Larry Meyers) with the bogeyman coming back to life and stealing children. There's actually a science-fiction explanation."

"*The Outer Limits* is more about human nature, the kinds of changes that we're going to face when mankind confronts new issues. They're all morality issues. The technology is there to bring out what we in society are either complacent about or on the brink of becoming," Densham says.

The central challenge is that times have changed for the Control Voice. "Scary horror science fiction is not a relic of the Sixties, but a relic of the Fifties," Cassutt says. "If you look at the original series, the threats were all basically from the outside. They were aliens, coming to eat you or pretending to be your neighbors. The stories I found myself responding to and developing were much more the biological horror. Your body turning into the enemy. Things from the inside. It's one of the situations in which science fiction reflects the times. *The Outer Limits* was the end product of those Fifties horror movies. It's a Cold War metaphor. The threat was godless, atheistic communism taking over, whereas 30 years later, the perceived threats are to personal security and health. My own script is about a modern-day Frankenstein. It's about a nanotechnology researcher/inventor whose invention blows up in his face."

Alas, not all went well during Cassutt's five and a half months in the creative pilot seat. "I was trying to get stories by Fredrik Pohl, Robert Heinlein, James Tiptree, Jr., Damon Knight, and other science fiction writers. Some of them may wind up getting through. But there are complications in terms of Can you find a way to adapt it? Does the story work? Can you find a way to get six people to sign off on the adaptation? Then, Can you make the deal? For example, a lot of Philip K. Dick's short stories would be terrific for *Outer Limits* episodes. However, they are priced beyond the range of mortal TV shows. It's a shame. Phil's stories have been

CONTINUED ON PAGE 90

OMNI'S PROJECT OPEN BOOK

ALIEN IMPLANT OR— HUMAN UNDERWEAR?

ARTICLE BY PATRICK HUYGHE

AN MIT SCIENTIST ANALYZES AN ALLEGED ALIEN IMPLANT SUPPOSEDLY PLACED IN THE BODY OF ONE ABDUCTEE IN THE COURSE OF A TRAUMATIC CHILDHOOD EVENT.

For Richard Price, a single traumatic childhood incident has thrown a terrifying shadow over the last four decades of his life. One evening in September 1955, near a cemetery in Troy, New York, Price claims, he encountered a couple of humanoids who took him aboard their craft and injected an implant under his skin. Now, a scientist from a world-class university has analyzed that implant and reached a fascinating conclusion.

Price, who was then 8 years old, has never forgotten the episode, especially the moment the aliens implanted something into his—now that the Bobbitt trial has made the word media-acceptable—penis.

"I was tied down to a table in the center of the room," he recalls, "and they had used a machine to scan over my body up to my neck. Then they took this implant from the table and put it at the end of this long needle attached to some type of box and cable. When they inserted the needle into my skin I could see on a monitor in front of me an enlargement where it looked like they were hooking up wires underneath my skin. Then, after they took the needle out and shut everything off, one of them came over to me and, before he helped me put my clothes back on, said: 'Leave it alone, or you'll die.'"

Price reports he was too frightened to tell his parents about the incident. But in 1964 while in high school he did tell a girlfriend and within a week everyone in school was calling him "the spaceman." Finally, after getting into a fight, he was called to see the principal, who referred him to the school psychologist.

Price underwent a battery of psychological tests and was given various medications. But since no one had even heard of UFO abductions back then, he eventually ended up in a state hospital. He was released after three months, but only after "admitting" to the doctors on his case that the incident had never occurred.

More than a dozen years would pass before Price could bear to relate this bizarre tale again, once more trying to convince the outside world it was real. After talking to UFO investigators in 1981, Price was urged to visit a doctor who, amazingly, confirmed the presence of a foreign object in his penis. But since Price felt no discomfort from it, the doctor suggested that nothing needed to be done.

Then in June 1989, while getting dressed, Price noticed the "implant" protruding above the skin, and about two months later it came out. The object was roughly cylindrical, rounded at both ends, and had at least six small appendages. Tiny, measuring about 1 millimeter wide and 4 millimeters deep, it had an amber colored interior and a white shell.

Within two weeks Price had turned over a portion of the "implant" to David Pritchard, a scientist at the Massachusetts Institute of Technology who believes scientists should look seriously at the abduction phenomenon. Pritchard says he agreed to analyze the "implant" for one simple reason. "Proving that life exists elsewhere in the universe would be the biggest scientific discovery of all time."

For Pritchard, however, that dream must wait. Indeed, the MIT scientist found the object was made of "the kind of material elements and chemicals—carbon, oxygen, hydrogen, and compounds—one would expect if the object were biological in origin and formed right here on planet Earth."

A dermatopathologist at Massachusetts General Hospital in Boston, moreover, supports Pritchard's conclusion. Thomas Flotte found that the "implant" consists of concentric layers of fibroblasts, a type of cell found in connective tissue, extracellular material like collagen, and some external cotton fibers. The human body apparently produces such calcified tissue in response to injury, either from foreign material like a piece of glass or a wood splinter, or from a trauma of some kind, caused perhaps by a baseball or a table corner.

"This calcification process is common," says Flotte,

"though the penis is not a site of trauma all that often." The cotton fibers probably came from Price's underwear; they became incorporated into the body tissue as it hardened.

Pritchard, who with Harvard psychiatrist John Mack organized an abduction conference held at MIT in the summer of 1992, knows of one other penile implant case. upon examination, that implant, too, turned out to be calcified damaged tissue of terrestrial, and human, origin.

But despite the rather mundane outcome, Pritchard feels that the Price implant case is as good as anyone in the business of analyzing possible extraterrestrial artifacts is likely to get. "I thought this object had an extremely good pedigree because it was associated with a conscious recollection," notes Pritchard, "and Price even has a doctor's report indicating that he had something under his skin 10 years ago."

While Pritchard found no sign that the "implant" was an alien artifact, he states his investigation does not rule out the extremely remote possibility that, as believers might argue, the calcified tissue was actually manufactured by aliens.

"It's possible," he explains, "that the aliens are so clever that they can make devices that serve their purposes yet appear to have a prosaic origin as natural products of the human body and fibers from cotton underwear. So this case only rules out the possibility of clumsy aliens. It doesn't rule out the possibility of super-clever aliens."

THE HARDENED TISSUE IN HIS PENIS SEEMED TO BE OF BIOLOGICAL ORIGIN. THE COTTON FIBERS MIGHT HAVE COME FROM HIS UNDERWEAR. BUT THERE'S THE POSSIBILITY, SAY BUFFS, THAT THE IMPLANT, DESIGNED BY CLEVER ALIENS, MIMICKED THE NATURAL DEFORMITIES OF MAN.

Other ideas, however, might make more sense. For instance, given the recent connection some scientists have made between the mind and body, it has been suggested that Price may have "induced" the implant much like people who practice visualization exercises have been shown to improve their T-cell counts, boosting the immune system.

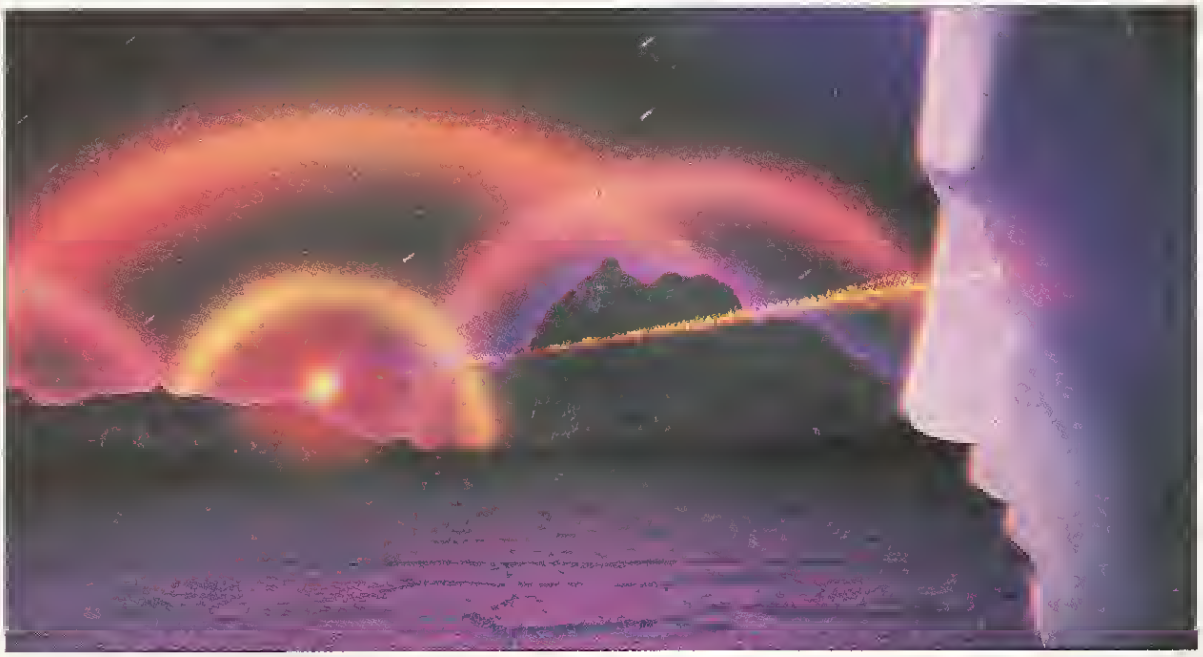
But psychologists reject the notion that Price's belief in aliens might somehow have provoked the growth. "To willfully create such a calcification is highly unlikely," says Kentucky psychologist Robert Baker, author of *Hidden Memories*, "almost as unlikely as an alien implant."

Baker also largely dismisses the possibility that Price might be using an alien encounter story to cover up an episode of childhood sexual abuse. "While such things are possible," he says, "it's not usually the case. In fact, over the years we've discovered that people remember very clearly cases of childhood sexual abuse. It's not a question of repression."

More likely, notes Baker, Price's so-called aliens were a hallucination associated with a sleep paralysis episode. The paralysis typically results in very shallow breathing, which reduces the oxygen input to the brain. In some people, such oxygen reduction stimulates the sexual centers. "And then later on if he found anything wrong with his genitals," says Baker, "he would attribute whatever the problem was to what the hallucinated aliens did."

But how did the "implant" get there in the first place? William Cone, a psychologist in private practice in Newport Beach, California, thinks he knows the answer. "To my knowledge we have yet to recover an implant that resembles anything alien," he states. "Instead, the chances of somebody finding a little something wrong with his or her body are greater than we think. Statistically, if you look at the population at large, you are going to see a lot of people who have had growths and bumps and pieces of stuff stuck in their body. Out of that large population, some people interested in abductions are going to find things in their body, and as far as I am concerned, that is probably what happened here."

Meanwhile Price, in an effort to come to grips with the turmoil this and two subsequent alien encounters have caused, is in the process of writing a book about it all with a surprisingly down-to-earth title: *What Affects Your Life*. ∞



THE OMNI OPEN BOOK FIELD INVESTIGATOR'S GUIDE: PART TWO

ARTICLE BY DENNIS STACY

Roger McGuinn of The Byrds once put it this way: If you want to be a rock-and-roll star, it's a relatively straightforward affair. "Just get a guitar and learn how to play." Musical rhetoric aside, much the same can be said of a UFO investigator. No special degrees or licenses are required—just a few basic chords.

As you go about making your UFO album, you'll find yourself returning to *those chords again and* again. The first one, presented in this chapter, is a basic UFO sorting system. When you've mastered it, you'll gain the virtuoso ability to recognize and classify potential UFOs. It stands to reason that, as a UFO hunter, this basic skill will enable you to assess a sighting's importance, determining how much time and energy, and what instrumentation, you want to bring to bear on a particular case. A report of a bright white light that lines up with Venus's known position in the sky at the time, for example, should attract much less attention than, say, a competing case involving multiple witnesses, radar returns, and indications of a physical impact *on the environment, such* as broken tree limbs, scorched grass, piles of debris, and so on.

A classification system is necessary not only as a starting point, but also as an end result. Once your investigation is concluded, in other words, you should be able to assign the original stimulus to a particular and specific category, beginning, in broadest terms, with "identified" and "unidentified."

Identified means that a particular phenomenon or object can be attributed to a known natural or man-made source, be it a star, planet, weather balloon, or advertising blimp.

By the same token, unidentified does not in and of itself connote an extra-*terrestrial spaceship, it* merely indicates that the source or stimulus of the original sighting remains unknown and unidentified. While all *known* phenomena may have been ruled out as a possible explanation, other unknown, but perfectly mundane, phe-

nomena may have been operative at the time. Put another way: Unidentified Flying Object means only that the object was unidentified after investigation, not that it was from another planet and necessarily hellbent on abducting humans and/or mutilating horses and cattle, or otherwise wreaking high-tech alien havoc on the residents of Earth.

As humans, we have a built-in classification system to begin with, one that compares present experiences with past ones on an "as like" basis. Most of us have seen airplane landing lights at one time or another, Venus shining like a searchlight in the evening or morning sky, a full moon peeping through ragged clouds, and whatnot.

It's only when "Venus" suddenly executes an abrupt right-angle turn or divides into two smaller lights that streak away at high speed that we find our attention attracted and realize we may, in fact, be in the middle of a UFO sighting.

One of the most thoroughly investigated and well-documented UFO reports in history is that of Trans-en-Provence, so called for the small French village in which it occurred.

On the evening of January 8, 1981, Renato Nicolai was working in his garden when he heard a whistling noise. What he would later describe to government investigators as "a device in the form of two saucers, one inverted over the other," then allegedly touched down on his property about 200 feet away. About five feet thick and the color of lead, the device reportedly rested on the ground for only a matter of seconds before lifting back up in the air above some pine trees and shooting away to the northeast. A circular ring just over six feet in diameter was partially scoured into the ground.

Even when things are this unusual, the natural human impulse is to classify and dismiss what we see. The French contractor at Trans-en-Provence, for example, felt he was witnessing some sort of secret aerial device built and flown by the French military.

Other witnesses in similar sightings have suggested that apparently inexplicable objects were weather balloons or the Goodyear blimp, anything, in fact, *but* a UFO.

Contrary to public opinion, we are not primed to see UFOs everywhere at the drop of a proverbial hat. And most UFO reporters are not unabashed publicity seekers.

Conservative indications are that fewer than one in twenty UFO sightings are ever reported to anyone other than immediate family members and friends. Indeed, many witnesses start out in denial. Startled and surprised by what they see, they generally make repeated efforts to explain it to themselves or dismiss it altogether before even considering the possibility of classifying it as an Unidentified Flying Object.

The intended end goal of any proper UFO investigation, of course, is to sort through *all* possible explanations in order to arrive at the most likely solution. Sometimes the UFO hunter can easily attribute a sighting to some mundane source, natural or manmade. At the same time, other sightings will remain unidentified or unknown after the investigator's best attempts to explain.

As we'll see, however, a classification of "unknown" presents its own problems and requires its own further classification system if the UFO hunter is to make any sense of the phenomenon at all.

One such system comes to us from the Air Force, which used it to evaluate the quality of the unknowns. Were they worthy of further investigation? Or were they just too vague and amorphous, too cloudy, to pursue at all?

The system, developed by the Air Technical Intelligence Center (ATIC) at Wright-Patterson Air Force Base, Dayton, Ohio, also home of Project Blue Book, held, first of all, that would-be witnesses had to time the duration of the sighting itself. When a sighting was less than 15 seconds, according to the ATIC guidelines, "the probabilities are great that it is not worthy of follow-up. As a word of caution, however, should a large number of individual observers concur on an unusual sighting of a few seconds' duration, it should not be dismissed."

The Air Force observed, no doubt correctly, that sightings of extremely short duration generally turned out to be meteors, incoming space debris like satellites falling out of orbit, or some other mundane object only briefly glimpsed.

The Air Force also placed value on multiple witnesses and a sighting's geographical range. "As an example," the ATIC memorandum noted, "twenty-five people at one spot may observe a strange light in the sky. This, however, has less weight than two reliable people observing the same light from different locations. In the latter case a position-fix is indicated." Of course, it goes without saying that 25 witnesses in a single location will hold more weight than two witnesses also at a single locale.

The Air Force considered the investigator's proximity to the case crucial as well. That makes sense. Obviously if you live in Albany or Trenton, the chances of personally investigating any UFO case, however compelling, in, say, Denver or San Francisco—never mind France or Russia—are greatly diminished. While much

can be inferred and confirmed by telephone, a personal, on-site investigation is best.

The Air Force also placed some emphasis on the reliability of the witness, the more reliable the witness—the more professional, the more educated, the more sane—the more the Air Force encouraged investigators to pursue the case. This is a subjective call, admittedly, but one we have to consider. Rightly or wrongly, most of us regard a 57-year-old astronomer or retired fighter pilot as somehow more reliable—and therefore more believable—than, say, a couple of high-school kids in a parked car. Chalk it up to human nature.

To some extent, however, the perception is correct. The astronomer and the fighter pilot *are* trained observers. They are familiar with much of what happens in the sky simply because that's what they get paid to do. At the same time, an advanced degree in astronomy or a pilot's license does not confer infallibility.

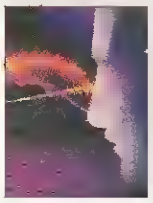
For that matter, one of the most famous hoaxes in UFO history was perpetrated by a former Navy officer with a Ph.D. degree in biochemistry. Ultimately, it is up to the individual investigator to establish or confirm the credentials and bona fides of his or her witnesses, and to corroborate their sighting as best he or she can.

The Air Force also considered the amount of elapsed time between when the UFO was sighted and when it was actually reported or investigated. ATIC recommendations noted that "if the information cannot be obtained within seven days, the value of such information is greatly decreased." However, in cases where "physical evidence exists," the Air Force conceded, "a follow-up should be made even if some of the above criteria have not been met."

Ideally, any case should be investigated as soon as possible after it comes to the investigator's attention, but this is not always feasible. Most of us have day jobs and family lives, as do most witnesses. Coordinating schedules is not always easy. Nor are all of us suited to the personal interview situation and its demands. Moreover, much valuable historical UFO information remains essentially unplumbed and unmined.

In one prominent example, the front-page headline of the *Roswell* (New Mexico) *Daily Record* once announced in bold type that the Army Air Force had recovered a flying disc nearby. That headline, dated Tuesday, July 8, 1947, lay buried in the *Record*'s files for more than 30 years, until it was discovered by UFOlogists in the late 1970s, setting off an investigation which has resulted in at least four books and which continues to this day.

A BASIC UEO SORTING SYSTEM WILL HELP YOU ASSESS A SIGHTING'S IMPORTANCE, DETERMINING HOW MUCH TIME AND ENERGY AND WHICH INSTRUMENTATION YOU WANT TO BRING TO BEAR ON THE CASE.



So the Air Force's seven-day limit should be taken with a grain of salt. Besides, some investigations *should* be historical by nature and design. A few years back, for example, I approached the Sunday magazine supplement of my local newspaper with the idea for an article based on San Antonio residents who had previously reported UFOs. Part of the purpose of the article was to see whether the average citizen still stood by, or even remembered, his or her sightings years after the fact. From the offices of the Mutual UFO Network in nearby Seguin, Texas, I was able to examine the files of some ten past reports, the oldest having occurred a decade previously. Only one or two witnesses no longer lived in San Antonio. Somewhat to my surprise, the others remembered their sightings as if they had happened yesterday. "I'll never forget it as long as I live," was an almost universal response. Equally interesting, despite the passage of time, was the fact that the events dredged up from contemporary memory were remarkably consistent with the original report, with little or no embellishment on the witnesses' part.

I was able to conclude that, whatever the source of the UFO stimulus, its impact and impression on percipients was both dra-

matic and relatively "permanent." So, while sooner is no doubt better than later as a general rule of thumb, a week or more of elapsed time between a UFO event and the onset of an investigation isn't necessarily the kiss of death the Air Force would have had us believe.

The intended results of any investigation should also be considered. If you want to examine how the national press treated UFO reports during the Korean War, for instance, or the origin of the phrase "little green men" and its derogatory association with the UFO phenomenon in general, it doesn't make much difference when you get started—only how deep you're willing to dig. And believe it or not, these questions are important. They help us place individual sightings in cultural or historical context, provide a referential base of meaning for the language used by witnesses, and illuminate the social significance of the phenomenon as a whole.

Such searches also help with the broader goal: deciding whether a UFO is worth investigating in the first place. Once you have made that decision in the affirmative, you must be able to categorize the particular sighting—to place it in the appropriate slot so it can be compared to other similar sightings that have come before. Toward that end, a usable classification system is a must.

The first classification system to gain widespread currency among civilian UFO investigators was that proposed by the late Dr. J. Allen Hynek in *The UFO Experience* (Henry Regnery Company, Chicago, 1972). Hynek certainly knew whereof he spoke, from the summer of 1947 until December 1969, he had served as the Air Force's scientific consultant on UFO reports. The Hynek system had the advantage of being both simple and, as it turned out, memorable. (In fact, cinematic wunderkind Steven Spielberg would base one of the highest-grossing motion pictures of all time, *Close Encounters of the Third Kind*, on Hynek's evocative nomenclature.)

Hynek's system was based on both numbers and phenomenology. Most UFOs were reported as brilliant light sources seen in the nighttime sky, so his first category, or classification, was the self-explanatory "nocturnal light."

Although significantly fewer in number, many UFOs were seen by the cold light of day, and the majority of these tended to be shaped like a circular plate or saucer, hence the popular phrase "flying saucer," and Hynek's second category, "daylight discs."

Some daylight discs were reported by witnesses and, simultaneously, captured by radar. To these cases Hynek assigned the descriptive term "radar-visual."

THE MOST FASCINATING YET TROUBLING UFO REPORTS WERE THE CLOSE ENCOUNTERS IN WHICH HUMAN BEINGS CLAIM TO HAVE ACTUALLY TOUCHED OR BEEN TAKEN ABOARD A LANDED UFO OR—IN THE CASE OF ABDUCTION—TO HAVE BEEN KIDNAPPED BY THE ALIENS AND BEAMED ALOFT.

All of the above, tantalizing as any single case might have been, still represented remote observations, whether by human beings or electronic monitoring equipment. More troubling—and therefore ultimately more interesting—were those UFO reports that could loosely be defined as "close encounters." And UFO researchers found the closer the better in terms of the potential information that could conceivably be gathered for review.

Hynek was willing to consider the Air Force's basic contention that most UFO reports represented the simple misperception of ordinary objects or phenomena—particularly when the UFO was seen at a distance. But Hynek also felt that the "misperception" theory tended to lose credence and viability in those cases in which percipients claimed to have actually touched, or been taken aboard, a landed UFO.

Hynek broke close encounter cases into three separate categories: those of the first, second, and third kind. All were assumed to have taken place within 500 feet of the UFO stimulus.

A close encounter of the first kind, subsequently abbreviated as CE I, was a UFO report in which the witness or witnesses claimed that the UFO physically approached within 500 feet of their position but otherwise

FLYING SAUCER VERSUS UFO

Believers and skeptics alike agree that much of the problem revolving around a dispassionate discussion of the so-called UFO phenomenon stems from basic linguistics. Kenneth Arnold, for example, whose June 24, 1947, sighting arguably initiated the modern era of UFO reports, never once mentioned "flying saucers" or UFOs. What Arnold told Associated Press reporter Bill Bequette was that the nine crescent-shaped objects he saw behaved "like a saucer skipping over water." An anonymous headline writer coined the phrase "flying saucer," and the rest is pretty much history.

UFO—Unidentified Flying Object—also implies by definition that some sort of physical flying *object* is involved in each and every UFO report, when it is not clear that this is the case. As astronomer J. Allen Hynek pointed out, "the U in UFO stands for 'Unidentified.'"

As with flying saucer, the original coinage of UFO remains in some dispute. In the opening pages of his classic *The Report on Unidentified Flying Objects*, former Air Force captain and Project Blue Book director Edward Ruppelt claims to have invented the phrase out of whole cloth. "UFO," he says unambiguously, "is the official term that I created to replace the words 'flying saucers.'" In a briefing—classified secret at the time—given the Air Defense Command in December of 1952, Ruppelt reiterated, saying, "We don't like the name 'flying saucers' and only rarely use it because it seems to represent weird stories, hoaxes [and some] sort of joke." But earlier that same year Ruppelt had contributed an article to *Air Intelligence Digest* in which he referred to UFOs as UAOs—Unidentified Aerial Objects.

UAO, however, had first been used by Project Sign, Project Blue Book's predecessor, in USAF Report No. F-TR-2274-1A, which dated from February of 1949. In addition, a 600-page report released in December of that same year (Technical Report No. 102-AC49\15-100)—two years before Ruppelt assumed the Project Blue Book mantle—was titled "Unidentified Flying Objects—Project Grudge." Clearly, the UFO acronym had crept into official Air Force usage before Ruppelt's time. The true originator of the phrase, in other words, was undoubtedly some lower-echelon staff person who will probably forever remain anonymous. ☐☐

left no lasting impression or residual effects on the surrounding environment. In other words, it was a visual sighting only.

At 6:05 on the morning of February 6, 1966 at Nederland, Texas, for instance, one of the most famous close encounters involved at least three witnesses and lasted for approximately five minutes. As the primary witness described it, "the neighborhood was lit up in a red glow. My first thought was that a police car was parked nearby or a fire truck. I called to my wife that something must be wrong in the neighborhood and to come and see. Suddenly I realized the light was coming from overhead. I looked up and saw the outline of an object moving out past the pitch of my roof, approximately 250 to 500 feet high. The red glow was coming from beneath the object, about center. It appeared as a stream of light coming from inside through a hole."

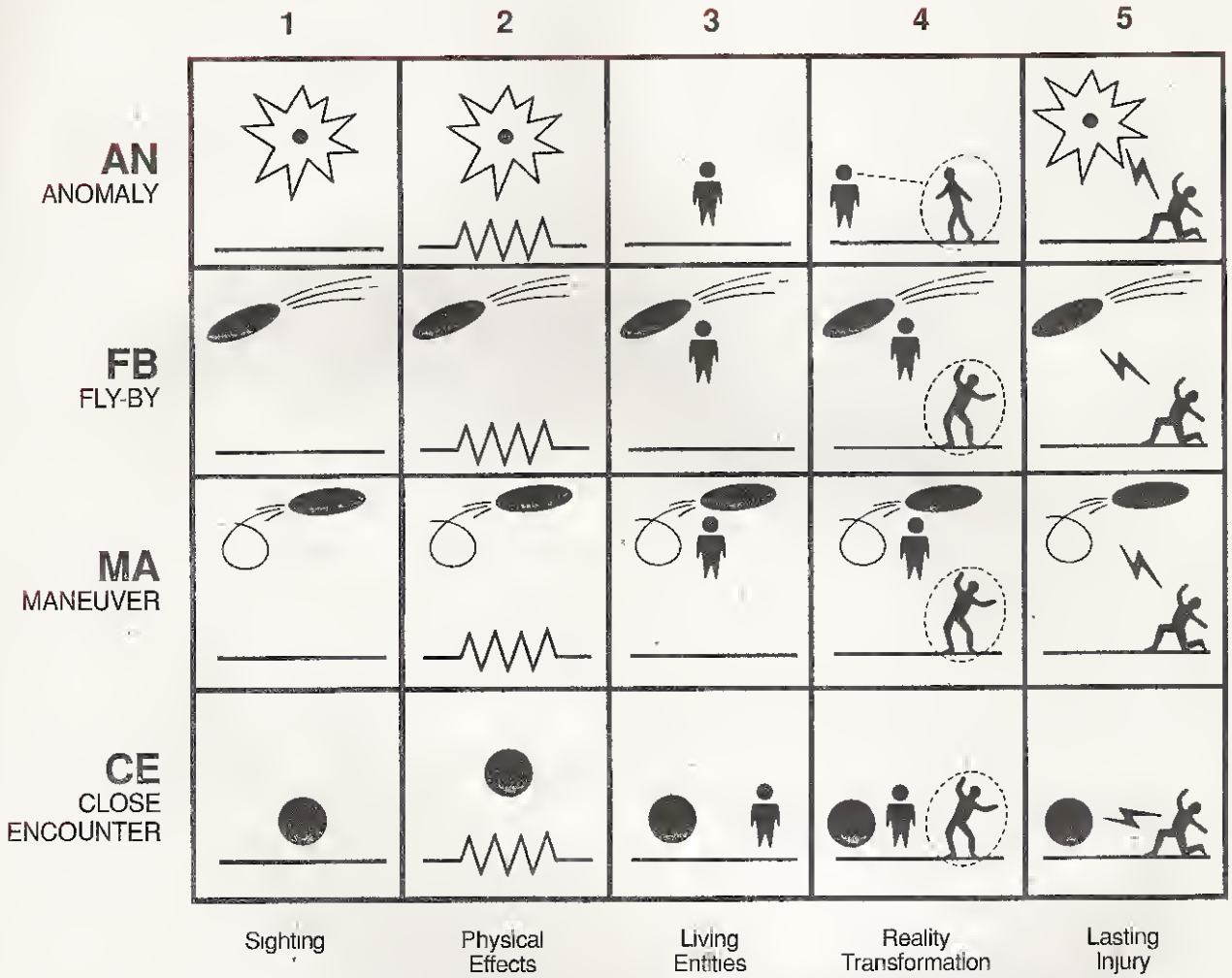
A close encounter of the second kind (CE II) represented a sighting in which the UFO was not only seen at a distance of 500 feet or less, but also during which "measurable physical effects on the land and on animate and inanimate objects are reported."

The Trans-en-Provence sighting mentioned earlier is a perfect example of a CE II case. The witness was within 500 feet or less of the object, landing traces were found, and scientists were later able to determine an implied physical effect on the environment apparently caused by the UFO source. In this case, physical effects were most pronounced in plant samples, which registered a measurable reduction in the green pigment known as chlorophyll.

Many CE II cases involve individuals whose car engines stall and headlights go out, as was reported by two witnesses at Loch Raven Dam, Maryland, on October 26, 1958. The pair had just driven over the dam and were approaching a bridge when they noticed "a large, flat, sort of egg-shaped object" hovering about 100 feet above its superstructure, at which point the car's electrical system apparently failed.

The engine died and the dashboard lights and headlights went out. Then "a brilliant flash of white light" emanated from the object, and both witnesses "felt heat on our faces." A "dull explosion" was heard, the object began rising vertically and disappeared from view in a matter of five to ten seconds.

A CE III was defined, in Hynek's words, as one "in which animated entities (of-



ten called 'humanoids,' 'aliens,' or 'occupants') have been reported."

One of the more celebrated and controversial CE III cases involved policeman Lonnie Zamora of Socorro, New Mexico. On the afternoon of April 24, 1964, Zamora said he broke off chasing a speeding motorist when his attention was distracted by a descending object emitting flames. It finally passed out of sight behind a small hill.

Eventually, Zamora was able to drive his patrol car within 150 feet of the object, which, he said, now resembled an egg-shaped craft parked atop metallic legs at the bottom of a gully. Two white-cloaked figures stood nearby, he reported, and he could see a kind of insignia on the side of the craft. At Zamora's approach the two figures reportedly climbed inside the craft, which then took off vertically and shot off horizontally.

To his dying day, Hynek remained concerned and perplexed by the growing new category of UFO reports known as "abductions" (sometimes referred to as CE IVs), those instances in which witnesses claim to have been "beamed" or otherwise transported aboard UFOs against their will, often in a state of physical paralysis. The most famous such case, perhaps because it was one of the first, involved Betty and Barney Hill of Portsmouth, New Hampshire. On the evening of September 19, 1961, the two were returning home from vacation in Niagara Falls along an isolated highway when they reportedly experienced two hours of "missing time."

Under hypnosis, the Hills filled in their memory gap with an account of abduction. While inside the starship, both said, they were subjected to invasive medical procedures performed by alien beings dressed in shiny black uniforms and caps. Afterward, the Hills were allegedly returned to their car and allowed to go on their way.

While more serviceable than anything the Air Force ever managed, the Hynek classification system also had its shortcomings, as was readily apparent. For example, not all daylight UFOs were shaped like discs. Triangle-, cigar-, box-, boomerang-, teapot-, and globe-shaped UFOs have also been reported, and not just once or twice, but on numerous occasions.

Moreover, not all nocturnal lights are necessarily simple pinpricks of luminosity. Multicolored beams and rays of light have been reported over the years, as have diffuse areas of illumination that can only be described as glowing shapes.

And then there were the "high-strangeness" cases, those reports in which the UFO allegedly "morphed," or changed shape, divided into two or three, disappeared from view altogether, or otherwise violated the known norm of physics. Nor were the reported physical effects always lined up like neat ducks in a row. Sometimes a UFO seemed to burn, scar, or otherwise harm its nearby percipients—on rare, unconfirmed occasions fatally—while at other times the effect, or by-product, of a UFO close encounter could only be described as healing or beneficial, almost enlightening, in nature. To paraphrase Forrest Gump: "UFO is as UFO does."

Indeed, one has only to review a small number of the abduction cases that can now be found somewhere in the media almost every day to see the principle illustrated. Some abductees claim that the aliens are brutal, inflicting untold pain and torture with each new encounter. Others, however, say that the aliens are benevolent visitors, here to help us transcend our own frailties so the human species can prevail.

Given all the fine distinctions, it fell to computer scientist Jacques Vallee, author of several pioneer UFO studies, to fine-tune Hynek's system of UFO case classification. In its final version (see chart), Vallee maintained Hynek's basic distinction of UFO sightings as either distant or extremely near events. To reflect the fact that certain aspects of the UFO phenomenon often seem related to anomalous experiences in general (poltergeists, near-death, out-of-body experiences, and so on) he added the category of Anomaly to those proposed by Hynek.

Columns running vertically down Vallee's chart reflect the various categories. AN stands for Anomaly. Fly-By (FB) and Maneuver (MA), are basically equivalent to Hynek's distant encounters (that is, Nocturnal Lights, Daylight Discs, and Radar/Visuals), with the difference that Vallee's terms ultimately reflect the behavior of the phenomenon itself, as opposed to the circumstances (day, night, radar) of the actual sighting. Vallee's final category is also the CE, or Close Encounter.

Each of these basic categories has five "degrees" of horizontal complication, as reflected in the chart and roughly equivalent to the distance of the observer from the phenomenon. These horizontal elements include: (1) Sighting, (2) Physical Effects, (3) Living Entities, (4) Reality Transformation, and (5) Lasting Injury. Each category is represented by a telling icon.

Thus, for those tapping into Vallee's system, AN1 would represent anomalous events such as amorphous lights or sounds with no obvious source and no lasting physical effects.

AN2 are anomalies that display lasting physical effects—for instance, objects that appear out of nowhere or fields with mysterious, flattened swirls of grass.

AN3 would involve any report of an entity, be it an alien, an elf, or a ghost.

AN4 would be those anomalous experiences in

IN HIGH-STRANGENESS CASES, UEOS ARE ALLEGED TO HAVE "MORPHED" OR CHANGED SHAPE, DIVIDED INTO TWO OR THREE, DISAPPEARED FROM VIEW, OR OTHERWISE VIOLATED THE KNOWN NORM OF PHYSICS. SOMETIMES A UFO SEEMED TO BURN, SCAR, OR OTHERWISE HARM ITS NEARBY PERCIPIENTS—AND ON RARE, UNCONFIRMED OCCASIONS, WITH FATAL RESULTS.

which the percipient reports interacting with the entity, here Vallee includes religious visions and miracles, near-death experiences, and some out-of-body experiences.

AN5 represents anomalous healing, injury, or death—associated phenomena include spontaneous combustion, miraculous healing, and even some instances of spontaneous remission.

FB1 would be a simple sighting of a UFO flying in the sky, the most common of all UFO reports.

FB2 is a fly-by with associated physical effects, such as a fall of alleged "angel hair."

FB3 is a fly-by in which living entities are seen on board the UFO, usually inside a clear dome or through windows or portholes.

FB4 represents a fly-by in which the witness's sense or experience of reality is affected at a distance. This might involve a loss of memory or a momentary feeling of paralysis.

FB5 would represent lasting injuries as a result of a fly-by. This could range from the "sunburn" experienced by Richard Dreyfuss's character in *Close Encounters of the Third Kind* to more serious radiationlike burns reported by other UFO witnesses.

Vallee's Maneuver (MA) category describes distant UFOs. Unlike their Fly-By counterparts, objects in MA sightings are said to execute abrupt changes in trajectory—a right-angle turn, for instance, or a rapid approach.

Vallee's final category is the Close Encounter (CE) and its now self-explanatory permutations, ranging in complexity, as with Maneuvers, from Sighting to Lasting Injury.

Vallee also applies what he calls the "SVP credibility rating" to individual UFO incidents, in which the initials stand for Source reliability (credibility of witnesses), site Visit (credibility and efficacy of investigators), and Possible explanation. Each letter in order is assigned a digit from 0 to 4 as follows. S, Source reliability: (0) unknown or unreliable, (1) known source of uncalibrated reliability, (2) secondhand reliable source, (3) firsthand reliable source, (4) firsthand personal interview by reliable investigator; V, on-site Visit: (0) none or unknown, (1) casual visit by individual not familiar with phenomenon, (2) visit by person or persons familiar with phenomenon, (3) reliable investigator with some past experience, (4) one or more visits to site by skilled analyst(s); P, Possible explanation: (0) if data is consistent with natural causes, (1) data indicates only a slight deviation from possible natural cause, (2) data suggests a gross deviation of at least one natural parameter, (3) data indicative of gross alterations of several parameters, (4) best available evidence indicates no natural explanation.

NOT ALL DAYLIGHT UFOS ARE DESCRIBED AS DISC-SHAPED. UFOS IN THE SHAPE OF TRIANGLES, BOOMERANGS, BOXES, CUBES, CIGARS, GLOBES, AND EVEN TEAPOTS HAVE BEEN REPORTED ON NUMEROUS OCCASIONS AS WELL.

Under Vallee's SVP Credibility Rating system, then, an average "good" UFO report might be rated 222 in terms of overall "weight" or reliability. This would mean that the report, although secondhand, was from a reliable source (S2), that the actual sighting site had been visited and investigated by persons familiar with the UFO phenomenon (V2), and that at least one accepted law of nature would have to be grossly distorted to assign the sighting a natural explanation (P2).

If the Vallee classification system seems too confusing or complex or too far out at first glance, then you might want to stick with Hynek's for the time being, at least until you gain more on-the-job experience. The important thing is to keep a detailed record of your investigation, that way other investigators will be able to assign credibility ratings of their own.

Now that you know how to classify UFO reports, you're ready to venture out in the field on your own. Next month, we'll describe the tools of the UFO hunter's trade. After you outfit yourself lock, stock, and barrel, you'll be able to start your investigation of the best UFOs.

Close Encounters of the Orange Kind

For quite a few years my family has been aware that something strange has been happening to us. The innocence and insight of my two young children finally defined what these strange events were: abductions.

I eventually sought the help of Dr. David Jacobs of Temple University. I did this in an attempt to deal with and understand this phenomenon that so plagues my family.

Because so little documentation can be found on this subject, I set out on an investigative course of my own. I have kept detailed notes and charts. I have countless photos of physical "aftermaths" of abductions found on our bodies. I have also opened up our experiences to scientific investigation and willingly played "guinea pig" to various types of equipment set up in our home.

Through the above-mentioned course of action and my strong-willed desire to stop these intrusions, I have become more aware of the signs and symptoms of abduction events. On the morning of December 22, 1993, various signs and symptoms of an abduction were found on my seven-year-old son. When I woke up my son for school, I noticed some dried blood on his nose. Further investigation of his bedclothes revealed a substantial amount of dried blood on his pillow, indicative of a nocturnal nosebleed. This is quite common among abductees.

The child also had three large bruises on his left lower stomach area which had not been present the evening before. The third and most unusual of the signs found on the child is what prompts me to write this letter. On his right lower stomach area was a blotch of brownish/orange residue that, like the bruises, was not evident the night before.

My husband and I had seen a substance similar to this only one other time. Some months before, my four-year-old daughter, who also recalls detailed accounts of abductions, woke one morning with this orange substance splattered all over her face. We questioned the child and investigated the room for the possible origin of this substance (for example, food, toys, play makeup, and so on). We came up with nothing. I took a few photos of my daughter's face and then, having no other course of action, proceeded to wipe the substance off.

Two weeks following the incident with my daughter, I investigated this event through discussion and hypnosis. We found that this substance was indeed applied during an abduction event and it served a distinct purpose. My husband and I were devastated at the notion of having found material used in "outer space" and of not having the foresight to obtain samples before wiping it off. When we saw the same residue on our son we made sure we took samples.

I took photographs of the orange material on my son's stomach and photos of his bruises as well. I photographed his face where the dried blood was around his nose and, to this day, still have the blood-stained pillow put away for whatever. I then immediately called an abduction researcher. I explained to him what we found on my son and sought his guidance. It was my understanding that many attempts by other abductees to retain samples of this substance had failed because the residue has a tendency to fade/evaporate/disappear. I did not want this to happen to us.

My husband and I soaked a few cotton swabs with rubbing alcohol and proceeded to wipe the substance from my child's stomach. The cotton swabs containing the residue were then wrapped in plastic, set in an airtight container, and placed in a dark cupboard. One set of swabs was sent to the abduction researcher, another set given to Dave Jacobs, and I kept the two remaining samples. Two major universities and one independent laboratory have run tests attempting to determine the makeup of this unusual compound. Though the exact nature of the compound hasn't been defined, it is certain that the combination of elements contained therein resembles nothing known to be found in a normal household environment. All test results exhibit a high sulfuric content as well as other common elements. The EDS scan shows a significant spike labeled to be Rubidium, which has an atomic number of 37 and has radioactive properties. More sophisticated spectroscopic analysis would prove to be of great value in determining the contents of this compound.

Apart from what has already been submitted, I just received word from one of the universities that further testing has been completed on this orange material. It is my understanding that no organic components were identified.

I understand that whatever this substance is finally determined to be—no matter how extraordinary—that it in and of itself does not prove the existence of UFOs nor will it validate in a skeptic's mind the reality of the abduction phenomenon. What I do hope is that this may help provide, at best, another tangible "clue"—verifiable

by the scientific community—toward the ultimate search for answers.

I am not a UFO fanatic. I am, however, an unwilling participant caught in the web of the abduction experience. I am willing to work with any reputable persons in an attempt to gain knowledge in this area. I am willing to openly tell my family's story if sharing our experiences will help to educate others. I want this intrusion to stop!

I appreciate the long-awaited serious approach that *Omni* is taking in addressing this issue.

Name withheld
by request

Editor's Note
Omni's Project Open Book is currently investigating the information this reader submitted. Results from the investigation will be published in a future issue.

Alien Crop Sculptures

I have seen a lot of television programs about crop formations and small metallic balls that supposedly create these awesome crop sculptures. What the hell is going on out there? Europe is being invaded by extraterrestrial artists and I feel like no one cares except for a few UFOlogists and locals. These crop sculptures are too perfect to have been created by humans with tools and they are too perfect to have been created by natural weather occurrences.

In order to create these you would need a bird's-eye view and very large tools or electromagnetism. Someone is leaving messages in fields and I want to know why and what they mean. Most that I've seen appear to be symbols of unknown meaning, yet they are familiar in some subliminal way. Could aliens be easing their way into our lives and minds via crop sculptures?

I'm assuming that aliens communicate using symbols and these sculptures are more than just unique designs with no significance. They are doing this for a reason and we should take it seriously. We finally have physical proof that aliens exist and it is time to investigate the evidence. Crop sculpture may be one step closer to a formal relationship with aliens.

J. Case
Scottsdale, AZ

A Tale of Two Sightings

I had an incredible sighting in September 1989. My girlfriend and I had just spent the whole day at the Grand Canyon in Arizona. It was evening, we were on the highway heading to Flagstaff—approximately ten miles south of the Grand Canyon—and I noticed what appeared to be satellites in the sky—first a few, then many. They had the appearance of fireflies in the night sky. The individual lights began to "jockey for position" moving up and down at 90 degree angles. They suddenly became huge and formed a great stacked formation in the sky—then slowly moved across the sky keeping their formation.

I AM NOT A UFO FANATIC. I AM, HOWEVER, AN UNWILLING PARTICIPANT CAUGHT IN THE WEB OF THE ABDUCTION EXPERIENCE. I AM WILLING TO WORK WITH ANY REPUTABLE PERSONS IN AN ATTEMPT TO GAIN KNOWLEDGE IN THIS AREA. I AM WILLING TO OPENLY TELL MY FAMILY'S STORY.

My girlfriend and I were both watching this incredible event and both agreed that "these were definitely UFOs." Unfortunately the highway was empty at the time, it was approximately 9:00 p.m. I intuitively felt a connection with the event and feel that a letter *M* was being created, which is my first initial.

About three months after the event I was walking down Fifth Avenue and 23rd Street, intensely remembering the experience. For some reason I looked up, there were two objects hovering far above the Empire State Building. They hovered there for about 45 minutes.

During both events I was stone cold sober and I am absolutely not prone to hallucinations. The first event was witnessed by two totally awake, sober, intelligent, college educated individuals. I have been left with a deep feeling of anger for any skepticism concerning UFOs, but understand that unless someone actually sees them, they will probably be skeptical.

Marshall Jacobowitz
New York, NY

UFO CRIME LAB

ARTICLE BY
PATRICK HUYGHE

If UFO abductions are real, there should be real evidence for them. That simple premise has led Victoria Alexander, a writer and UFO researcher in Santa Fe, to advocate the use of crime-scene investigative techniques to obtain evidence in UFO abduction cases. "After all," she says, "crimes are supposedly being committed. The aliens are accused of unlawful entries, kidnappings, assaults, and rapes. So I think it's time we start looking at the typical bedroom abduction as a police crime-scene unit would."

Alexander's interest in a forensic approach grew out of her frustration over the lack of physical evidence in abduction cases, the helplessness of the victims, and the apparent willingness of many UFO researchers to simply accept such stories as true. Though the crime lab approach has never been proposed—let alone attempt-

ed—in two decades of UFO abduction investigations, Alexander felt it was the next logical step.

"Since the vast majority of abductees claim the aliens are humanoid, not robots," she argues, "there should be biological and chemical traces of their presence. If these are real events, if the aliens are real, if contact is taking place, there has to be real evidence for it—latent fingerprints, fungi, particles, whatever. It's a basic tenet of criminalistics that when any two items come in contact there will be an exchange of microscopic particles."

But the only way to gather such evidence, Alexander realizes, is to recruit the cooperation of "conscious repeaters," those people who claim to be abducted over and over again and remember it the next morning. The first thing they should do is take a urine sample, she says. "Lab tests of urine should show if the body has undergone any stress. And if the abductee wakes up with a bloody nose, they should keep a sample of that, too, for later analysis."

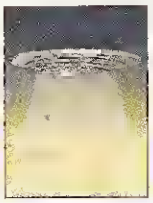
Otherwise, anything the aliens have come in contact with—any part of the abductee's clothes they may have touched, any portion of bedroom floor or carpet they may have walked over—might yield tangible evidence: hair, secretions, prints, or particles from their skin, clothes, or craft.

Alexander is calling on abductees to collect this evidence themselves. "There is not an emergency room in the country that is going to say 'Oh, you've been raped by aliens? Let's run some tests,'" she notes. "No police department is going to believe such a story and go through your place with a fine-toothed comb. Abductees have to do it themselves. And UFO investigators can help. It has to start this way. Then, later, maybe we can attract the help of professionals."

Thomas Van Valkenburgh, bureau chief of the Department of Public Safety's crime lab at the New Mexico State Police headquarters in Santa Fe, finds Alexander's suggestion feasible. "We should be able to use forensic techniques in this situation," he says, "though I have a problem with people doing their own crime scene because they are not trained." He admits, however, that since some police bureaus may turn down requests, people "are probably going to have to do it themselves, at least at first."

The reaction to Alexander's proposal in the UFO community has been generally positive. "I think it's great," says John Carpenter, director of abduction research for the Mutual UFO Network, "if it's done properly. My main concern is who is doing it and how well it's done. Having the abductees do it themselves might stir up new claims of hoaxing and improper procedure. Ideally, it should be done by an outsider."

ANYTHING ALIENS HAVE COME IN CONTACT WITH MIGHT YIELD FORENSIC EVIDENCE—HAIR, SECRETIONS, PRINTS, OR EVEN PARTICLES FROM THEIR SKIN, CLOTHING, OR SPACECRAFT.



Temple University historian David Jacobs, author of *Secret Life: Firsthand Accounts of UFO Abductions*, also gives the proposal a thumbs-up. "Any effort to gather evidence is worth doing," he says, though he doubts the aliens have fingerprints, based on the reports he has from abductees who have seen their captors' fingers close-up.

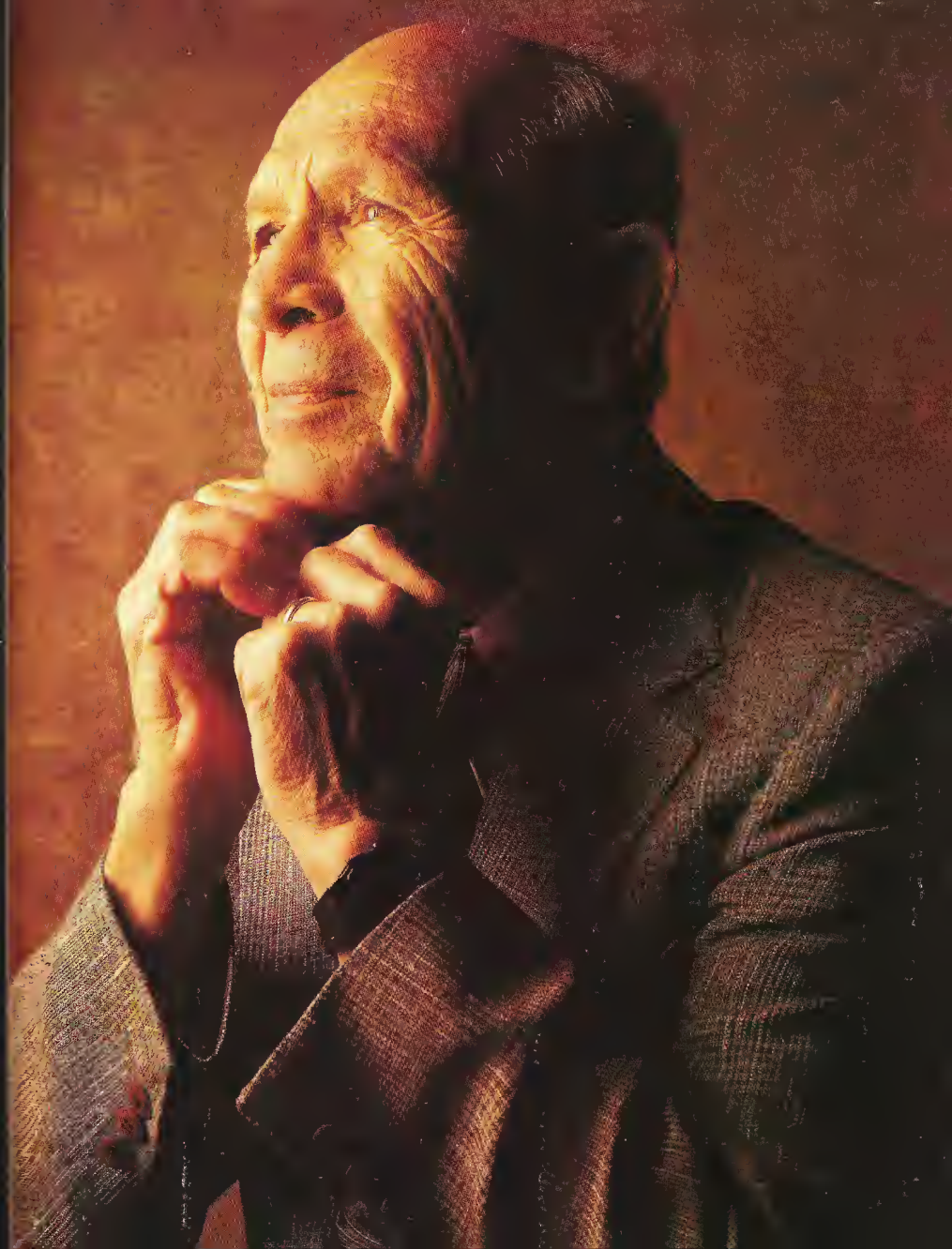
Victoria Alexander is now working on a manual describing collection protocols, and she's designing a kit to be used by abductees and investigators. "We have to at least make the attempt," she continues. "Even if it all fails, if the prints are sloppy or don't come out. At least we will be changing the abductees' mind-set about the experience. I want them to stop thinking of themselves as victims and start thinking about trying to find an answer. Doing this has to change their whole experience. This sort of participation should empower them."

Skeptics, not surprisingly, tend to regard such proposals as futile. "In my opinion," says Philip J. Klass, "if abductions were fact and not fantasy, we would have had impressive evidence a long, long time ago."

MAX FAGET: MASTER BUILDER

Article by James Oberg • He halds patents an the Mercury spacecraft, the space shuttle, an ingeniaus racket escape system, and ather natable pieces af space hardware. He supervised develapment of the Apalla

spoce vehicles and *Skylab*. Far 20 years he was director af engineering at NASA's Johnsan Space Center in Haustan. Sa why have you never heard of Max Faget? • Phatagraphs by William Caupan



One day last November in Houston, three men met for lunch. Two of them—Russian cosmonauts in training for an upcoming joint U.S.-Russian space mission—had never met the third, a slightly built American gentleman in his seventies. But 12 years ago, he had saved the Russians' lives.

Vladimir Titov and Gennadiy Strekalov were strapped into a capsule one night in 1983, waiting for the giant booster rocket beneath them to ignite and send them into orbit. Instead, a fire broke out on the launch pad. The cosmonauts would have perished in the blaze if their capsule had not been hurled clear by an ingenious escape system designed by a NASA engineer named Max Faget. Knowing a good thing when they saw one, the Soviets had copied the system, installed on all manned NASA spacecraft from Mercury on, for their own.

"No one has ever come and thanked me," Faget told *Omni* with a chuckle. "Whatever they give, the Red Star or whatever, they've never given it to me."

On that November afternoon, Titov and Strekalov were only too happy to bestow informally upon Faget the honor he had wistfully mused about for years. With ceremonial flourishes and genuine respect, they pinned to his lapel a Soviet space medal donated by a collector.

Before the meeting, Titov and Strekalov were told only that the "American Korolyov" wanted to meet with them, and to them that was reason enough to agree. Sergey Korolyov was the engineer whose genius created the Soviet triumphs of the early "space race," including the *Vostok*, *Lunik*, and *Voskhod* space vehicles. For years the Soviet government identified him only as the "chief designer," keeping his name secret until his death in 1966.

Faget, 15 years Korolyov's junior and still active to this day, is indeed the nearest American equivalent to Korolyov. His name appears on the official U.S. Patent Office documents registering the invention of the Mercury spacecraft, the space shuttle system, and a host of other crucial pieces of space hardware—including the escape system to which Titov and Strekalov owe their lives. As director of engineering and development at the Johnson Space Center in Houston, he oversaw the development of the Apollo, Mercury, and Gemini space vehicles and the space shuttle. His complete list of professional awards extends to two single-spaced pages in his official biography.

Faget's name was never kept a state secret, but nonetheless, it remains so unfamiliar to the U.S. public that it might as well have been. Considering his accomplishments, why haven't his name and face been burned into the American consciousness like those of the Mercury 7, John F. Kennedy, and others connected with the U.S. race to the moon? Unfortunately, Faget is not the stuff that media dreams are made of. Shy and diminutive, he's possessed of whimsical intonation, an uninspiring appearance, and a predilection for bow ties. So like Korolyov, Faget remained in the background all those years, invisible to the public but indispensable to NASA, while others appeared on magazine covers and TV broadcasts.

Faget himself scoffs at the notion of being the "chief designer of American spaceships." "This is not that kind of country," he says. "Nobody is appointed by the king to be the royal spaceship designer."

HIS NAME APPEARS ON THE OFFICIAL U.S. PATENT OFFICE DOCUMENTS REGISTERING THE INVENTION OF THE MERCURY SPACECRAFT, THE SPACE SHUTTLE SYSTEM, AND A HOST OF OTHER CRUCIAL PIECES OF SPACE HARDWARE.

Max Faget was born in British Honduras (now Belize) to American parents a few years after World War I. His physician father was working in Central America as an employee of the British government after all British physicians had been sent to the trenches in France. Dr. Guy Faget, a noted specialist in tropical diseases, is credited with finding the first practical treatment for leprosy.

As a child, Max Faget remembers building lots of airplane models, reading *Astounding Science Fiction*, and wanting to become an engineer. He attended Louisiana State University and graduated at the height of World War II. Faget, the future spaceship builder, initially wound up under water, a junior officer on a combat submarine in the Pacific.

With the war behind him and his engineering diploma still fresh, Faget set out for the government's flight research center in Langley, Virginia, to look for a job. He got one, just as the challenge of supersonic flight appeared. With no access to good wind tunnels and only rudimentary computational and analytic tools, Faget and his fellow engineers were faced with the task of investigating the problems associated with breaking the sound barrier. They soon decided to take the practical approach—flight-testing small models. Faget's model-building skills, honed in childhood, blossomed along with his aerodynamic intuition.

Faget's flight research work quickly boosted him up the ladder of responsibility. At times, he led small, ad hoc teams on specific projects, becoming the head of the performance aerodynamics branch of the Pilotless Aircraft Research Division. Shortly after the Space Age truly began, he was appointed to the position of chief of the Flight Systems Division. When President Kennedy called for a manned lunar landing three years later, Faget was the logical choice to be named director of engineering at the new space center in Houston, a post he held for the next 20 years. He turned out to be the right choice as well, intuitively knowing how hardware interacted in flight on a complex vehicle and the best ways to prove the safety of a design. His engineering judgment supplied what answers his intuition didn't.

Faget's first major task as director of engineering was developing the design of the Mercury capsule, a spacecraft upon which he unmistakably left his mark. "I will maintain to this day that it would be very difficult to design a more efficient spacecraft to do the job that the Mercury had to do other than the final design we came up with," he states. Remarkably, during the same period of intense creative work, he also conceived the *Scout* and *Little Joe* solid fueled research rockets and designed the initial warhead shape for the submarine-based *Polaris* missiles.

A detractor once sniffed that "Faget only really had one good idea, and he stole that," referring to the blunt shape of the Mercury capsule, which Faget based on the aerodynamic principles first established by engineer Harvey Allen in the mid 1950s. But Faget's talent has always rested on his wide-ranging knowledge of alternative designs and his instinctive choice of the best one available, often with some subtle but highly original twist. The Mercury capsule's escape tower—the device that saved Titov and Strekalov—provides a classic example of his engineering ingenuity.

CONTINUED ON PAGE 82

Resolve and Resistance

The beggar was in the ruins of London, leaning against the stump of a tree in the blighted field which had once been Hyde Park, watching the foreign conquerors parade arm in arm with trollops, and with girls who would not have been trollops had their fathers and sweethearts not perished in house-to-house fighting. And perhaps some of the girls were not trollops. The invasion was a year past, and the young have short memories.

Fiction by S. N. Dyer ✣ Illustration by Gregory Manchess

The beggar shifted slightly, suppressing a moan. His absent arm and his blind eye had long since ceased to ache, but the loss of his leg was still fresh. Perhaps because he had lost it in defeat, it continued to trouble him. It was if the foot were present, each missing toe throbbing continually in phantom agony. ✣ Sensing him move, the ginger tomcat on his shoulder began to purr, and his parrot looked over from its perch on his empty cap. "Do your duty, do your duty," it said.

He saw some officers approaching in their savage finery, led by a servile Englishman. Soon he could hear the man's voice, and recognized the broad nasal accents of his own native Norfolk. The beggar ducked his head and tried to appear asleep, leaning his face so that the cat obscured it.

"You there. Do your pets do tricks?"

He sighed. Norfolk was a large county; he could only hope that the man would not recognize him. He preferred to think that none who had ever known him could become collaborators.

"Aye, me lords," he said. "Now Nappy, where's Farmer George?" He shrugged so that the cat jumped down.

The parrot began to strut, shouting "Hooray for Boneyparte! Hooray for Boneyparte!" Then it leapt upon the cat's back and rode about contentedly.

The French officers laughed happily, and each tossed a coin into the cap. The Norfolkman bent down. "I knew a bird like that once—smaller, it was, belonged to a boatswain's mate when I was a lad."

The collaborator stared at the beggar, his gaze dissecting away the tangled shock of white hair, the disgusting beard, the missing teeth, and focusing instead upon the long thin nose, the huge black eyes. He drew in a quick breath, his own eyes widening.

"I'm done for," thought the beggar. The thought was nowhere near so unpleasant as he had expected. After losing the last battle and his leg, his hope had been of vengeance and salvation. But this year of wandering had buried any hope, even that of escape.

The Norfolkman said, "No, the parrot I knew had some yellow to him," and whispered before he drew away, "Darcy. Pemberly."

That night some roughs came and took his coins, dealt him a few blows for no good reason, and tossed his crutch away for the sheer pleasure of watching him crawl after it. Nappy and Farmer George had taken refuge together in one of the few standing trees, and watched their master's new humiliation with impassive eyes.

The beggar did not care. He raised himself upon his crutch and hobbled back, whistling for his pets. He had a destination now, though he had no idea where Pemberly might be, or what manner of man Darcy. But for the first time in a year he had more to his life than pain and the shadow of inchoate yearnings.

And so, smiling, a green Indies parrot upon his left shoulder, a flearidden orange cat curled in his lap, Horatio Lord Nelson, Viscount Bronte, Knight of the Bath, Commander in Chief of the Channel Fleet, fell asleep and dreamed of battles that would never be and of others that would never end.

Two months later he arrived at Pemberly. The nights had turned cold, and he knew that if he did not find refuge here, he would not survive the winter.

The village was surprisingly prosperous, as if bypassed by the war and the blockade. He saw French soldiers laughing outside a pub, ruffling the hair of a child, and he felt unreasoning hatred for these simple country folk. In Norfolk, in Yorkshire, even in Scotland and Wales, those wild lands with the least claim of loyalty to their Hanoverian king—there guerrillas fought a war that was vicious and unrelenting. In the ports and harbours of England, old men and boys halfheartedly rebuilt burned out shipyards and raised scuttled vessels, all that had been left by the Navy and merchant ships which even now set forth from colonial ports under the guidance of the exiled Prince of Wales. England still ruled the waves, she just did not rule herself. But here, now, it was if the war had never occurred, and the Frenchmen were the invited guests of Mad George.

He stopped by the pump, drank his fill, then cupped his hands for his comrades. The parrot stood upon the cat's back to drink, and they soon had a small audience for their small performance.

A pair of French officers emerged from a shop and watched Nelson.

"*Tres amusant*," said one.

"He must come with us," said the other. "The fair Elisabeth appreciates oddities."

They mounted their horses, nervous Thoroughbreds who were obvious booty from the stables of some Englishman of taste. "You there," an officer called.

Nelson looked blank until the fellow spoke to him again in English. "You there, beggar, come with us. Madame will give you dinner and a place to sleep."

Nelson nodded and tugged on his hat in a crippled imitation of servility. He whistled. Farmer George's sole trick was to leap up to his shoulder. As ever the cat managed to make it seem he had done it of his own accord as well as a great favor to his master.

The Frenchmen rode slowly, admiring the fine hedgerows and fertile fields

where they soon intended to hunt, while Nelson stumped along behind. They were entirely unaware that he understood them, and probably would not have cared had they known.

"You will like Elisabeth, Jean-Paul, but remember—she will not award you her favors. I believe she is holding out for the emperor himself."

"Perhaps he'll let me search her."

Nelson gritted his teeth and gripped his crutch more firmly, longing to dash out the man's brain. The casual joke encompassed a tragedy which had struck him as severely as the fall of his country, and even now made his one good eye see through a crimson fog. Emma. His beautiful Emma. She had gone to Bonaparte in the guise of a lover and the role of an assassin, and had met her fate at the guillotine which had replaced the gallows at Tyburn field. While she died in futile bravery, he skulked anonymously about the country, senselessly preserving his life. Emma had died in a vain glorious gesture for her country—and now she was reduced to a sniggering policy of caution.

"Elisabeth may set her sights high," the Frenchman continued. "She is quite the original. Your average Englishwoman, of course, will sleep with anyone for a dram of gin, and not be worth the price."

Once more, Nelson's fingers tightened about his crutch. What beneficent God would reduce him so, and now force him to smile as the women of his country were denigrated? Nappy chanted again, "Do your duty, do your duty."

"The sisters, tell me again of the sisters."

"Ah. *Les belles filles Bennetts*. Jane is the most beautiful, but she is faithful to her boring husband Bingley. Mary is a bluestocking, any man who tries to seduce her will die of boredom. Lydia, though—ah Lydia." It was clear from his lascivious tones exactly how friendly Lydia might be.

"She is a widow, and you know how they are. Kitty, now, she is malleable and will do what she sees others are doing."

"I see," said Jean-Paul. "But in this fine household of Madame Darcy, I have one question . . ."

At the name Darcy, Nelson's heart began to beat faster, and not merely from the exertion.

"Where might be Monsieur Darcy?"

"You must ask Elisabeth, she says it so amusingly. How foolish he acted, she will say. Did he not know how interesting and entertaining we soldiers of the Empire would be? It certainly served her husband right, to refuse us hospitality and to be shot instantly dead."

One may toss a bucket overboard, a bucket of slop, of blood, of fine wine. It does not matter. It will strike the water, spread forth and in seconds dissolve entirely, no trace of it remaining in the grand, cruel ocean. So it was, then, with Nelson's last hope.

Sometimes, in the grip of extreme hunger or fatigue, he felt his mind slip into a delirium the equal of those which had tormented him during his various tropical fevers. Now, hurrying after the horsemen, he felt the waking dreams come upon him once more. He was in charge again of the fleet, but this time the invasion force did not slip past him in the fog, as had previous French fleets at Alexandria and Toulon. This time he did not sate his fury upon empty vessels, nor send Hardy and the ships to Brighton to rescue whom they might while he and his marines hopelessly pursued the vast army on land . . .

This time he came instead upon the fleet a mile off Portsmouth, and set his own ships amongst it, pell mell, without regard to the line. Cannons exploded, ships burned and he gave no quarter, listening to the screams of drowning men and horses, while in reality he walked a sunlit path, smelling late autumn roses and hearing the song of the mockingbird.

In his mind he had fought not only this battle but others, his tactical sense and his rage so heightened that, did he only think he might go to some harbor without being recognized and captured, might find some vessel to smuggle him away to the colonies, might meet up with his men again and command a fleet—then he should be the invincible arm of terror and destruction. Then no Continental ship should ever leave its port, no ship at all touch shore upon his besieged island home . . .

And to what avail, even in his dreams? He who was thought dead and was as good as such, no hero in hiding, to save his nation. Only a crippled and sun-touched old sailor, masquerading as a buffoon for so long that it no longer seemed a masque.

His reverie ended at the finely wrought gates of Pemberly. The great home, like its village, seemed untouched by conflict. Perhaps more horses had once graced its stables, perhaps famous pictures and crystal chandeliers no longer decorated its halls. No matter, it seemed whole and inviolate.

The only curiosity was a building beside the stable, its equal in size but with walls of canvas. Odd sounds emanated from the massive shed.

"Phillippe, what is that?" asked the younger officer, echoing Nelson's silent question.

"Did I not tell you that Elisabeth loves oddities? She has given refuge to a genuine ancient eccentric, who is building . . ." Here he paused to laugh, and could barely continue, " building a balloon that will travel to the moon."

"But that is absurd. It could not fly high enough . . ."

"Ah yes, but he uses chemicals rather than hot air, and . . ." Again he interrupted himself, this time with a fit of ungentlemanly giggling "and he will harness birds to it, and they will pull it to the moon!"

"Oh dear," said Jean Paul. "And so if the lovely ladies take us hunting, as you said they would, then we will be slaying the steeds of this noble effort!" He, too, succumbed to merriment.

And so, reflected Nelson, I seek refuge with a woman whose sense of cruelty delights in allowing madmen to make fools of themselves. I should be most welcome.

Farmer George and Nappy performed their act at the doorstep for Madame Darcy and her sisters. The women were indeed beauty incarnate, wearing fashionable gowns of simple, sheer silk that were testimony to their collusion with the enemy. They watched with vague ennui, never gracing Nelson with more than the briefest of superior glances.

The lady of the house then ordered her butler to take the beggar below and bathe him—"Twice," she added imperiously—and bring him to dinner. He protested, but her odd whims seemed to be law.

This, Nelson reflected, might be a danger equal to any he had faced since being wounded and finding refuge in the hidden cellar of a smuggler—a man who had made his living circumventing the law and profiting from the enemy, but who in the throes of invasion proved himself a better friend to his country than so many who had adhered to the conventional path, and ultimately dying a more virtuous death than many.

Nelson submitted to the bath and allowed himself to be dressed in coat and breeches which must have belonged to the late and apparently unlamented Mr. Darcy, but he refused to be shaved. Examining his now trimmed coif and beard in a small mirror, even he could barely recognize his famous features, sunburned and lined with illness and fatigue. Still he took pains to rearrange his hair so that it stood at odd angles and to put the neckerchief in disarray.

Dinner was a bizarre yet festive occasion, so great a feast that one would not suspect the nation to be under the

yoke of a dictator, the people starving from the thievery of the conquerors and from the half-successful blockade of the remnants of their own Navy.

Madame Darcy had placed the French colonel at the head of the table and flirted with him shamelessly and relentlessly, though with an undercurrent of coldness that signified a resolution to maintain her virtue. Her sister Jane and husband Bingley were bluff English gentry, polite, hearty, and entirely ignorant of the fact that they were engaged in giving comfort to the enemy. Lydia Wickham, evidently the widow of an Army captain who had died in service, was even more the strumpet than the Frenchman had implied, and her sister, Kitty Bennett, seemed to possess that lack of discrimination which was common to the animal for which she had been named.

The final sister, Mary Bennett, was actually engaged in reading at table. Beside her sat an ancient wearing an ornate, outmoded long wig and a dressing gown, who babbled on to himself about something called chymical economy. Occasionally Mary would look up from her book and address a question to this Lord Henry, and then their conversation would become so abstruse as to seem to be conducted in a foreign tongue. Madame Darcy's father, Mr. Bennett, finished the party, an oblivious gentleman who did not seem perturbed by his daughters' scandalous behavior.

No one at this table of ignorance, licentiousness, and madness spoke a word to Nelson. He thought back to his meals with his sailors, and tried to behave in the uncouth nature of the untutored, eating with his fingers or a knife, downing his watered wine in a single gulp. And indeed, after a year of living upon the rude charity of the road, he did not have to entirely feign the manners of a starveling.

He ate in fear of committing some error which might call attention to the reality of himself. His identity itself must be safe, for he was presumed dead. His boatswain, after entrusting the care of his parrot to the wounded admiral—or perhaps it had been the opposite—had taken Nelson's blood-stained coat and attempted to sell its wealth of medals. Eager French officials had known it immediately to be a relic of the missing Nelson, the boatswain had then bragged of stripping the coat from a corpse hastily tossed into some mire, and held to this brave contention even to his death.

But while no one would suspect this pitiful beggar of being the late commander in chief, surely they could recognize him as a fugitive gentleman. Investigation would then identify him—and he would be disposed of swiftly by firing squad, or slowly and visibly with farcical trial. Or most likely, and most detestable, he would be pardoned in a humiliating show of magnanimity to the fallen nation, to be kept as a crippled caricature of his former dignity. Kept as a house pet, fed and groomed and brought out at state dinners to shout "Hooray for Boneyparte."

"Has your cat lost as many lives as you?"

Nelson started back to the moment. Miss Mary Bennett was speaking to him. "Whatever d'ye mean, milady?"

"It is said that a cat has nine lives. You have obviously had a number of misadventures, losing your leg and your arm. Your right eye would also seem to be weak . . ."

He cursed it silently. It did not appear scarred or shrunken as did so many sightless eyes, but the damned thing had lately taken to wandering.

". . . and that scar you attempt to hide with your hair is most impressive. In fact, the mere fact that your hair is entirely gray and your age not so very advanced—fifty, I should judge—bespeaks a life of action . . ."

"Sister," yawned Elisabeth Darcy, cutting short the disquisition. "You are wont to experiment thoroughly with boring subjects, and as such have quite lost the ability to be entertaining. Philippe here has been telling us that the emperor will soon come to residence in the city, and you would rather hear the sanguine life story of an accident-prone drunkard."

And so the table was instead regaled with news of the imminent resumption of the social scene. Madame Darcy ended dinner with the announcement that she would, indeed, winter in London, and enjoy the opportunities of which the metropolis provided. Next the gentlemen called for brandy and the women briefly retired, and Nelson was escorted to a windowless room with a cot, where his pets awaited. He was instructed to remain there, no matter what he might hear.

He woke after midnight to the sound of an opening door, and groped for the feeble defense of his crutch. Farmer George, foolish beast, began to purr as he always did upon half-wakening, and Nappy, now off his best behaviour, squawked, "Do your duty, men. Do your duty."

A figure stood in the doorway—Madame Darcy, with her hair down now, and clad in a simple muslin gown which gleamed ghastly in the light of a candle.

Marvels abound, thought Nelson. Did her interest in oddities thus include their amatory prowess? He had been celibate for a long time, at first with a sailor's tired stoicism. Then his mistress had been executed and his wife Fanny, determined not to be outshone even in death by her rival, had succumbed in some equally foolish show of resistance. In this act of sublime stupid bravery she had been joined by his stepson Josiah, who had saved his life at Tenerife . . . And with the deaths of those women he had loved had died also any carnal longings.

Nor did he think his ill and battered body, whose suffering was equal to that of his spirit, willing to acquiesce to any erotic adventure. But Madame Darcy was lovely and spirited, if devious and cruel. And if such a woman was of a mind to seduce this wretched bit of humanity, he doubted not that she would possess the means to bring him to the mark.

She slipped into the room, closing the door, and waved the candle at his eyes. "As I thought," she said. "The right does react less swiftly. You are blind in that eye, are you not?"

"Ey, mum, this ain't done now . . ." he whined.

"Enough." She spoke as one used to command. "I observed you at table. Your ill manners were most well done, but I sensed the inner battle against proper behaviour. You are a gentleman, are you not? And a man blind in his right eye, absent his right arm, with evidence of a serious head wound . . ."

He had an uncomfortable presentiment where this trail might end. "Missing me left peg, too, mum."

She waved dismissively. "One cannot expect things to remain static. Sir, I must know—are you Admiral Nelson?"

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> THAT NIGHT SOME ROUGHS CAME AND TOOK HIS COINS, DEALT HIM A FEW BLOWS FOR NO GOOD REASON, AND TOSSED HIS CRUTCH AWAY FOR THE SHEER PLEASURE OF WATCHING HIM CRAWL AFTER IT.

INTERVIEW

HAZEL O'LEARY

WHY THE U S. SECRETARY OF ENERGY TURNED ON THE LIGHTS AND TURNED UP THE HEAT AT THE DEPARTMENT OF ENERGY

Unlike other Clinton administration cabinet nominees, Hazel R. O'Leary's confirmation as Secretary of Energy was swift and relatively unremarked. She presented excellent credentials: years as an electric utility industry executive, extensive work with the Department of Energy, and experience as assistant attorney general for the state of New Jersey. Phi Beta Kappa graduate of Fisk University with a J.D. from Rutgers University School of Law, O'Leary is the first woman and the first African-American to serve as energy secretary.

During the first months of her tenure, O'Leary worked quietly to research and restructure the Department of Energy. She prepared a new budget and devised a comprehensive review policy for contractor-related activities. In and of themselves, none were surprising undertakings for a new cabinet member in a new administration. Then, in late November 1993, an aide informed O'Leary of the imminent publication of an article concerning plutonium experiments on uninformed human subjects. Spurred by the certain publication, O'Leary went public with her own effort, begun in May 1993, in response to a presidential directive, to declassify millions of documents in the cold-war archives of the Department of Energy (DOE) and its predecessor, the Atomic Energy Commission. Suddenly she was catapulted into a position of national prominence.

Her immediate forthrightness—so rare in today's cautious and surly political climate—stunned official Washington, the press, the scientific community, and the public. In contrast to O'Leary's predecessors' piecemeal efforts to open the DOE's past activities to public scrutiny—efforts that led largely to internal standoffs within the department's own vast bureaucracy—

O'LEARY'S SHEER GUTS, CANDID DISCLOSURES, PROMISE OF MORE SWEEPING DISCLOSURES, AND HER CONCERN FOR THE VICTIMS OF GOVERNMENTALLY SANCTIONED MEDICAL EXPERIMENTATION, STRUCK A RESPONSIVE CHORD. TO MANY, HER MESSAGE WAS TRANSFORMING: THE AMERICAN EQUIVALENT, PERHAPS, TO THE DESTRUCTION OF THE BERLIN WALL, A

tangible sign that the shadow government of security secrets could finally be dismantled. Cold War secrecy, she implied, had its time and place, but also has hidden a part of our history that we need to recover in order to solve important problems.

Since then, O'Leary's initiatives have gained national media attention that she's effectively used to enliven public dialogue about the development of a national energy policy and problems of nuclear waste cleanup. Cleanup cannot take place covertly under a shroud of public fear. Believing that only through public debate and education is change possible, she has sought forums in which business, government, public policy groups, scientists, and environmentalists can hammer out a National Energy Policy Plan. "The standard government stiffs sit and read their scripts," she complains. "The talkers talk and the listeners listen. Can we shake this dialogue up?"

O'Leary has used her leadership abilities to build consensus to shape difficult policy decisions. Recently, she announced conversion of the Lawrence Livermore Lab to a laser fusion research facility, a first step in what she hopes will be a broad redirection of the national labs away from military preoccupations toward basic science and partnership with an American business community increasingly strapped for research and development funds. In her view, these labs contain the very genius required to tackle the technology problems of the twenty-first century and the facilities—like the superconductor facility in Virginia—which the business community no longer can afford to provide. But she worries that Congress and the public will no longer bankroll the national labs. "How is it," she asks, "that we have failed to generate public support for our big science projects? I grapple with this—how to drive the message to the public."

JOB DEFINITION:
The Secretary of Energy diddly-bops around, dealing with the scientific community, national security people, Defense Department, and the universe of people interested in the energy policy. By the way we shape the mission of the DOE all that is fundamentally interconnected.

GOAL AS ENERGY SECRETARY:
A better and cleaner environment with an energy policy built on principles of sustainable development

ONE PROBLEM:
We've gotten very confused about science. If you ask Americans how we will solve the problems of the next century, they answer science and technology. If you ask, 'How do you feel about science and technology?" "Great!" they say, "I want my kids to be scientists!" Well, who's going to pay? The public wants the government to do everything, but nobody wants to pay. We want a Cadillac on a VW budget.

Hazel O'Leary is a strikingly pretty woman, whose fluid elegance conveys strength and resilience. There is compassion in her expression, and a touch of mischief. Known for her use of the well-placed cuss word, she delights in outdated slang. "It'll be groovy!" she interjects into an articulate response to a complex question, or, "No. Not on your bippy." Her voice has the genteel resonance of an educated Virginian—relaxed yet precise.

"That color you're wearing is so becoming! I've been thinking of trying something in that shade," she says, leading me to the window of her office at the top of the James Forrestal Building in Washington, DC. "Have you seen this view of the Smithsonian Castle and the Mall? Now if this isn't informal enough, we can kick off our shoes!" She settles comfortably into conversation. "Now, tell me about yourself. The writer's life sounds like political life in Washington. So, which was more difficult, your divorce or your move to Baltimore?"

"So you're interviewing me!" I exclaim.

"Oh, I always do that," she smiles.

—Linda Turbyville

O'Leary: Let's roll! [noticing Turbyville's two tape recorders] You must have worked in power plants. You've got redundant systems!!

Omni: When I think of you I think of the person who said, "The emperor has no clothes." And suddenly everyone says, "Oh yes! That's right!" People have been struck by your personal courage and independence of action, and would probably like to learn something about your background.

O'Leary: Boo! Hiss!!!

Omni: Boo, hiss? Well, redirect as you please. You grew up in a segregated old community in Newport News?

O'Leary: In fact, it was a relatively new one called Aberdeen Gardens, built to house people coming into tidewater Virginia to work in the war effort. My father came because the community needed a physician. It was outside of Newport News and bisected by Aberdeen Road, a highway my sister and I were forbidden to cross. Behind the farm was a wonderful stream where we swung on vines from tall trees like Tarzan.

It was a great, almost enchanted growing-up time, though it was somewhat repressed because my parents were so, well, as I look back on it now, concerned about keeping us safe from the thing called "segregation." I just remember that as the daughter of the doctor I was very privileged and different, and had pretty much free run of the community. We were sent to New Jersey for high school because my parents wanted us to have an integrated educational experience. At that time schools were still segregated in the South. I remember the day when Brown vs. the Board of Education was announced by the Supreme Court. It was my birthday; I was a junior in high school.

We had a big family, and I had lots of role models who were accomplished either through education or through grit and hard work. My grandfather was a physician, and my grandmother had gone to Hampton Institute, an extraordinary accomplishment for those days—to have both parents

and grandparents with a college education. So there were strong expectations that I would be successful and well-educated. That my paternal grandmother fought in the town of Portsmouth to establish the first library for colored people, which is what we were called then, was important. My paternal grandfather's five brothers had been educated at Shaw, a black university. One was a doctor, one a dentist, one a lawyer, one a minister. The other owned businesses—but he, too, was educated. Every summer we had a huge family reunion in Dare County, North Carolina, where my grandfather's people came from.

Omni: Did you feel you were being prepared for a special life?

O'Leary: Oh yes. A sense of responsibility came with the sense of privilege, an expectation that we would be, you know, "perfect." That's a heavy burden. Much of it was unspoken, woven into the fabric of our traditional family life. But many of us grew up that way, and we finally learned to accept it.

One person who made a big difference in my life in college was Professor Collins—still at Fisk, though he's retired now—who taught the first course at Fisk in Negro literature. You see, in my family there was some denial about who we were. We didn't really celebrate our blackness. I remember that my sister and I read everything that was forbidden us. By flashlight, of course! Most of the books that I read by black authors we brought in secretly. And now, here at Fisk, was someone offering courses celebrating black writers and the black experience. And it was like, "Holy God! This is wonderful stuff!" At home the attitude had been more, "Well, you may be colored but you're not *that* colored." And all of a sudden I experienced this rush of, "Yes I am! And this is great stuff!"

Omni: Honesty is important to you. And it seems that you have much less cynicism about government than many people do. For example, many still believe there is little we can do to repair the damage of the Cold War. But you think it's possible?

O'Leary: Oh yes! But there is no experience in life that comes without pain. Individuals, we must recognize, are not perfect, and since institutions only reflect people, to pretend they can be perfect or that they do not require continuous maintenance and improvement is to live in a dream. But the initial acknowledgment of defects in government plays into the "Aha! I knew it!" syndrome. You know, folks who say, "I knew it was a damn dirty government all along!" We've learned that openness helps to bring a corrective to government, and quickly.

While the cloak of secrecy shrouded us during the Cold War, a real struggle actually took place between scientists and the military establishment over how open we could be about our defense work, including even the bomb design. Some scientists argued for more openness, at least in terms of peer review; the military saw a need for national security and secrecy ultimately reflected in the Atomic Energy Act. Now—and precisely because the shroud has been more or less totally removed—comes the awful part.

Actually, the shroud was removed in 1986 when the first full report on human experimental subjects with radioactive materials was released. But the report was given short shrift in major newspapers and went away. And the reason it went away is because responsible government officials said, "There's nothing there." The difference between 1986 and now boils down to different leadership. I was empowered to do what I did by the president. Now, if some think that I went further than my empowerment . . . well, we'll all have to decide that for ourselves.

The first time we in the administration met as a cabinet we talked about the need for openness. We joked about the classified material that comes to us straight from the CNN newsroom! One study showed the only group rated lower than the DOE in public confidence was Congress. I thought, "We're going to change that." The focus of all that we do at DOE is science and technology. So, if people can't get at the data, then how can we resolve issues regarding environmental clean-up, demilitarization, and dismantling of weapons? People must be certain we're doing it in a way that protects our workers and communities. None of this can happen unless we open our data to public scrutiny.

DISCLOSURES ARE NOT A DIVERSION. THE DOE NEEDS CREDIBILITY TO DO ITS WORK. THIS STUFF IS TOO EXPENSIVE, TOO CONTENTIOUS, TOO SCARY—WITHOUT THE CREDIBILITY NOTHING HAPPENS.

Omni: Some say the issue of disclosure is like shooting fish in a barrel. Problems of developing an energy policy and of nuclear waste clean-up are so pressing that the openness issue is no more than a historical footnote or a welcome distraction from the real problems that the DOE faces.

O'Leary: My view is because the problems are so expensive, so contentious, so scary, without credibility, nothing happens. For example, the waste issue. Since 1979 this nation has had no strategy for disposal of spent nuclear fuel. And what's more important, no strategy for the disposal of the military production of this material. I came to the job with a legal mandate to characterize the site at Nevada, to "find out whether Yucca Mountain will safely contain nuclear waste for ten thousand years." People have been pushing that wet spaghetti strand up the mountain now since 1982. And this work has been advancing very slowly because quite frankly, the citizens of Nevada haven't been absolutely cheered by their selection as the site.

Since I've been here we've worked harder and faster to finish blasting a hole in that mountain so we can answer the question, "Can nuclear waste keep going there?" Because if it can't, guess what? In another ten years sites in the United States are going to have spent nuclear fuel sitting around outside of reactors. And their state legislators won't think that's a good idea. They'll close down power plants that provide 20 percent of the power that's used in the United States.

Utility rate-payers have been paying money into a fund to have the Yucca Mountain blasted for the last 12 years. Well, guess what the fund is being used for? To balance the U.S. budget! We've not been able to touch it. This year we have a proposal before Congress to get at some of these funds to have us develop a new site. In 16 years, we will have 32 states involved, and some 59 nuclear power sites likely to close down. Frankly, we don't have the time and money as a nation to pay the power plants to replace this nuclear power. Like it or not, it's up and running, and it's relatively cheap. So we'd better find some way to get spent nuclear fuel stored.

When I came to the job, I knew we had already missed the target date for 1998 for a new deposit site. If we can finish the characterization, science,

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MAX FAGET

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When NASA began developing the one-man Mercury ship in 1958, even the most optimistic engineers held little hope for raising the booster reliability to much above 75 percent. When the booster failed, they knew that it would probably do so catastrophically. So the spacecraft and any astronauts inside had to have an instantaneous way of getting clear if either were to survive.

One proposed recovery system called for small booster engines—glorified versions of the JATO (Jet-Assisted Take Off) engines that had helped airplanes get airborne since World War II—mounted on the side of the capsule. Another option required the pilot to use an ejection seat with its own rocket pack. But making either these rockets or the JATO engines strong enough to get clear fast enough meant that they couldn't be steered accurately.

Faget recalled a simple device used in early flight tests of models, developed by Woody Blanchard, one of his engineers. The "tractor rocket" system consisted of a powerful solid-fuel rocket attached to the model by a long cable. Once the rocket fired, it was kept on course by the trailing model's air drag. In addition, the rocket usually had several nozzles to direct its exhaust slightly away to the sides in order to avoid scorching the model.

Faget knew that, if needed to save an astronaut, the rocket would have to fire immediately. It had to be already secured in its forward position, above the capsule, since there would be no time to deploy it on a cable—as was done with the models—and then fire it. This in turn required that the rocket be attached to the capsule with a rigid tower, rather than the tension-tightened line used with the models.

Faget's escape-tower concept was tested, accepted, and built into the Mercury system, with the astronaut, an on-board autopilot, and ground command each capable of triggering it. While none of NASA's manned spacecraft ever had to put Faget's invention to actual use, as the Russians did, the engineer did on one occasion see how his design really worked.

He attended the launch of an unmanned Mercury capsule on an Atlas rocket in May 1961—a rare occurrence in itself, because Faget rarely went to launches. "To watch a flight is not that big a deal," he told *Omni*. "If you're not involved, it's just a lot of standing around to watch it go off." Faget is not comfortable just standing around, and so during the entire Apollo program, he witnessed only one blastoff. He has never seen a space shuttle launch.

On that spring day 34 years ago, he watched the Atlas head up into a cloud with its precious cargo—and explode. "The cloud lit all up," he says. "You could see the cloud turn gold. It was up pretty high, and it takes a long while to hear the first bang. But we got the capsule back."

Again and again in his career at NASA, Faget used flight-testing experience to come up with "new" ideas to solve new problems. In the mid 1970s, Faget drew on his experience building model airplanes to illustrate the soundness of the idea of test-flying the space shuttle from the back of a 747 carrier aircraft. When doubters claimed the two craft could never separate safely, Faget recalled that, while in college, he had built and flown a powered tandem model that had worked just fine.

> HE EXPLAINED THE DIFFERENCE BETWEEN NACA AND NASA BY WRITING THEIR INITIALS ON A BLACKBOARD AND MAKING TWO VERTICAL CHALK STROKES. THE BLACKBOARD NOW READ NA¢A/NA$A; THE DIFFERENCE WAS OBVIOUS.

Seeing things from a different angle was another strength, and he sometimes made dramatic demonstrations of this. A gymnast in college, Faget liked to leap over chairs in conference rooms or to stand on his head "to improve blood circulation in my brain," as he put it. With keys and coins falling out of his pockets, Faget would calmly discuss the engineering questions on the agenda.

Faget's wit and bold style manifested themselves in other ways as well. An amateur sailor, for years he kept a portrait of John Paul Jones on his office wall, with the quotation "I will not have anything to do with ships which do not sail fast, for I intend to go in harm's way." He was known to explain concisely the major difference between doing research for the 1950s National Advisory Committee on Aeronautics and its 1958 successor, the National Aeronautics and Space Administration, by writing the initials NACA/NASA on a blackboard. Grinning impishly, Faget made two quick, vertical chalk strokes; the blackboard now read NA¢A/NA$A, and the difference was obvious.

Despite his reputation as a meticulous engineer, Faget always retained his instinct for high-performance flight testing, an instinct that sometimes proved more accurate than exhaustive theoretical calculations. He even has a space souvenir to make the case for his intuition: a simple piece of blue plastic wrapper.

One of his early Apollo design questions was how much heat shielding to install on the lee side of the Apollo capsule to protect it when it reentered the earth's atmosphere upon returning from the moon. "Based on intuition, not calculations, I said you didn't need to put anything on it," Faget says. "But the people who were doing calculations were ultraconservative. They put about an inch of ablative material on the lee side. Sure enough, when the thing reentered, it still had its thin mylar dust sheet. So my intuition would have saved at least four or five pounds a square foot, carried all the way to the moon and back, absolutely useless."

Faget didn't win some other, more significant engineering battles either. He fought against the big central window in the Mercury capsule on weight and strength grounds, but the pilots won. He wanted a single, central window in Apollo's lunar module instead of two smaller side windows, arguing that the increased field of view made it practical for just one crew member to pilot the module down to the lunar surface and back. NASA, of course, chose to put two crew members aboard the module, but the Russians followed Faget's design for their abortive man-on-the-moon effort. He preferred single-segment, solid-fuel boosters for the space shuttle, a design that probably would have prevented the *Challenger* disaster. But because only one company had a factory close enough to the Kennedy Space Center in Florida to transport such structures, NASA changed the design to multiple-segment boosters so that other rocket companies could compete for the contract.

The final NASA space-shuttle design changed in other ways, too, from the plan that Faget originally patented. But he's not disappointed. "She really is a very marvelous machine," he says. "However, it could have been better." He pauses, smiles, and admits with pride, "I don't think an awful lot better."

Faget left NASA in 1981, after the

space shuttle's second flight, to pursue new space engineering challenges. But both NASA and the outside world had changed, and Faget's new projects—as innovative and practical as ever—never met with as much success as his famous space designs for Mercury, Apollo, and the space shuttle. He founded a small firm called Space Industries, which, over the next ten years, developed two modest but potentially powerful spacecraft designs. Both promised to satisfy operational needs far more cheaply than NASA's big-budget alternatives.

Space Industries designed the Industrial Space Facility as a Greyhound-bus-sized module that operated unmanned, with automated equipment aboard producing pharmaceuticals, crystals, and other valuable materials. The space shuttle would occasionally visit to service it, harvest the products, and reload the equipment, and the shuttle would in turn receive power from the module's solar batteries to extend its flight time. Faget and a small team of co-workers (including ex-astronaut Joe Allen) came up with simple, reliable, cheap, and fully adequate systems to make the spacecraft work. Some of them even cherished the notion that when the module was launched on a space shuttle, Faget himself would ride into space as a payload specialist. But NASA, fearful that a small but successful space platform could threaten congressional support for the grandiose space station *Freedom*, saw to it that the project got little or no support in Washington.

The company's other spacecraft, the *Comet*, was to have been a small, recoverable unmanned space vehicle intended to perform various orbital missions and then bring the results back to earth. It would have gone into space on a new, privately developed, small booster. Again, Faget assembled an optimal combination of proven technologies and innovative design. But as performance requirements and budget plans changed from month to month, the original program proved impossible to complete. It may, however, be revived, Faget says.

Still, Space Industries and Faget have kept right on designing. Space Industries produced the *Wake Shield Facility*, a revolutionary spacecraft aimed at improving the purity of space vacuum for industrial processing. It was launched into space early in 1994, and its concept proved sound, although the freak failure of one "off-the-shelf" component prevented a full test of the vehicle. The second *Wake Shield* flight, with improved components, is scheduled for this summer.

Today, Faget looks back to the years of the "space race" and recognizes what he and his associates achieved before NASA metamorphosed into another federal bureaucracy. "It was an accomplishment of the species to be able to get free of the planet's gravity," he says. One popular misconception he still objects to is that it was "easy" to get to the moon. Faget endorses an observation made to him years after the last Apollo flight by Robert Gilruth, who had managed the space center in Houston during the race to the moon and who, as a young engineer, had first hired Faget for NACA in 1946. "Max, we're going to go back there one day," Gilruth prophesied, "and when we do, they're going to find out it's tough."

It was indeed tough to get to the moon. Max Faget knows that better than anyone, he was there from start to finish, testing models, designing unconventional spacecraft, improvising remarkable solutions to seemingly intractable problems. Without him, humans would never have walked on the moon, and without someone like him at NASA or its future counterpart, we'll never walk there again. ∞

Resolve and Resistance

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He sighed. It was over. "That I am, madame. At your service." He waved his left arm in a parody of a flourish, unable to bow as the scene demanded.

To his surprise, she fell to her knees, clasped his hand in hers, and raised it to a face now glistening with tears. "Oh milord, how I have prayed for such a happenstance as this!"

She led him through a house strangely active, then outside. It seemed that half the yeomen of the district were present. "Will you not wake the Frenchmen?"

She laughed. "They think themselves exhausted by Lydia and Kitty, but in truth it is Mary's botanicals."

The studious sister, leading out the ancient eccentric, said, "A simple dissolution of laudanum and extraction of . . ."

"Later, sister," sighed Elisabeth Darcy. They passed men practicing with rifles. When one is constantly entertaining hunters, the lady explained, it was only natural that some weapons and charge might disappear, and be put to better use.

They came to the huge shed. The canvas had been drawn up. A strange vessel rested there, a framework of light wood above an open boat. Four similar craft sat behind it.

"What then, do you need my knowledge to invade the moon?"

"No," replied Madame Darcy, "to invade London."

She turned and curtsied. "Lord Nelson, your fleet awaits."

In reality, his fleet was nowhere near ready. The moonboats were not, as Nelson had feared, mere balloons harnessed together. Rather than hot air, they relied upon a heretofore unknown substance which Lord Henry Cavendish referred to as dephlogisticated air, which he formed of water and electricity.

"Lord Henry, you must know," Miss Mary Bennett took pains to inform Nelson, "is the man who weighed the earth."

"A boon to humanity I am sure," he replied. But he was pleasantly surprised the first time he took his flagship up. It veritably sprang into the air, angered at restraint, and reaccepted the ground only grudgingly as the odd gas was returned into storage vats.

"Did I mention," asked Lord Henry casually as he flew with Nelson one night above the trees, "that dephlogisticated air is remarkably inflammable and will explode upon any contact with fire or lightning?"

"Musket fire as well?"

"A direct hit to a gasbag would prove fatal," the desiccated old man replied. "I trust that I have placed the bags high enough, and sealed them adequately, to prevent the sparks of our own flints from igniting them. But one must lack certainty without the opportunity of direct observation."

Ah well. Nelson had seen first rates explode when fire reached their magazines, had risked it himself. No one who had ever witnessed such a conflagration—the awful roar, the instant extinction of hundreds of men—no one could forget such a sight. Yet one still sailed into battle.

There was much to do. Before teaching the crews, Nelson had first to devise methods of flying. It was a bit like sailing, in that one was at the mercy of wind and weather, but it differed in the addition of the vertical.

Long sails might be extended laterally from a ship, to aid in steering. These might even be manned as oars, if the ship were to become becalmed.

The crew, when aloft, wore ropes about their waists in case of turbulence. Nelson had a set of leather belts with which he strapped himself to a forward strut, whence he might survey both the ship and the path ahead. From this odd perch, jutting out somewhat like a figurehead, he could see sepulchral wisps of cloud, and the dark fields below, divided by fence and hedge and sparkling ribbons of water. At times it seemed almost inviting, calling to him to step away, to fly freely . . . And then he was glad of his bonds, like Odysseus tied to his mast, listening to the song of the siren maidens.

There were signals to devise, and marksmen to train. His sergeants in this were a pair of poachers known as the Wheat brothers, Dick and Rees, unruly men who could hide in a tree and shoot a rabbit through the eye. This seemed a valuable talent, and soon Nelson was sending all his new marines into treetops, both to impart to them the skill of shooting accurately downward, and to steel them to heights. His men were armed with rifles, which gave them some small advantage—they might accurately shoot three times the distance of a French musket. But those French muskets, of course, outnumbered them by the thousands.

There was no lack of volunteers. Madame Darcy's collection of oddities, it seemed, contained several former soldiers and a surveyor, all pretending to be farmhands. Nelson's own lamentable cover identity was Mad Tom the human scarecrow: on pleasant days he stood in the housegarden and waved

his crutch at birds. It was a humiliating performance that he found himself entering with no qualms, to the extent that he sometimes abased himself further, to earn a coin from an amused French visitor.

He began each night as a beggar, rag-clad, red-eyed. Yet as he entered the shed and passed amongst the shadows of the moonboats he became a different man, standing straighter, pain ignored, voice deep and resolute. Those who laughed at him by day took his orders by night, and wondered to themselves who their new admiral might be.

And so he would find himself in the helm of a moonboat, snapping commands to the boys as they ran aloft in the riggings—for other than the few old soldiers designated for boarding, and the indispensable Wheat brothers, it seemed best to have lightweight crewmen. This allowed the boat to go higher, and gave them the luxury of lining the underside of the balloon casings with a padding of burlap—sufficient, it was to be hoped, to prevent musket fire from piercing the bags and igniting the dephlogisticated air.

One cloudy night he determined to take his men up all together, to practice some vague concept of formation flying. The surveyor was complaining bitterly—he had just finished painting figureheads upon the boat, carved wood seeming an excessive weight, and the paint was not yet dry on Nelson's flagship, the *Electra*. The name amused him, as he remembered his triumphs in the *Agamemnon*.

He had thought himself immune to surprise, but as he donned an extra coat—for it was cold aloft, and cloaks tended to become entangled in the rigging—he saw the five Bennett sisters approach him, scandalously attired in breeches and jackets.

"Ladies!" he said. "We do not embark upon a pleasure voyage."

He did not share the superstition that women were bad luck aboard a ship, and in any event, they had yet to invent new superstitions suitable to the airships.

"This is not a cruise," agreed Elisabeth Darcy. "We have always intended to captain these ships ourselves. We are smaller even than your village lads, we are familiar with London and its troop dispositions due to our recent journey of reconnaissance. And if we are ignorant of seamanship—why, so are the men of this county, and all humanity is equally ignorant of airmanship. To further my qualifications I am also, as you are no doubt aware, the general as it were of the Free Patriot Army of this part of England."

He actually had not been aware, but it did explain some of the surreptitious visitors and odd meetings he had noticed. It also explained his old shipmate's message to him. "But . . ."

"And besides . . ." said Lydia, a dueling pistol appearing suddenly in her hand. She aimed at a rat which was skulking in shadow toward the stables. There was a brief thunderclap, the smell of powder, and the rodent fell twitching. Lydia smiled, her small teeth gleaming ferally in the moonlight. "And besides, our solicitous French friends have turned us all into crack shots. And we are. I do not blush to say, utterly ruthless."

He had some question regarding that—he had seen Jane cry over a wounded sparrow, and thought Mary might be quite distracted from combat by the sight of an interesting toadstool—but he did admit that Elisabeth and Lydia had the makings of diligent and stern warriors, and that Kitty might be relied on to do whatever the others did, only more vigorously.

"Very well," he said. "But be warned that, as admiral of this fleet, I shall not temper my language or orders out of regard for your sex."

"Be certain you do not," snapped Elisabeth, and she and her sisters each betook themselves to the helm of a moonboat.

Mr. Bennett tended to be somewhat overwhelmed by the activities of his daughters, though he was often heard to say, "If Lizzy believes it correct, I shall abide by her decision." He spent most of his days in the nursery, supervising the education of the various tiny Bingleys, Darcys and Wickhams who were trotted out intermittently after meals or on sunny afternoons, and were otherwise kept in seclusion.

One day Bennett came to Nelson's small room. One of Nelson's periodic fevers had recurred, and he lay drenched in sweat, sipping bitter quinine and hoping that he would recover in time for their proposed action upon Boxing Day, or weather not permitting, upon the New Year's day. It seemed wise to attack when the better part of their foes, complacent with garrison duty, would be obtunded from holiday celebrations.

As always when his master had a fever, Farmer George hovered closely, delighting in the heat and adding his own feline warmth to Nelson's discomfort.

"Brought you something, Mad Tom," said Bennett, with a slight cough of disparagement. He, as all the men, held clueless suspicions regarding Nelson's identity.

"Thought you might like it," he continued, and held up an antique scarlet

uniform coat. "My great uncle's. Can't have you going into battle dressed as a beggar now, can we? Meaning no offense, of course,' as he recalled that the man was a beggar.

Nelson thanked him. It did suit his purpose. His crew were to wear no signs of identification, to aid in their escape should such be necessary. He, however, lacking various limbs as he did, had no chance of escape, and would prefer to die in the uniform of his nation. Even a uniform some fifty years outdated.

They held their final conference on Christmas morning. The Yule log roared in the fire, and Cavendish rattled on a bit about the hazards of the explosive grenades he had concocted, the need to watch the temperature of the air in relation to the balloon's ascension, and various other facts with which Nelson was already depressingly familiar.

"And now," said the aged scholar, "I believe I have finished my role in this comedy of patriotism. I have noticed certain properties in stationary bodies of water which make me believe it will be possible to weigh the moon, and I have delayed my investigations into this matter long enough." He left the room, and only Elisabeth's peremptory command kept her sister Mary from hurrying off to discuss this interesting mathematical question with the old gentleman.

"Very well," said Elisabeth. They went over the plans again. The Free Patriot Army—a motley selection of allied individual groups which tended to the occasional act of terror or thievery—was to be alerted but only when the fleet was already above London, to keep any from suspecting trouble and rousing the troops. Their own men were to begin the day's action, however, by silently capturing the semaphore stations which allowed messages to be transmitted across country at a shocking speed. They would send their own message, but only when the moonboats had begun their action.

Mr. Bennett entered the room as they were ending their conference. "I had thought we ought to ask the vicar to dine tonight, and hold services for the holy day," he said.

"It will not be convenient, Father. We have planned otherwise," replied Elisabeth. "Tonight we leave to invade and conquer London."

"If you think it advisable, Lizzy," her father returned.

Then they went to prepare for the night's action. Nelson allowed himself to be shaved, and his hair to be tied back with a riband. His cat, meanwhile, bathed in equal self-satisfaction, and the parrot groomed its feathers.

"We are," he remarked, "the Spartan army, bathing and oiling that they might look well as they die." It felt good to be back in uniform, even this foolish antiquated one, and to speak again in his own voice.

The troops seemed taken aback by Mad Tom's transformation. He leaned against the railing of the *Electra,* uniformed, his gaze hard and steady, as the crews gathered in the twilight by the moonboats. The craft had taken on a full load of dephlogisticated air, and they strained against their bonds like cavalry horses eager for battle. He called for their attention.

"England expects every man—and woman—to do his—or her—duty."

Elisabeth Bennett stepped forward. "My friends"—only a woman would exhort warriors so—"Tonight, with the Almighty's help, we will liberate our captive nation, and free ourselves from the onerous and odious foreigners. And lest you doubt that God has already given us every sign of his favour, let me remind you that in our hour of need he sent us this man to lead us into battle. Sent us Horatio Nelson, hero of the Nile, Commander in Chief of the British Navy."

Her troops exchanged astonished glances, then began to cheer. It was only with a loud shout and his much enhanced reputation that Nelson was able to restore order.

Then suddenly the damned parrot had flown onto his shoulder and was shouting, "Do your duty, do your duty."

He was never sure what fool had set them loose, but the cat was there as well, scrabbling up into the rigging, and the parrot had flown amongst the gasbags. It would take too long to catch them; they would simply have to come along. And when he stopped to consider it, they were in fact the only veterans of naval combat at his command.

"Set sail," he ordered. High above, Nappy called, "Hooray for Boneyparte! Do your duty!"

The most astonishing thing about air travel was its utter silence. Floating now above the clouds, guided only by compass and the surveyor's dead reckoning, linked by dark lanterns flashing code, they were alone in a world of black sky and white clouds. There were, to be sure, various creaks and aching sounds from the rigging, the soft ripples of the billowing sail, and the occasional odd beat of the mechanical wings as they corrected course, but in all the impression was of silence. They traveled within the clouds themselves, cleaving through the

ghastly, fluffy field of white. The cold haze of the clouds was nothing like the salt spray of the ocean. But Nelson felt strangely at home.

The ships seemed to fly as if possessed, and the crews as well. Nelson found himself under constant scrutiny, village lads looking at him with what could only be termed worship. When the *Meryton* came alongside, he even surprised Mr. Bingley, (acting as second in command to his wife) with a similar expression. The jaded, familiar voices of the Bennett women, immune to hero worship, were a relief.

"You should not have told them, Captain Darcy," he said to Elisabeth. She was perched high in the prow beside him, telescope at the ready. "They now feel themselves invincible."

She merely smiled.

Travel without regard to roads and waterways was remarkably quick. They were over London within hours, odd how one disregarded the stench of the place when one approached slowly by land or sea, but how it struck one almost physically as one floated down gently from above.

Until now, if seen at all, they must have been considered part of the clouds. As they began to draw lower they would be apparent to those below. Nelson suspected, however, that most who noticed them at this hour would be drunk, and the rest (he hoped) disbelieving or awestruck.

Their good luck was, indeed, unbelievable unless (as Mistress Darcy would have it, and Nelson might once have been inclined to accept) God was for them. They hovered far above the Tower of London.

"If Bonaparte is not there, we are done for," said Nelson.

Elisabeth, peering below with her telescope, made an impatient sound. "Remember the cowardice of the man. He could not sleep in a captive nation but inside a fortress. Besides, I have had intelligence from within."

One could hardly argue with that. Nelson nodded. Perhaps he should give some new, bold signal to his fleet—but he had not the heart.

Instead, he signaled for commencement of their plan. The *Electra* and *Boadicea* were to land, whilst aboard the *Boyle,* Mary Bennett would discover whether the grenades were truly effective by dropping them upon the guardhouses. Nelson hoped that there were not many Englishmen amongst the French, then shook his head quickly. If so, they were collaborators, and deserved what fate might overtake them.

The *Beryton* and the *Canada* contained the bulk of their sharpshooters, and were to stay above, offering covering fire.

Nelson sighed, slipping free of his restraints and wrapping his arm about the post. He was about to land in the enemy stronghold, he was beplumed and dressed in an absurd outfit of bright red, he could not run—one might think him nothing but a target to draw fire. Yet had not he always stayed upon the quarterdeck during melees, dressed in his every medal, seeming to dare the sharpshooters to take him? Best to do battle in the same manner he always had before.

They were halfway down—landing was always a bit unsettling, the ground rushing up beneath you, your stomach lagging a good ten paces behind, and the hope that the illiterate blacksmith's apprentice piloting the ship had judged the descent properly, lest all come to resemble a pudding dropped from a bell tower—when a guardsman looked up and began to scream.

Nelson heard a sharp retort, and saw the guard fall. "Never has so much been owed to a handful of poachers," he thought. Around him, rifles began to fire. His men had the advantage. He saw the Wheat brothers calmly take aim and fire, lads behind them reloading, while the terrified French soldiers could not even reach the ships with their musket fire, which then tended to return to them . . . But then they had fallen within musket range.

"Do your duty!" screamed his bird.

"Get above, you idiot," Nelson cursed, and immediately swore again, as he felt sharp claws dig into his shoulder. The terrorized Farmer George was moving on to his accustomed refuge.

The surprise unbalanced him entirely and he pitched backward, but not before hearing a musket ball pass far too close. It singed his scalp and tore the unfortunate cat off his shoulder and into eternity. Another had died for his sake—and if the cat had not surprised him, it would instead be he who had been sent to greet his forebears.

Elisabeth skidded down beside him. "Admiral? Are you . . ."

"Damnation! Help me up," he said. He was bleeding, but this time it mercifully poured over his blind eye, leaving his vision unencumbered. "Then see to that lad."

That lad was beyond help—a belly wound. But deferring his own medical help in favor of the sailors had always won Nelson their hearts, and this time was no different.

There was an explosion, and great gouts of flame leapt up beyond the wall. Evidently Cavendish's inventions had succeeded again.

The *Electra* thumped to her rest upon the ground, Nelson barely retaining footing. The crew was half off already, screaming and drawing weapons for close fighting—a few swords and cutlasses, more pitchforks and scythes. "For England! For Nelson! For George!" they shouted and their admiral, a bit concussed by the bullet, wondered if that final cheer were for his cat.

Then he was out of the moonboat, hobbling furiously for cover. Soldiers were approaching from the opposite side of the ship. Elisabeth turned, smiling with narrowed lips and eyes, and shot directly into the central airbag. The dephlogisticated air exploded, destroying the *Electra* and taking out the majority of the pursuers. Still though, she had been a noble ship and he regretted her loss.

They could hear shouts and firing inside the Tower. As Elisabeth had expected—she was so much the optimist—the English servants had fallen upon their foreign masters.

They met up with the crew of the *Boadicea*. Nelson watched as Lydia, a knife in her teeth and her blouse open to the waist in a remarkable display, put a bullet through a guardsman's chest and a second bullet through another's throat, then paused calmly amidst the carnage to reload her pistols.

They entered the Tower. He found himself lagging far behind, stumbling now and then over the body of a foe or friend. Once he rounded a corner only to find himself staring directly into the muzzle of a French officer's pistol. Only then the man's mistress smashed a chamberpot down upon his head.

"Thank you, madame," said Nelson. Leaning against the wall, he was able to doff his absurd feathered hat. Of course, the parrot upon his shoulder made the gesture a bit less courtly.

"My pleasure, sir," she replied, taking up the loaded gun and departing, in search of new game he presumed.

Then he was in a large ornate bedchamber with his men (and women) holding guns outstretched on one side, and on the other Napoleon Bonaparte himself, clad in an astonishing saffron nightgown and surrounded by loyal guards.

"You cannot escape," said Elisabeth. Outside a building exploded. Damn! Had they not expressly asked Mary to spare the magazine, of which they might have future need?

"What will it be?" Elisabeth continued. "Die now, and let your men fight on to keep the country? Little good that will do you!"

The emperor's pudgy face contorted as he thought. What to choose, safety and surrender, or glorious death? It was certain that, while he would ordinarily not hesitate to opt for the former, he was having unexpected difficulty with the choice. The man was not entirely without honor.

"I cannot surrender—not to rabble, not to women," he cried.

"Then surrender to me," said Nelson, limping forward. He bent down and shook off his hat, then looked directly at Bonaparte. Would his famous profile, his well-known haunted eyes, reveal his identity despite the comic but blood-soaked costume and the parrot?

Napoleon's eyes widened and his jaw dropped in the moment of recognition. Then he smirked. "If I have been defeated, it has been at the hands of a dead hero."

"My death, perhaps, was reported prematurely, sir," replied Nelson. "May I have your sword?"

Bonaparte gestured to his men to put down their guns, then proffered his sword, hilt outward.

Nelson smiled, and waved his hand dismissively. "I fear I cannot oblige you without help. Captain Darcy?"

And to the emperor's eternal scandal, the woman went forward to accept the token of surrender.

At that moment Nappy began to squawk. "Hooray for Boneyparte," he said. "Hooray!"

The admiral of the airfleet and savior

of England sighed. He was obviously going to have to work on his pet's repertoire.

It is a truth universally acknowledged that a single woman in possession of the gratitude of her nation must be in want of a husband.

Nelson, newly bandaged, having set guards about the castle and having supervised the incarceration of the prisoners and the sending of messages regarding the victory, as well as briefly paying his respects to his oblivious mad monarch, had been pleased to discover his own medals in the possession of the emperor. Their familiar weight gave solidity to the scarlet coat. All this exertion, far from tiring him, had exhilarated him. He found, also, that for the first time in a year his missing left leg no longer ached.

He located the Bennett sisters in a drawing room finely painted though its decorations and the bulk of its furnishings had been removed as booty long ago. They sat demurely, pistols beside them, as the staff served tea. Jane was silent; Mr. Bingley had been amongst the casualties. However Kitty, one arm in a sling, was remarkably ebullient.

"It is settled then, Elisabeth," she was saying. "You shall accept no less than the Prince of Wales."

He sat, and allowed the captain of his late flagship to pour him a cup of tea. Nelson admitted that it did seem a good match. One felt that this year of fugitive adversity must have matured George, honing him from a dissipated selfish fop into a stern, dedicated patriot. Or so one, at least, hoped.

"And for Jane?" That sister wiped away a tear. It was clear she would maintain deep mourning for at least a year. "Another royal duke?"

"I think not," said Elisabeth thoughtfully. "We shall need the royal dukes single, to induce treaties. So many sovereigns have marriageable daughters."

"Allow me to recommend my executive officer and dear friend Captain Hardy," said Nelson, entering into the spirit of the thing. "A capable man, and I'm sure he has been promoted to admiral in my absence."

Jane allowed that she might take it under advisement.

"Well, I want a duke," said Kitty and began to pout. "Foreign would do, just not from too far east."

"And you, Mary?"

The studious sister glanced up from a book of philosophy she had discovered in Napoleon's bedchamber. "I suppose I shall have to marry Lord Henry. I do, after all, bear his child."

This comment had the insalubrious effect of ending all conversation for the space of several minutes.

Then Nelson wished the ladies happy, and rose. He imagined he had more to do that evening, to ensure their safety until the Navy returned and the Army was reconstituted.

"Does no one intend to ask my future?" asked Lydia suddenly.

Nelson paused. "I had presumed, Captain Wickham, that you would wish to remain with your ship, and make a career, as it were, of flight." The new Air Navy would need experienced officers.

"Not enough," she said, and rose to walk over to where he stood leaning upon his crutch. She took his lapels in her hands, and came very close. "Not enough to be a captain. I wish an admiral."

Nelson felt a sudden odd weakness before her predatory gaze, and realized something else. For so long his life had been circumscribed by pain and want. And now, in his time of triumph, pain had retreated—and he felt the first stirring of that other long dormant phantom, of pleasure.

"It may yet be arranged," he replied. ☒

S. N. Dyer is a pseudonym for a full-time physician in private practice. Dyer has been nominated for the Hugo Award, the Nebula Award, and the World Fantasy Award. Dyer's last story for Omni, *"On the Edge," was published in December 1988.*

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OUTER LIMITS

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adapted, but never faithfully at all.

"I was becoming intensely aware as I was developing and working on the first few episodes of what a challenge it was to do *Outer Limits* in the 1990s because the original show is the culmination of a certain kind of science fiction and fantasy, certainly in the mass media. About 15 years after *The Outer Limits* went off the air, you had *Aliens,* you had *Predator,* and now you've got *The X-Files*. It's really tough to do *Outer Limits* for the 1990s, at least the straight-line evolution. It's a postmodern problem."

Still, the norm of science-fiction shows lately seems to be pat series containing beloved, unchangeable characters. This will be a regular science-fiction anthology show with unpredictable plots and situations in which characters are in true jeopardy of the most unsettling sort.

The range of human drama reflects the range of human experience. The advent and development of science fiction was the intellectual and emotional product of technological and social movement. Extrapolation and epiphany. Fear and loathing. With the form and texture of these changes shifting in unsettling and surprising ways, can it be any wonder that the nature of science fiction itself has warped?

With 44 episodes ordered, money on the table, and an audience hungry for the stuff, this show will happen, postmodern problems or no. "We'd like to champion science fiction," says Coto. "We'd like to champion the intellectual side."

"The goal at the end of this," says Stern, "is that the viewer should turn off the TV (after each show) and go 'Wow!'"

"The challenge really comes back to telling stories that grip us as human beings," says Densham. "The things that scare you and me don't change."

Attitude, talent, good scripts, determination, and heritage seem to weigh in the show's favor.

Ultimately, the irony of the original *Outer Limits* was that the viewer had a lot more control of that dial than the Control Voice admitted. The show lasted only a year and a half.

In this interactive technology age, you can almost hear the Control Viewer speaking to this new incarnation. "I control the horizontal. I control the vertical. Now *scare* me." The new *Outer Limits* hopes to do just that. ☒

David Bischoff's latest novel is The Judas Cross *with Charles Sheffield, from Warner Books.*

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and technology for Nevada, the earliest we can get a site up is 2010, depending on how much of the money we can get at. This plus the nuclear clean-up is one of my major initiatives. But, hey, everything we do here is expensive. It's dangerous, untested. Some places we have to clean up don't even have blueprints. We go in to decommission and decontaminate a site, and we don't even know where the electrical box is because no one drew it in!

Most people active on issues of nuclear waste work on two levels. If it's going to be in your community, you don't want it, but you're also concerned about nonproliferation and the environment. You want this material contained, under surveillance, and ready for the next technological advancement that might help further destroy it. We're not going to let it pile up around each and every power plant and let each community be responsible for its security. I'd like it all in one place under constant security.

Omni: In my lifetime I've seen a trivialization of political agendas. Might this also be a legacy of the Cold War? As though there is a kind of inverse relationship between government secrecy and public voyeurism regarding the private lives of public figures. Is this invasion of the intimate a kind of a substitute for political activity?

O'Leary: I don't think so. Remember there had been a real enemy. Once my husband and I were in Frankfurt for a conference. We were walking down the street and heard singing in a rathskeller and decided to go in. My husband opened the door, and I looked into a long, dark room filled with people—and they all looked very Aryan to me. Suddenly, with the music and the smoke in this dark room, all of my childhood terror of Nazi Germany rushed back to me. I looked at my husband and said, "There's no way I'm going in there, man!"

For Americans, the next terror was Communism. I was graduating from college when Nikita Khrushchev said, "We will bury you!" And the threats posed by Soviet power initiated defensive behaviors that in retrospect we find unacceptable—especially those affecting our health and our safety, where we think it's the government's responsibility to protect us. But sometimes we need to look at positive things that came out of that time—the technology we developed, or the advancement of women in the workplace. Great benefits came from nuclear medicine in diagnostics and treatment.

Omni: Why is it so hard to develop a national energy policy?

O'Leary: We develop one often but nobody likes it when it gets developed. Whenever Congress passes something, or an administration articulates some change, the public—to the extent it remembers it at all—always remembers, 'Oooh, someone said something about never having to worry about [oil] imports again.' When issues go to the Congress every few years, no one seems to want to bite the bullet. The last true supply interruption we had, when prices spiraled so terribly, was in 1980 and 1981. I purchased a house and the mortgage rate was 16 percent! The price shock and its impact on the economy finally caused the Congress to say, "Hey! Hold it! Enough!" With price projections for petroleum at $80 a barrel, you could begin a vigorous program to invest in technology underlying replacements for imported fuel.

We created the Synthetic Fuels Corporation whose goal was to convert coal into liquids that could replace petroleum. The market entry price for synthetic fuels was close to 50 bucks a barrel. Good policy! If you can keep the price of the product that we're trying to wean ourselves away from high enough to develop the alternatives. But once the price of oil drops, cost-effective alternatives dry up. It's happened time after time. Going for energy efficiency helps a bit, but it's not a solution. Some of us now realize part of the solution involves diversifying our import base. By increasing supplies from Mexico, Canada, Venezuela, and North Sea producers we can reduce our dependency on Middle Eastern suppliers.

Omni: Doesn't cheap foreign oil make capital investment in new technology less attractive?

O'Leary: Well, yes and no. New technology has been developed. Compact fluorescent bulbs reduce energy consumption. We use them here. But we need to focus on technologies for large industrial processes. Using private and public sector money, the United States has spent over $7 billion designing new technology to generate electricity—mostly involving coal, but some using natural gas and nuclear energy. Fuel cells are an option already being used by some of our East Coast utility companies. That the fuel cells have applications for connection to our existing national grid system spells opportunity to utility company executives who frankly don't like to think their business

will be obsolete in the twenty-first century. One day soon we may all have a little fuel cell in our basement that will pick up enough power overnight to run our homes and power our cars. Or they will power whole office buildings, business complexes, and even entire communities. But pretty much all of the energy will come off the grid.

People in the traditional utility business are starting to think this way—to beat what I call the Western Union phenomenon. Folks there couldn't see that a plastic card with a line of credit would make it easy for people to get money anywhere. Now you don't have to call Aunt Sarah when you need $200! They missed it. And the same thing even happened with some banks. "Let somebody come up to a machine and get money? No teller? Have you lost your mind?" Understand, someone in the banking system had to have the vision and take the leap of faith.

Omni: Can so-called free sources of energy—geothermal, wind, solar—be used to meet some energy needs?

O'Leary: Well, first, there really is no free lunch. Take wind. When I left the Carter administration 18 years ago, the cost per kilowatt hour for producing wind power was at about 22 cents. The cost of producing electricity then was between six and eight cents. So, if you were sitting at the state regulatory commission and reviewing the data, unless you could find some other things to put in the equation, wind didn't make the economic cut.

Now, in those days no one computed the full life-cycle cost of conventional energy sources. The economic picture changes if we ask, for example, "How do you handle waste? What's the polluting effect?" While people were debating true societal costs, the DOE was working with the private sector on science and engineering projects to drive down the cost of wind. By the late Eighties, wind still wasn't as cheap as coal or hydro, but darn near. Title 29 of the Tax Reform Act of 1986 said, "If you can get alternative energy in production, you can knock off 1.5 cents per kilowatt hour as a tax rebate." All of a sudden wind is economical. With a production tax credit for alternative fuels, there are now real opportunities to introduce alternative energy sources into the grid. Some large power stations are making that decision.

As we've opened up competition to entrepreneurs who've given some thought to designing power plants that can be built and operated a little more cheaply, electric companies can take bids from outsiders instead of building their own stations. Fifty percent of the new increments of power coming on line in the United States over the next seven to ten years will be from independent power producers. It's cheaper, cleaner energy, and generating stations are smaller. We like that. It meets the test of sustainability.

Omni: What might an energy-efficient economy built on American love of personal autonomy look like?

O'Leary: I know!! You want me to be a futurist! In my vision, people who drive opinion really focus on the requirement for environmental-economic balance. Here at the DOE we are asking the largest energy consumers by industrial sector to make assessments about correct manufacturing processes for the twenty-first century. Their research and development data tell them pollution prevention saves money for business and makes them more competitive. They also recognize that the public has become much more conscious of the need to protect the environment and to correct its degradation.

Take the pulp and paper industry. Large polluters, they've done a lot over the last ten years to reduce pollution—especially by getting involved in recycling their products. But now they're recognizing that unless they can design new pulp and paper manufacturing processes for the next century, they'll get left behind. And they're also recognizing they have to deal with the information highway. We're working with the steel industry, aluminum, glass, and cement. We're also working with Argonne National Lab in Chicago which is involved with some local groups trying to get a set of new electrical wiring codes approved so they can build attractive, affordable, energy-efficient homes. They're now stuck with lighting codes developed in the 1950s when we didn't contemplate trying to be so much more energy efficient.

Omni: You've expressed excitement about a, well, almost low-tech development called "bio-barrier." What is it?

O'Leary: Say you plant a tree and you want to keep it away from your septic tank or plumbing lines. In the old days you'd wait for something bad to happen and Mr. Rotor Rooter—the guy with the auger—would come and remove it from your lines. Now you can plant this strip of bio-barrier next to your tree, and it will keep the roots of that tree or shrub from incursion into anything. How did this get developed? At Hanford [Nuclear Reservation, Washington State] we had to make sure no underlying roots of shrubs and trees mucked up the piping or equipment around tanks containing nuclear and hazardous waste. Then, along comes a

bright entrepreneur who reads the research, finds out about bio-barrier, and gets a license to use it. Suddenly, all over the Northwest you can go in K-Mart or your local green-thumb store and buy bio-barrier. This guy, who had a one- or two-person operation, now has 60 people working for him and projects 500 in the near future.

A small particle accelerator facility is being built in Virginia. We're interested in doing basic science there, but the business community is also lining up to use it for things like testing fibers and materials for use in industrial processes. As competition with Europe and Japan grows and U.S. business has to drive down costs, the private sector has tended to reduce its research and development budget. More and more frequently, they rush to our laboratories saying, "We want to work with you, because it's cheaper and maybe better for us to use your facilities."

Right now our national labs have the ability to work from basic science all the way to applied technology. But Congress or the American people may not want to continue to fund our national laboratories. In western Europe and Japan, the governments have long since made the decision that government policy would undergird its competitive push in science and technology. This is our dilemma. Now, if the American public can equate the work of our national labs to jobs. "Oh, good! If you guys did all of this and if Mr. Bio Barrier who had two employees now has 200 and will soon go to 500—well, then, maybe that's okay."

Omni: What about basic science itself?

O'Leary. The supercollider went down. The space station didn't—because it was more easily understood by the American public. The space station was personalized through ads run by businesses who could point back to Sputnik and our Apollo flights. When the benefits people saw were personalized—"one small step for man, one giant leap for mankind"—folks understood it.

But there I was with the superconducting supercollider, trying to explain that some of its applications might yield ionized equipment and material that would help us treat brain cancers or soft cell tumors. That bothered the physicists no end! Because in their purity they said, "Well, Secretary, we don't know. . . ." Meanwhile in Congress, they were saying, "Hold on a minute, woman! You need $11 billion! What is it going to get us?" So, I tried to talk about it from the general perspective. "We have to encourage more science and scientists. There have to be people who think about the improbable."

But as scientists themselves will point out, the scientific community has been accustomed to showing up once a year, scouting the halls of Congress with two or three Nobel Prize laureates and saying, "We need it because we need it." Now budgets are tight. The case for science has got to be better made. These people all talk about their community—the scientific community, academic community, public policy community. It drives me nuts. You know, they say, " . . . and the community thinks . . . " I say, "Excuse me guys? It doesn't work any longer to talk only to yourselves, nor just to show up in a meeting once a year."

People who are engaged in scientific endeavor are starting to be a presence here in Washington. They're finally getting it that contact with public policy-makers needs to occur on a more routinized basis. If we don't pull these groups together we are lost. Because the American public won't pay the tab. We cannot draw the line at applied science. If we don't fund basic science with its big question marks, there will be nothing to drive us toward technological innovation.

Omni: People have commented that women often bring to the workplace and political life substantial skills in working with people to get things done. Is that true of you?

O'Leary: I'm so clear about goal-setting. I have almost laserlike attention. I'm clear about who I am. Right now, I'm giving this job all my focus. I've got five or six things that need doing—things that can maybe make a difference. I love my job. One day I may wake up and say, "This is where we have to go," and I may make a big mistake. But it won't be a big mistake that adversely affects the health or safety of anyone who works for us or who lives near one of our sites. If I make a big mistake, it will be on the side of ensuring that people are healthy and safe. These are heavy responsibilities.

If you come to the Department of Energy thinking that you can't make a difference, it will grind you down. We're sitting on thousands of acres of land we need to clean up and nuclear waste materials that need to be finally disposed of. I get up every morning fully understanding that—and that the genius in our national laboratories can help provide answers to questions we have as a nation. And I do believe that we can make a better and cleaner environment with an energy policy built on principles of sustainable development. That's where we're headed. And the challenge is really groovy.

GAMES

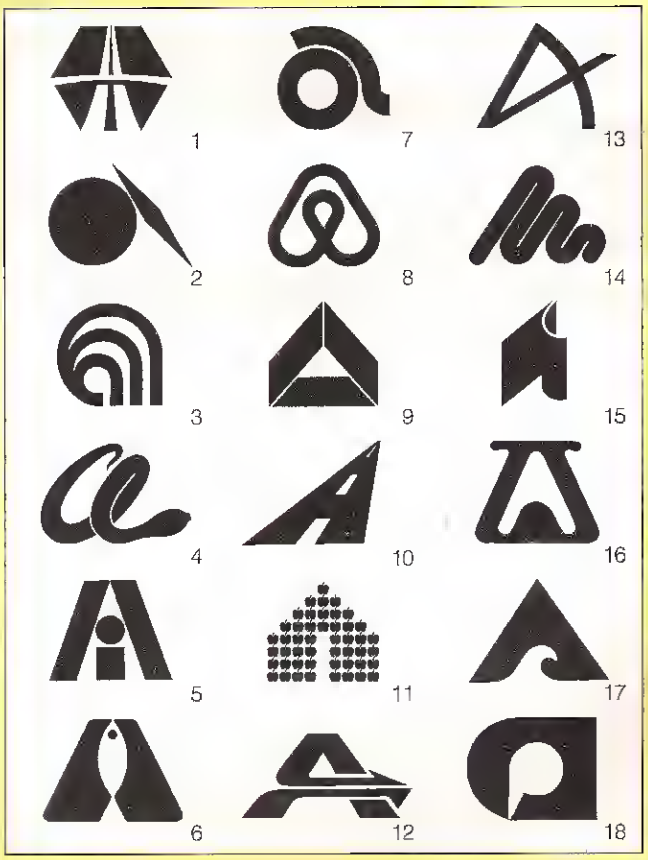
A IS FOR APRIL:
The best letter logos combine form and function

By Scot Morris

Graphic artists have twisted the alphabet in endlessly creative ways to convey their clients' images in a single letter. Look at the logo on a bottle of Evian water, stamped into the plastic above the paper label. The lowercase "e" is a streamlined skier bent over and racing to the right, with his ski poles forming the letter's crossbar. Goodwill Industries has a logo that you have probably seen many times. Have you ever noticed that the lowercase 'g" is, appropriately, one side of a smiling face?

Considering just the first letter of the alphabet, Amtrak recently introduced in its print advertising a design of two lines tilted toward each other, suggesting an "A" shape, or two parallel railroad tracks apparently converging in the distance. The Alaska Catalog has for its logo an A that is snow-capped on top, with a crossbar formed by the flukes of a diving whale.

Here are some of my favorite A's from around the world, as found in *Trademarks and Symbols of the World,* Volumes I and IV, by Yasaburo Kuwayama (the books were published by Rockport Publishers of Rockport, Massachusetts, but are currently out of print). In each case, there's a suggestion of the type of company that employs that particular logo. Match each "A" or "a," numbered in the box at right, with the appropriate company name, listed below in alphabetical order. The answers are at the end of the column.



A. Acasso Supermarket (Buenos Aires)

B. Adams Waste Disposal (England)

C. Aerographics Lithographers (Toronto)

D. Ager Auto Repair (Amsterdam)

E. Alpeadria and Dos Ljubljana tourism (Yugoslavia)

F. Anchomar Fishing (Buenos Aires)

G. Anorsa, manufacturer of materials for experiments (Madrid)

H. Anzen auto accessories (Japan)

I. Ar Co machine tools (Naples)

J. Architettura Design School (Milan)

K. Armando Electrical Machinery (Milan)

L. Arntz Cobra automobile (U.S.)

M. Assicurazioni Intercontinentale insurance company (Rome)

N. Association of Architects (Lyon)

O. Automatic Plastics Limited (Dublin)

P. Autoroute (logo for French Association of Highways)

Q. Avant card publishers (U.S.)

R. Azuma Drive-In (Japan)

THE SCIENCE OF LAUGHTER. Here are some chuckles from *Absolute Zero Gravity: Science Jokes, Quotes, and Anecdotes* by Betsy Devine and Joel E. Cohen (Simon & Schuster, 1992).

The answer is "Game, set, and match." What's the question?

Name two theories invited by von Neumann, and an incendiary device.

How many programmers does it take to change a light bulb?

None. That's a hardware problem.

How many gorillas does it take to change a light bulb?

Only one gorilla, but it sure takes a lot of light bulbs.

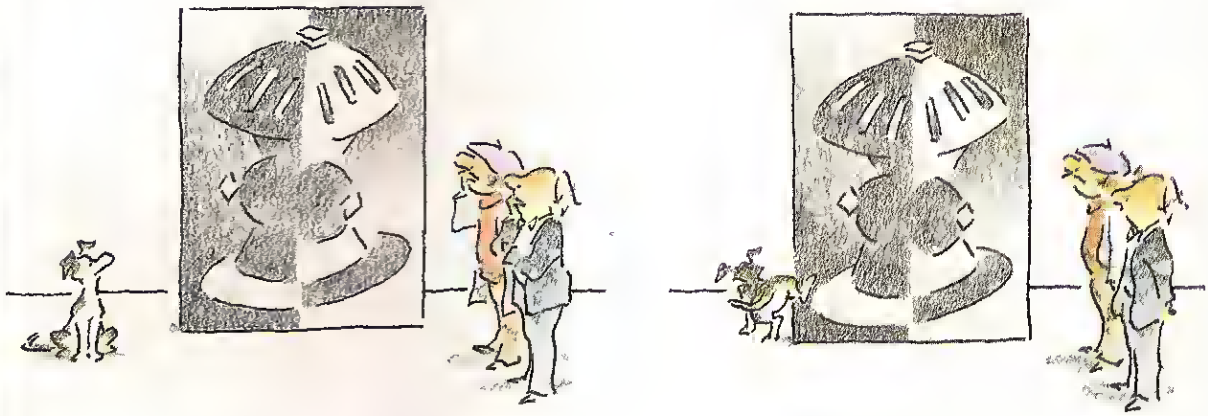
Answer: Count Dracula.

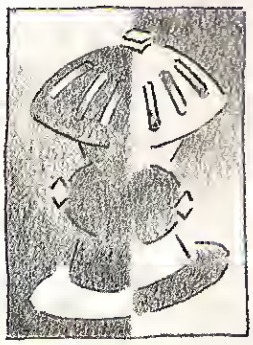
Question: What did Transylvania's only demographer forget to do?

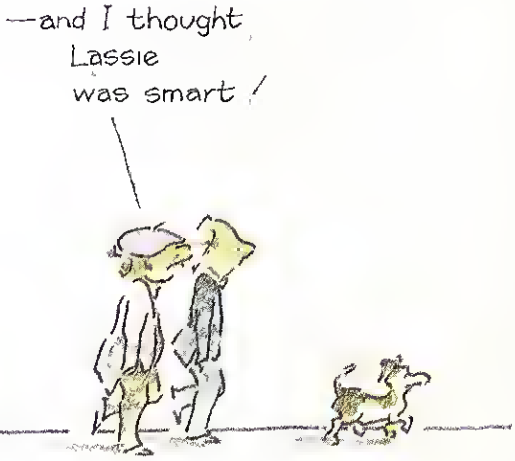
A great scientist reaches the pearly gates, and the angel Gabriel rewards him by offering the choice of his dearest wish. Will it be infinite wealth, infinite beauty, or infinite wisdom? "Infinite wisdom," says the scientist. There's a poof! and a cloud of smoke, and the scientist sighs, with infinite wisdom, and says, "Damn! So I should have taken the money!"

QUIZ ANSWERS:
1-P, 2-J, 3-C, 4-L, 5-M, 6-F, 7-D, 8-R, 9-N, 10-H, 11-A, 12-B, 13-I, 14-K, 15-Q, 16-G, 17-E, 18-O

The Artist







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LAST WORD

PORTLY'S COMPLAINT:
Finding room in America for the not-so-average physique

By Daniel Pinkwater

I have been fat all my life, except for a period of about two years when I was thin. In this regard, I was within statistical limits. All the studies on the subject of weight loss I have found suggest that people who lose weight gain it back, plus more, within two years. It's always comforting to know that one is normal and average.

During those two years when I was not circumferentially challenged, I was unpleasantly startled every time I caught an accidental glimpse of myself in a mirror or a shop window. I felt that movie and airplane seats were unnaturally large and uncomfortable, and I worried about my health a lot—something I never did when I was fat.

Speaking of health, doctors have always told me that, as a fat person, I was at greater risk of heart attack, diabetes mellitus, hypertension, atherosclerosis, osteoarthritis, and a bunch of other terrible things. It took years for it to occur to me to ask the questions, How much greater is the risk? and Which would confer the greatest benefit, quitting smoking, getting more exercise, reducing stress, or losing weight? Having asked these questions, I worry even less.

A recent study, widely reported by the media, concluded that—get ready for this astonishing result—overweight people overeat! My God, isn't science wonderful? The same study further observed that fat people generally turn out to have eaten more than they themselves thought they had.

Like most people don't do that. I once informally polled all my acquaintances, fat and thin, and asked everybody I knew whether they regularly ate to the point of discomfort. They all said they did. Human beings are not designed to consume the 16-ounce rib-eye dinner with baked potato, all-you-can-eat salad-and-appetizer bar, and the slab of New York-style cheesecake for dessert—but we sure do. Not to mention the couple of drinks before, the unlimited free refills of soda, and the cups of coffee with cream and sugar.

The difference between fat gluttons and thin gluttons is purely metabolic—and societal. There is nothing we humans like better than abusing and reviling others for perceived faults of which we are guilty ourselves—but are getting away with. Baiting the obese is the last safe prejudice. TV comedians can make fat jokes, which if they were about racial or ethnic groups, would result in collective outcry, cancellations of contracts, and humiliating forced public apologies.

In public, fat people, especially women, are regularly subjected to vile remarks, lectures, pointing, and mockery. I submit that there is no fat person in America who has not been confronted in a restaurant by some maniac, who fulminates, "How could you let yourself get like that? You're disgusting! Aren't you ashamed?" I, for one, am not ashamed. What I usually say to these people, taking advantage of the fact that they are delusional and probably highly suggestible, is, "Get away from me, loony, or I'll eat you." I suppose I should apologize to the mentally infirm who may read this, but understand, it's impossible to enjoy one's taco platter when someone is yelling at one.

It's at least six times as hard to get hired if you're fat. There's an ingrained belief that fat people are excessive, bestial, greedy, lustful, stupid, lazy, dishonest, and weak. Perfectly true, of course, but no more for fat people than all humans, fat and thin. The recent announcement of a "fat rat gene' suggests what we knew all the time—fatness is hereditary. Notwithstanding, former Surgeon General C. Everett Koop announced only one week later a new war on fat. Make up your minds! Is it our fault or not?

But there's good news for the diametrically disadvantaged. Fat people are on the march—and our numbers are expanding, our ranks are swelling. The Centers for Disease Control recently reported that about one-third of Americans are seriously overweight, a finding backed up by an American Medical Association report that claims some 58 million people in the United States are at least 20 percent over their ideal body weight. It used to be that I would have to make special trips to a fat men's clothier in New York, but these days, Sears and J.C. Penney have catalogs of fashions for persons of size. There are many journals concerned with questions of fatness, including *Rump Parliament, Fat!So?,* and the dating magazine for fat gay guys, *Big Ad*.

Many culture heroes are fat. Roseanne, John Goodman, the late John Candy, Marlon Brando—and even our president may yet fulfill his destiny and achieve true greatness. A fat day is dawning, America. Remember—you heard it here first.

In his latest novel, *The Afterlife Diet,* just out from Random House, Daniel Pinkwater takes a seriously demented look at weight-consciousness in America.