OMNI

JANUARY 1995

WHAT WOULD YOU SAY TO AN ALIEN?

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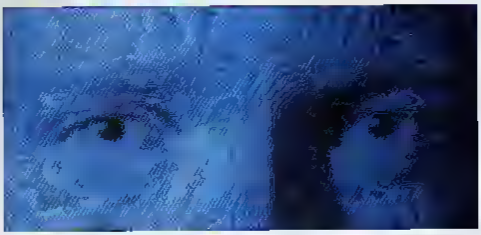

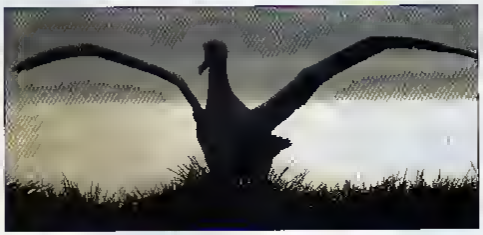

If you found yourself facing an alien delegation, would you know what to say? Would anyone? President Clinton Arthur Miller, and George Carlin are just some of the people from whom *Omni* sought an answer. Cover art by Jim Zuckerman. (Additional art and photo credits, page 103)

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FIRST WORD

YOU CAN NEVER SAY NEVER ENOUGH.
The first lady of American film fights AIDS and apathy

By Elizabeth Taylor

In the ten years of the AIDS crisis that I have spent lobbying, fundraising, and persuading the population, I have experienced such joy and pain. Each time we have gained a small victory—in science, in education, in public policy, or in caring for people with HIV/AIDS—we have been set back by the loss of another loved one.

In the face of seemingly overwhelming despair, it would be easy to give up hope and to give up action; to say that it's all too hard to bear. But we are at war with AIDS! And each time we lose in one battle, some friend, old or new, steps forward to fight to try again to change the world. So we continue to fight this enemy that recognizes no social, racial, economic, religious, or national boundaries, at war with an enemy whose target is not particular groups of "high-risk" individuals but the high-risk behavior of any individual.

In order to win this war, we need tenacious courage and boldness in *educating* ourselves and our loved ones. In my travels around the world on behalf of the American Foundation for AIDS Research (AmFAR) and the Elizabeth Taylor AIDS Foundation (ETAF), I am constantly stressing the *need for education*. HIV/AIDS education, however, cannot be just the business of agencies and individuals who are working the front lines trying to save lives. It is everyone's business to know how AIDS is spread and how we can protect ourselves. It is the responsibility of every individual to protect him- or herself and others from infection.

I am hopeful today as I observe the developments in community support and activism against AIDS. The American community is slowly becoming more supportive and understanding of people with HIV/AIDS. I am hopeful that people are beginning to realize that they cannot sit idly by while AIDS continues its relentless course. Many people are getting involved because they feel a compelling responsibility to help. Tragically, however, more and more people are getting involved because more and more people are being touched in a very personal way through the illness of their friends and loved ones.

Even after 12 years of the AIDS epidemic, the greatest barrier in the fight against AIDS continues to be the stigma associated with the disease. The stigma of the association of AIDS with homosexuality and injection substance abuse continues to make the battle against AIDS formidable. This is the same stigma that breeds contempt, instead of compassion, for those who are affected and infected by HIV.

It is encouraging to see films such as *Philadelphia* and plays such as *Angels in America* receiving high acclaim. Though the AIDS-affected community has been beautifully expressing its hopes and joys, pains and sorrows, for years, it is exciting to see that these mainstream media are willing to portray the realities of AIDS. Projects like these do much to educate the public not only about the realities of the disease, but also about the realities of those who are fighting it.

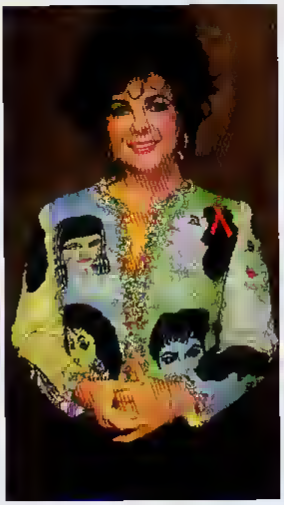
The media have done both a lousy and a great job on AIDS. Since the beginning of this crisis, there have been stories that sensationalize the issue and play on people's fears. While some report inaccurate information which unfairly hypes potential treatments, others continue to promote old stereotypes—AIDS as a disease affecting only gay men or substance abusers.

The media have also presented very sensitive and touching portraits of the realities of living with HIV/AIDS. They have presented programs that have covered the topic in depth with accurate information. They have run public-service programs and announcements.

Given the far-reaching capabilities of the news and entertainment media, they are an incredibly valuable tool for disseminating HIV/AIDS information. I implore them to increase their participation through more AIDS education campaigns. They *can* do more. They *must* do more.

Complacency and AIDS are not compatible. We cannot stop our activism, our advocacy, our pleas for more resources. Most importantly, we must never stop caring and giving all the support and compassion we can to those with HIV/AIDS. With education and activism, we may some day render this disease a terrible memory. I pray that such a day may come very soon!

"Not until every man, woman, and child knows the facts about AIDS can we hope to diminish the spread of this insidious disease. There is no subject more important to future generations."



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JANUARY

COMMUNICATIONS

READERS' WRITES

What matters most—birth, death, or the life that flows between the two?

Just A Hunch

I was disappointed that Dr. Cappon [IQ2 September 1994] didn't mention the most important application of intuition through the ages, the real everyday use that determines the outcome of the human aptitude—child rearing. Intuition plays an extremely viable role in raising a child to his or her potential. He speaks of hard (yang) applications of intuition—making money, inventions, and scientific theory. But what about the soft (yin) uses—mothering, counseling, teaching? These don't make a lot of money or fame, but they do have far-reaching effects on the human condition.

Polly LaGrave, M.Ed.
Elberta, AL

Science versus Religion

I consider the ability to argue both sides of an issue one of the most desirable and rare evidences of true intelligence. Your October 1994 issue reaffirmed *Omni* as being at the forefront of intelligent journalism. First, the UFO Update may seem ridiculous, but the concept isn't unfounded. Consider what Satan might undertake to explain the sudden disappearance of thousands of people as foretold in the Bible as the Rapture. Alien abduction would be a viable and [now] acceptable alternative to a confirmation of Biblical prophecy. Second, I read Hancock's book [Confinuum Lead] last year, and the first thing any Christian would notice is that Hancock isn't. The real reason no one tried to find the ark in this manner before is because most Christians don't dare doubt the Bible. Third, it seems silly that one would stumble on the lack of a DNA explanation in the Bible [Science and Religion]. Evolution doesn't adequately explain the origins of DNA either. It's still the old chicken and egg argument. You can't have life without DNA and vice versa. As we move toward the year 2000, with Bible prophecies unfolding daily, the melding of science and religion is a subject one cannot afford to ignore.

Jeffrey M. Cook
Lynnwood, WA

I just read the October issue and was somewhat alarmed. The chasm existing between religion and science is healthy normal, and should be continued. It's obvious to me this theologian [Robert Russell] is attempting to use the good reputation of science to add credibility to religion [Science and Religion]. In the future I hope to see the overwhelming weight of scientific fact crush religion completely, pushing it back to the Stone Age where it belongs. Mr. Russell would like to keep theology relevant to the times. Why not just admit it has never been relevant and be done with it? Religion has caused more harm in every era of human history than any other single idea.

William McNulty
Seattle, WA

Enjoy It While You Can

"The Other Side of the Bloch" [October 1994] was a refreshing admission of humanity. I'm tired of people being comfortable with death. I've heard all the pacifiers—the universe is a safe place, you'll go to heaven, you'll become one with the great spirit, you'll disappear into benign nothingness. My favorite is the jaded, 'Who cares, what's so great about life anyway?' The fact is, life is wonderful, and it scares the hell out of me that I have limited time to enjoy it. When I was younger I knew I could not die. As I aged I believed science would break the morfality barrier. Now I realize that even I am going to die. I don't know how that can be, but I'll tell you: I'm not happy about it. Death is downright terrifying, and I'm with Robert Bloch in saying so.

Jane Smith
Irvine, CA
AOL: Dakhma

Editor's note: Robert Bloch died September 23, 1994. His work lives.

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MEDICINE

FANTASTIC VOYAGE:
Traveling the body in microrobotic style

By Steve Nadis

Researchers at MIT's Artificial Intelligence Lab have plans to go where no man, woman, or "mobot" has ever gone before—into a dark, slimy, and winding tunnel known as the large intestine, or colon. The microrobot—named Cleo and little more than an inch in width, breadth, and height—was devised by 22-year-old MIT senior James McLurkin, who admits to having 'always liked small things.' Cleo is about the smallest thing on two treads going these days and it's also among the smartest. It can find a path between obstacles, move toward or away from light, avoid hills and grasp objects with a small claw. All these actions can be initiated by a person operating a joystick. Cleo can also function on its own, untethered, making its way through a plastic colon maze, for instance, by bumping into a wall, backing up, and shifting its direction ever so slightly.

Cleo is the fourth so-called "ant" created by McLurkin—and the product of an effort certainly disproportionate to its modest size. To gather all its miniature parts, McLurkin pored through "catalog after catalog, making a million phone calls, always asking the same question: 'Do you have anything smaller?'"

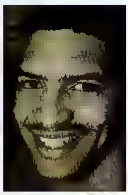
The project is funded by the Advanced Research Projects Agency (ARPA) in the Department of Defense which is looking to remote surgery as a long-term goal. According to this vision, someday remote manipulators (robot arms) might perform surgery on U.S. soldiers around the world, guided by physicians back home. For the nearer term, the agency regards colon examinations and surgery as the most immediate applications. 'A diagnostic task such as looking for cancer is the main motivation," explains ARPA surgeon Richard Satava.

The technology allows the microrobot to work in conjunction with light and a camera. If something unusual is spotted, the controlling physician might take a sample (a biopsy), or possibly snip off little growths or polyps and stop intestinal bleeding with lasers or electricity. "We can do all these things today in a procedure called colonoscopy, but that involves pushing a long tube into a person which is extremely uncomfortable," Satava says. "A small instrument like a microrobot has the potential to be much less painful and much less dangerous." He predicts that robotic colon surgery could be possible within five to ten years.

Robotic surgery is not altogether new. 'Robodoc' for instance, is used during hip replacement surgery to bore a precision hole in the hip bone for an artificial replacement part. Robots have also helped neurosurgeons determine the exact position of brain tumors. But Cleo is among the first to be designed to go *inside* the human body. Before that happens, though, several problems have to be solved.

Locomotion is the most pressing challenge. The large intestine is wet, slippery and elastic, with sharp curves and loops—factors which make it "a difficult environment to move around in. It's like driving on a Jell-O mold," explains Art Shectman, an MIT senior who is working on the problem. Size, too, is a factor. Cleo's motors—which at 7 mm in diameter and 17 mm in length are among the smallest that can be bought today—were taken from vibrating beeper devices. MIT graduate student Anita Flynn and undergraduate Dean Franck are trying to build much smaller motors made out of piezoelectric materials which expand or contract in the presence of an electric field. If their efforts prove successful, McLurkin believes it will soon be possible to build a one-cubic centimeter robot that is small enough to enter the small intestine and other realms of the body.

Cubic millimeter-sized "gnat" robots, the ultimate goal, could wander about anywhere in the digestive tract, plus the ears, bronchial tubes and bloodstream. Robots might be swallowed in pill form, inserted in the bronchial tubes with a tongue depressor, injected into blood vessels, or simply march into the ears. Though some may be frightened by the notion of autonomous robots moving through the body on their own, Satava counters that concern: "It's not any more worrisome than major surgery, where you're put completely to sleep and operated on when you're completely open."



Cleo may look a bit like an army tank, but this microrobot, the next generation of medical tools, is probing a new frontier.

It may be quite a few years before anything as futuristic as this high-tech version of the 1966 classic, *Fantastic Voyage*, is in common use, but McLurkin is optimistic about the future. "This is not pie-in-the-sky," he insists. "Sooner or later, one way or another, robotic surgery is gonna happen." Now that really will be a fantastic voyage.

ELECTRONIC UNIVERSE

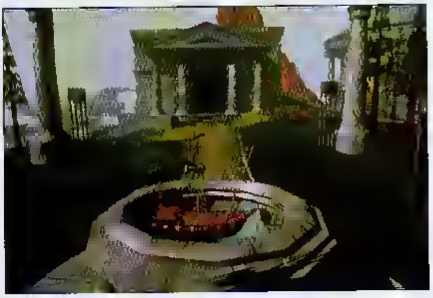
ELECTRONIC EVOLUTION:
Computer entertainment enjoys another renaissance

By Gregg Keizer

Ka-bing, ka-bang ka-boom. In case you're wondering what all that noise is about, just listen carefully. It's electronic entertainment flexing at the joints, trying to accommodate changes in digital temperature. Some things are cooling off quicker than a Montana winter while others are heating up faster than a middle-aged gamer's hot flashes.

Bring out your dead! That 386SX PC tucked into a corner of your house just won't cut it anymore. Nothing pushes the hardware envelope harder than entertainment—you can only type so fast in a word processor, but animation had better fly if it's going to be persuasive—a fact of computer life that translates into an insatiable appetite for fast processors and lots of memory. In fact, with Intel dropping prices of its top-flight Pentium microprocessor and computer makers doing the same for their Pentium-based PCs, these fast machines are fast becoming the home user's dream machine. If you're upgrading the PC this year, it makes sense to skip past a 486 and head straight to a Pentium. Such advice may be contrary to my midyear prediction, but if Windows 4.0 is as game-friendly as some early tests seem to indicate, you'll want the extra power sooner rather than later.

The phenomenal success of CD-ROM titles like Brøderbund's *Myst* may inspire a new crop of nonviolent computer games.



Can I see your I.D., kid? Game violence made headlines during 1994 when Congress pushed publishers to put ratings on boxes or face senatorial music. Everyone jumped to fall into line, but the result—at least two different ratings systems by the end of the year, each supported by a different industry association—is unnecessarily muddy. Still, ratings will quiet the critics and provide conscientious parents with at least *some* guidance on what's appropriate for their kids. Ratings won't quell the violence within games, though, star witnesses are Acclaim's *Mortal Kombat II*, which is even bloodier than last year's model and *Doom*, the gutshooting festival on the PC (and on other platforms, including the new kid-ready Genesis 32X).

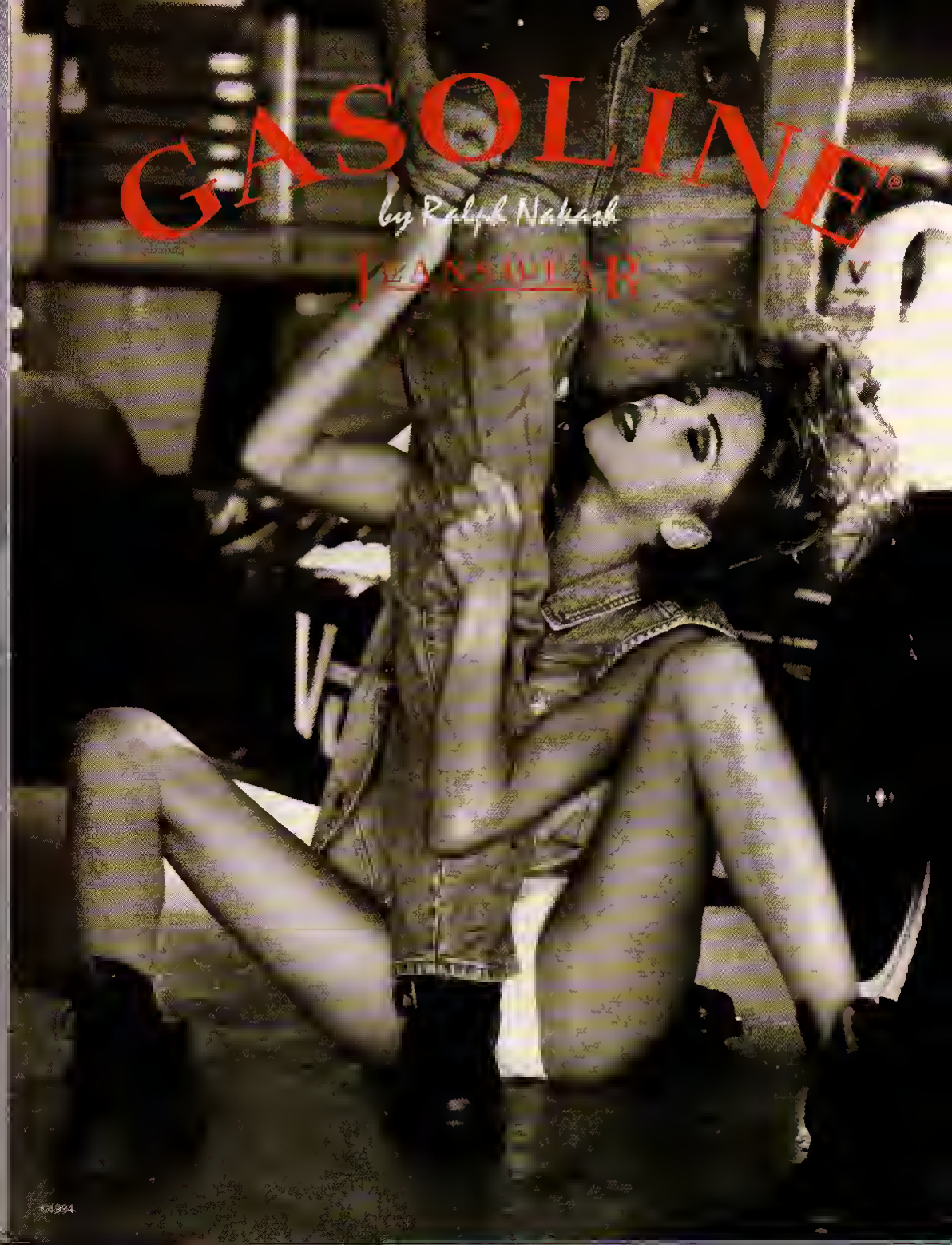
Play *Myst* for me. The phenomenal success of *Myst*, Brøderbund's adventure/puzzle game, proves there's a major market for CD-ROM titles aimed at adults who want to think, not twitch their thumbs on a joystick. Anything that's been on the best-seller lists this long is sure to spawn a slew of look-and-act-alikes, good news for anyone who enjoys nonviolent computer games. And since *Myst* is less a "guy thing" than most games, it may even spur publishers into making more titles tantalizing to both men and women.

Sixteen bits on a dead man's chest. Although existing 16-bit videogame machines are far from dead—I stand by my call that they'll keep you entertained through the end of 1995—Sega's trying to shove us up to 32-bit. Its Genesis 32X add-on should serve as a bridge between past and future, since it's affordable ($149), beefs up the Genesis' color count (to over 32,000), and even sharpens the video on SegaCD titles. A small set of software, including potential hits such as *Virtua Racing Deluxe* and the already-mentioned *Doom*, is its biggest bottleneck.

Nostalgia 1995. If they can recycle Woodstock, they can recycle classic videogames. As the first generation of videogamers starts to worry about turning 30 (or even 40), we'll see a crowd of face-lifted games of yesteryear appear. Activision's *Return to Zork* and Microsoft's *Arcade* jump-started the blast-from-the-past genre. Next up are Nintendo's *Donkey Kong Country* and Activision's *Pitfall: The Mayan Adventure*. This is just the beginning of the videogame version of Classic Rock radio.

Missing in action. Interactive TV was hot news in 1994, but don't expect to see it in the headlines this year. And don't expect to be playing with the TV anytime soon. Test sites of new cable offerings, including the Sega Channel (videogames downloaded to your Genesis), got off to a slower-than-expected start in 1994 and don't seem to be getting anywhere fast.

Get 'em when they're young. Make multimedia PCs and Macs affordable to the average family, and people will swamp superstores and warehouse clubs eager to buy a machine for the home. That trend, which cranked up in late 1993, continues. The result is a glut of good kids' software on CD, from Brøderbund's *Math Workshop* (one of the best math titles I've seen in years) to Microsoft's *Creative Writer*, a writing tool that's also moved to CD-ROM. Even videogames are going after tots and tykes. Sega has launched Kid Club, which features several Genesis games aimed right at pre-schoolers and early elementary-aged kids. ∞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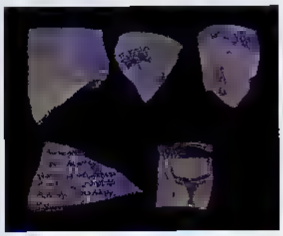
DIGS

BEFORE THE DELUGE:
Dam construction in Turkey threatens invaluable archaeological sites

By Karen Fitzgerald

The fifth-largest rock-and-earth dam in the world, the Ataturk is the third of 21 dams the Turkish government intends to build on the Tigris and Euphrates rivers. Supplying irrigation water and hydroelectricity, the dam promises to transform the vast dust bowl of southeast Turkey into a breadbasket that could feed all of the Middle East and Europe, too, according to Vassar College geologist Yildirim Dilek, who has studied the dam's impact.



Dam construction imperils sites such as Kazane Hoyuk, which boasts pottery (right) dating back to 5000 B.C., and Harran, home of ancient Harran University (below).

But to make way for the future, pieces of the past must be sacrificed. The dam project has already flooded hundreds of archaeologically significant sites along the Euphrates and will affect hundreds more before completion. The clock is ticking for the archaeologists scrambling to excavate these potentially invaluable sites before the water rises. Much of the region is virgin territory to archaeologists.

Samsat, near the Euphrates, was one of the first victims of the dam project. A bustling city of 50,000 during the Roman Empire, Samsat goes as far back as the Neolithic Period. A rich site like this would normally take decades to excavate, but archaeologist Nimet Özguç of the Turkish Historical Society and her team had only 11 years to work before the water came rushing in in the late 1980s.

Archaeologists from Ankara University, working under the direction of Olus Arik, have begun another emergency excavation at a town called Hasankeyf, due to be submerged upon the completion of the Tigris's Ilisu Dam in about six years. Many archaeologists consider Hasankeyf the most wrenching loss because of its striking buildings. "Hasankeyf is filled with masterpieces of Islamic architecture," says archaeologist Guillermo Algaze of the University of California, San Diego.

The dam region holds the only clues to the intersection of the Mesopotamian cultures to the south and the Anatolian cultures of ancient Turkey to the north, Algaze explains. Only four known sites record the incursion of the Sumerian culture of Mesopotamia into Anatolia, he says. The Carchemish Dam, planned for the Euphrates River, will put three of them under water.

Yet another threatened site, Kazane Hoyuk, may contain artifacts that overturn conventional notions of how and where civilization began. A tablet found there recently is written in cuneiform, the first system of writing, devised by the Sumerians. Some archaeologists consider it another example of Sumerian culture spreading into Turkey, but University of Virginia archaeologist Patricia Wattenmaker, a director of the excavation, says the artifacts found so far reflect a culture distinct from the Sumerians. The great size of the site—100 hectares—suggests it was a city of a population unheard of before the development of agriculture and civilization. Wattenmaker believes the prehistoric city was an independent seed of civilization, perhaps one of many independent city-states throughout the Middle East that nurtured cultural advances at about the same point in history.

Her team has excavated Kazane Hoyuk for only two summers, and only five to seven more years remain before irrigation construction concludes there. Then the land will be devoted to agriculture year round, making archaeological excavation too expensive to continue. Ironically, archaeologists would probably never have discovered the Kazane Hoyuk site if not for the large irrigation channel that now cuts through the modern town. During its construction, bulldozers kicked up prehistoric pottery that tipped off Wattenmaker to the importance of the site.

Although she knows her days at Kazane Hoyuk are numbered, Wattenmaker has only praise for the Turkish government's efforts to excavate the sites before flooding. She and other archaeologists point out that other countries, including the United States, do much less when technology encroaches upon archaeological material, a not-uncommon occurrence. "It happens literally every day everywhere in the world," Algaze says.

Regardless, the massive scale of the dam projects in a country so rich in antiquities makes Turkey's case particularly poignant. Turkey boasts more than 40,000 recorded archaeological sites, and half the country hasn't even been explored.

WHEELS

AMAZING AMPHIBIAN
Traveling around the world in the Surface Orbiter

By Ginger Pinholster

It all started with a trip to Australia, where show-car craftsman Rick Dobbertin got decked by a kangaroo. Dobbertin, 41, and his wife, Karen, were touring Down Under to promote his 1985 Pontiac J2000, *Hot Rod* magazine's "Hot Rod of the Year" for 1986.

That's when Dobbertin—bored with muscle cars—decided to build an amphibious vehicle suitable for circling the globe. "Someone said, 'Hey mate, how'd you get [the J2000] here, drive it?' Then it dawned on him to create a machine you actually could drive across continents," explains Loren Benedict, project manager for the trek.

The Dobbertins weren't sure at first how to bankroll their dream, but Lady Luck intervened when Karen captured Rick's impromptu boxing match with a kangaroo on videotape. By parlaying the tape to television's *Totally Hidden Videos*, they won $10,000 worth of seed money for their amphibious car.

The Dobbertin Surface Orbiter is a $175,000 amphibious conversion of a milk tanker that plans to complete its trek around the world in 1996.

At press time, they were chugging slowly through the Caribbean in their Dobbertin Surface Orbiter, an amphibious converted 1959 Heil milk tanker known on the water as Perseverance. After island-hopping to South America and past the equator, they'll steer north for a pit stop in California, using a large compass and global positioning system to navigate. From there, it's on to the Aleutian Islands, Japan, the Philippines, Australia, India, Africa, and Europe. They hope to complete the trip by September 1996.

The Dobbertins began their incredible journey on December 19, 1993, after signing new wills and chipping through ice for a test ride around Lake Cazenovia. Capable of 70 miles per hour on the highway and "sailboat speeds" (6 knots) in the water, the Orbiter's gray cockpit was comfortable enough as Rick and Karen zigzagged south toward Florida, traveling about 12 miles on each gallon of diesel fuel.

But the going got tough at 2:00 a.m. on March 5, 1994 when they launched from Key Largo, Florida, and plunged into the Gulf Stream for a stomach-churning, 17-hour crossing to the Bahamas. "I was seasick," recalls Karen, a 35-year-old interior decorator. "Rick had to man the helm the whole time." Though they had encountered five-foot waves during practice runs on Lake Ontario, Rick was surprised by swells topping 10 feet in the ocean. "In one second, we would be turned one way, and the next second, we would be turned the other way, which was kind of aggravating," he says mildly. "The compass would show 35 degrees, then it would show 310."

Since its hull was originally designed to haul 32,000 pounds of milk, however, the Orbiter remained watertight. "It's a double-walled stainless steel tank, insulated, and obviously if it held milk in, it could hold water out," Benedict notes.

The 32.5-foot stainless steel monstrosity created quite a stir in the Bahamas, where local police insisted on "escorting" the couple, and witnesses kept asking, "Are you crazy?" In Nassau, Rick says, "a guy said he wanted to watch us launch because we would sink."

Powered by a 6.5-liter GM turbo-diesel engine with a Peninsular marine conversion, the Orbiter also includes a Hydra-Matic 4L80E automatic transmission and Borg-Warner transfer case. It relies on standard amphibious technology. When moving from land to water, the Dobbertins simply slip a collar from one drive shaft to another, switching from four-wheel drive to propeller mode. To climb back onto land, they engage two front tires. "It's a push-me, pull-me' operation," Benedict explains.

Design modifications may help the Dobbertins avoid a sequel to their spin-cycle experience in the Gulf Stream. Rick tried attaching the severed bow of a shipwrecked power boat to the Orbiter. "We looked like the Beverly Hillbillies," he says, adding that steel fairings might help, too. Because it rides low in the water, however, Rick claims the vehicle isn't likely to sink. "I don't think it's a life-or-death vehicle," he says. "If the engine blew up and we were set adrift, it would just bob around like a cork—a vomit-filled cork."

ARTS

THE RECLAMATION PROCLAMATION:
A band of artists unites to reinvent urban planning

By Steve Nadis

It was a museum like no other, two dozen art installations scattered amidst an industrial wasteland, creating some unlikely juxtapositions—wind-driven mobiles sharing space with burnt-out vehicles, headless, flattened human figures pressed against a chainlink fence, and stone benches situated near discarded chunks of concrete. The site at North Point, an obscure parcel of land straddling the Boston-Cambridge, Massachusetts, line, is cut off from general use by highways, a rail bridge, and the Charles River. The exhibit opened on April 30, 1994, stuck around for a month, and then quietly vanished—another hit-and-run job by the Reclamation Artists (RA).

The group of more than 100 Boston-area artists and landscape architects formed in 1989 with the goal of "reclaiming" land apparently bypassed by development plans and producing outdoor exhibitions that present alternative visions for urban planning. The April show was the sixth of seven exhibitions so far with more planned for 1995 and beyond. By design, all RA shows are uncurated. "People are free to do exactly what they want to do, which ensures diverse messages and points of view," explains MIT sculptor Joan Brigham, the group's current coordinator. It also gives members from world-renowned artists to students, equal opportunities to exhibit their work. "For too long, curators have completely controlled what the public can see. This is about artists taking back their rights."

It's also about getting the public involved in decisions about how land in their region is used. The first step is to set up exhibitions that lure people to neglected urban enclaves—particularly land threatened by the Central Artery Tunnel project, the largest highway building project in the country. "We use art as a catalyst to get people to look at things," says Cambridge artist Laura Baring-Gould. At North Point, she installed three sculptural pieces—copper benches, which she calls "bleacher seats on the heart of the city. You can sit here and see all the things it takes to make a city function—trucks moving in and out, commuter trains on the bridge, and boat traffic on the river."

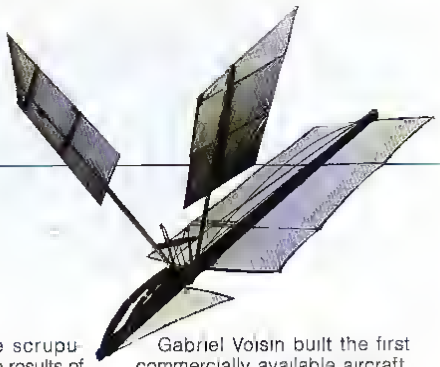
RA is drawing attention to North Point, the last half-mile of undeveloped riverfront property in Boston, in the face of current plans to turn it into a generic hotel and condo park. "We should pay attention to what makes places unique so that everything doesn't look the same. The repetition of the same old formulas is killing America," Brigham notes, suggesting there's got to be another way for public spaces to be developed. One problem, she adds, is that the design of our cities goes on with little or no public input—a fact that RA desperately hopes to change.

This effort parallels the efforts of other artists trying to promote the idea of democracy as a participatory process," explains New York art critic Eleanor Heartney, co-curator of a show on "Public Interventions" which was held at the Institute of Contemporary Art (ICA) in Boston from April 27 to July 17, 1994. The exhibit focused on public artwork that "agitates in some way for social change," featuring the works of RA, other art collectives, and individual artists. "Art is starting to move out of the galleries," Heartney says. "And through this work, artists are not just attempt

CONTINUED ON PAGE 95

Intervention, a leather labyrinth by Marty Cain, is one of many site-specific installations designed to direct the public's attention to neglected land.

WINGS



LAWRENCE HARGRAVE: Unheralded aeroplane pioneer

By Janeen Webb and Jack Dann

On November 12, 1894, Lawrence Hargrave, the Australian inventor of the box kite, linked four of his kites together, added a sling seat, and flew 16 feet. By demonstrating to a skeptical public that it was possible to build a safe and stable flying machine, Hargrave opened the door to other inventors and pioneers. The Hargrave designed box kite, with its improved lift-to-drag ratio, was to provide the theoretical wing model that allowed the development of the first generation of European airplanes.

In the 1890s a small number of inventive technologists were working to translate infant aviation theory into airplanes. Leading the race was Hargrave, a quintessential nineteenth-century gentleman scientist of independent means. A gifted explorer, astronomer, amateur historian, and practical inventor, Hargrave devoted most of his life to constructing a machine that would fly. He believed passionately in open communication within the scientific community and would not patent his inventions. Instead, he scrupulously published the results of his experiments.

The first successful aircraft incorporated three crucial aeronautical concepts developed by Hargrave: the cellular box-kite wing, the curved wing surface, and the thick leading wing edge (aerofoil). The Wright brothers had access to Hargrave's work through the aviation annuals published by James Means, and Octave Chanute's *Progress in Flying Machines*. Chanute, who corresponded with the Wright brothers, devoted a section of his book to Hargrave's experiments. But the Wright brothers, constrained by politics and patent problems of their time, admitted no influences.

The direct line of Hargrave's influence on the evolution of flying is more discernible in Europe. The French (who thought that France was the cradle of aviation) freely acknowledged Hargrave's influence. Alberto Santos-Dumont was the first European to fly a heavier-than-air machine constructed of Hargrave box kites in 1906. When Gabriel Voisin built the first commercially available aircraft, based on the stable lifting surfaces of Hargrave's box kites, he called them "Hargraves."

In 1889 Hargrave revolutionized engine technology by inventing the radial rotary engine, which reappeared (unacknowledged) in modified form in 1908 as the French Gnome engine. Although as early as 1892 Hargrave had voiced his opposition to the idea of the "connection of the flying machine with dynamite missiles," the rotating radial engine was extensively used in military aircraft until it was superseded by new engine technologies many years later.

Hargrave's concern for the peaceful promulgation of knowledge was evidenced in his concern for the safe placement of his working models in an environment open to the public. The only museum that would meet his terms was the Deutsches Technological Museum in Munich. It is ironic that most of Hargrave's 176 working models were destroyed in the Allied aerial bombardment of Germany during World War II. The 25 surviving models were restored in the 1960s to Sydney, Australia's Powerhouse Museum, which is staging an exhibition to mark the centennial of Hargrave's first flight.

Octave Chanute wrote in 1894 that "If there be one man more than another who deserves to succeed in flying, that man is Mister Lawrence Hargrave of Sydney." But Hargrave never did solve the power-to-weight ratio problem. His 1902 design was put to the test in 1992 when students at the University of Sydney rebuilt his aircraft from the original blueprint, replacing Hargrave's power plant with a modern one.

It flew.

Lawrence Hargrave's flying machines, based on the box kite, provided inspiration for many of aviation's pioneer designers.

MUSEUMS

VIRTUAL GALLERIES
Museums weave a web of online exhibits

By J. Blake Lambert

Having seen enough of the art on display at the Louvre for the moment, you pop over to the London Transport Museum for a look at some historical hardware. Then it's off to Berkeley to check out the University of California's paleontology exhibit. No, you haven't leased a Concorde for the day—you're touring the museums of the world via the Internet's World Wide Web, sitting comfortably in front of your home computer.

Museum discussions, art collections, virtual exhibits, and more await the online visitor. Instead of walking through exhibit-filled hallways, you view works on a display that looks much like a color newspaper page. Just point and click on any topic of interest to retrieve text, pictures, or sounds.

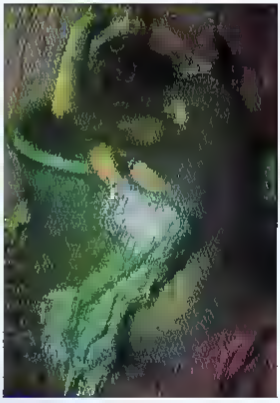
You can climb on the World Wide Web from a home page—a listing of Internet locations that fit a particular interest. There's no better place to start museum browsing than the Virtual Library *Museums* page, created by Jonathan Bowen. To start browsing, connect to *http://www.comlab.ox.ac.uk/archive/other/museums.html* using Mosaic or Lynx.

A good first stop is the EXPO, which takes Internet visitors through four exhibits based on Library of Congress material: Rome Reborn (200 images from the Vatican Library), the Soviet Archive Exhibit (previously secret documents), 1492, An Ongoing Voyage (focusing on the years 1492 to 1600), and Scrolls from the Dead Sea.

Next, you might jump over to Fiat Lux, an online exhibit of Ansel Adams photographs commissioned by the University of California. Some of the images of UC campuses and research facilities are spectacular.

LeWebLouvre is an awesome site which won a Best of the Web award in 1994. In addition to famous paintings (there's an especially good selection of Impressionist art), there's also French medieval art, as well as an excellent text and image tour of Paris.

The University of California at Berkeley Museum of Paleontology Public Exhibit is a virtual museum arranged by animal groups. (The Mammal Hall splits off into placental, marsupial, and monofreme mammal rooms, for example.) While traveling from room to room, a virtual guide explains what's being displayed.



The San Francisco Exploratorium presents information and schedules about the actual physical museum, along with a series of images related to the museum and its exhibits. These include some interesting artworks by artists-in-residence.

There's far too much accessible from the *Museums* home page to completely list here, but other exhibits include the Smithsonian, Bodleian Library manuscripts at Oxford, the Museum of New Zealand, the Institute of Physics in Naples, the London Transport Museum, the River and Rowing Museum, the Singapore Art and History Museum, Jerusalem Mosaic, and London's Natural History Museum.

Online museums reach a global audience. As Robert Guralnick, museum Internet specialist at the University of California Museum of Paleontology, explains, "In August we have had visitors from 41 different countries—including the former Soviet Union—view our World Wide Web server." The museum sends more than 6,000 files to online visitors each day.

Kevin J. Comerford, visual resource librarian and manager of information technology at the Dallas Museum of Art, stresses the benefits of being able to reach "literally millions of people worldwide, at an amazingly low cost." Even visitors to the actual museum benefit, since they are able to "take home part of the museum (in the form of digital images)," Comerford explains, and to "keep in touch with museum events and exhibitions."

Even if you don't have Internet access, you'll find that many online services have their own excellent museum resources. America Online hosts the Smithsonian Institution, with great photos of exhibits, as well as the National Museum of American Art, which has over 260 images of American paintings and folk art. America Online's Library of Congress section contains mostly text, but offers photos in the Dead Sea Scrolls exhibit.

Museums around the world are opening the doors wide for virtual visitors. Guy Hermann, information systems manager for Mystic Seaport Museum, says that, as Internet access becomes easier, "the 'great' museums are going to be the ones which provide the best access to the most information" online. DC

Museums accessible on the Internet turn your computer's screen into a virtual gallery of some of the world's great artworks.

MIND

THE CHANGING MINDS OF CHILDREN
Growing up in a context-free reality

By Evan I. Schwartz

A college basketball coach recalls the players he led a generation ago reading books on the bus to pass the time. Today, they don their Walkman headphones and break out their Nintendo Gameboys. For years, the coach diagrammed plays on a blackboard, representing opposing players with Xs and Os. More recently, however, he began noticing the athletes do not understand the plays unless he shows them videos of the teams in action. "The kids have changed over the years," he says. "They seem to have lost their abstract thinking skills."

Such stories are rather typical these days. And they are sending childhood psychologists and neuroscientists down a new path of inquiry. Are new technologies altering the structure and abilities of the human brain?

Biopsychologist Sherry Dingman, assistant professor of psychology at Marist College, suggests that children today are developing awesome capabilities in their right cerebral hemispheres "at the expense of left-hemisphere skills." The left cerebral cortex, she says, is specialized to process language and abstract functions such as translating a narrative from a book into a visual image in the mind. The right cerebral cortex is specialized to process visual imagery, such as video. The faster and more intense the visual information, the more work and practice the right brain gets.

The result, Dingman says, is a generation of "children who may be deficit in left-hemisphere skills," and who can become addicted to the fast action electronic visual feast. By contrast, the 'camera angle' in a classroom or book never changes. This helps explain, she thinks, why children seem to pay more attention to videogames and electronic media than they do when they read or listen to a lecture.

Changing environments means changing neural wiring. The human has perhaps the most malleable brain of all creatures, young brains are the most plastic of all, developing neural connections up to age 14. Today's youth seem better able to process many different contexts at once, says neuroscientist Karl Pribram, director of the Center for Brain Research and Information Sciences at Radford University in Virginia. Minds nurtured on electronics become adept at context switching, going back and forth between two or more different scenes or entire programs.

People can handle massive amounts of information, Pribram explains, provided it's in a context—a narrative story or documentary news format, for instance. Context overload comes when you don't have time to make the information a part of yourself. "When you're multitasking on TV or a computer, you're processing a tremendous amount of information," he notes. "When you're able to context-switch effectively it allows you to be more tolerant of other viewpoints."

"Some people would say the new technology puts us another notch away from thoughtfulness," Pribram adds. "Will we use our brains less thoughtfully? With massive computer storage, we are less dependent on memory, everything is momentary. We'll have to find new ways to alert people to the past. Hypertext is one technique—just click on something, and it will trigger a reference from the past. We'll only have to remember the triggers. We'll have to develop better triggers to the past."

Does this mean the brain is changing in an evolutionary sense? Not that obviously. The genetic blueprint takes thousands of years to vary significantly. But for all practical purposes, "our culture has changed the way the brain develops," Pribram concludes. Says Dingman: "We have invented technology that is changing us, and we have to pay more attention to it."

What will be the effect on our cognitive and perceptual systems as they confront an ever-increasing and quickening electronic outpouring of information?

LAW

WHEN COMPUTERS COPY STYLE:
The case against Hal and the future of copyright

By Anita Bartholomew

It was a landmark event in the evolution of computer intelligence when *Just This Once* was published by Carol Publishing in 1993. The first novel authored by a computer—Hal, a Macintosh IICX to be precise—the book may end up as a landmark in legal circles as well.

Scott French, who gets "as told to" credit on the book's cover, decided it might be possible to program an artificial intelligence system to "learn" style. His goal: to produce the novel Jacqueline Susann would have written next, had she lived. French fed Hal two earlier novels, with instructions on the formula that made Susann the top-selling novelist of all time. *Just This Once* is not a copy of Susann's books; it's an original, but based on her style and formula.

French's dream of playing midwife (mid-husband?) to a computer-generated novel came true when he discovered an expert system shell (the framework for an artificial intelligence program) that did everything the $100,000 shells did for $94,000 less. French then spent the next eight years—and another $50,000—trying to produce the great American computer-generated pulp novel. When he wasn't coaxing Hal to churn out passages filled with sex, drugs, intrigue, and betrayal (each chapter required about two hundred passes through the system), he was taking courses in computational linguistics, natural language programming, and artificial intelligence.

Using stringent "if-then" rules for content and syntax, French tried to break down Susann's style into something that Hal could emulate. By the time he was finished, he came up with over 20,000 rules which Hal then transformed into *Just This Once*.

But getting it published was almost as difficult as getting it written. As French recalls, "I had publishers and editors who read it, who knew Jacqueline Susann and said, 'This is my project, this is great.' Then the Susann estate threatened a lawsuit, and enthusiasm in the publishing community withered. For a while, no one would touch the book. Finally, French connected with Steven Schragis, who heads Carol Publishing. Schragis, a lawyer himself, figured the odds and decided to risk it. "Can a computer violate someone's copyright?" asks Schragis. "Are we saying that computers may get so good at imitating style that human beings are allowed to copy style, but computers can't because they'll end up virtually replicating? These were the issues that were fascinating to me, and I was frankly anxious to be part of some sort of test of them."

In the end, the suit was settled out of court. French and Schragis are prohibited from commenting on the terms, but credible sources claim the Susann estate gets about 50 percent of the profits. Looking back, French says copying Jacqueline Susann's style may not have been the best choice. He's thinking of switching genres. Yet the case raises some interesting questions about the viability of current copyright practices in today's increasingly electronic market. It also suggests the need for some hard thinking about the integration of artificial and human intelligence. While these are not issues easily resolved, the case against Hal does highlight the shifting ground that has many publishing industry insiders worrying about text online, electronic rights, multimedia expansion, and the application of legal constraints not only on the men and women who program computers, but also on the increasing ability of computers to generate their own dialogue.

Imitation, as the saying goes, may be the sincerest form of flattery, but as Scott French discovered, it may just land you in a court of law.

Undeterred by the lawsuit, French recently called a best selling author of spy novels and asked if the author would object if Hal were programmed to emulate his style. The author was noncommittal but, two weeks later, French got a certified letter from the author's lawyer. Try it, and we'll see you in court. But for French, there are always other authors. As for publisher Schragis, he says, "Part of me wants to do it again, but it would never be as much fun the second time around."

It just may be though, that where the publisher's fun ends, the lawyer's begins. When it comes to intellectual property, the law, and computers, there are volumes yet to be written. Who knows, maybe even Hal could lend a hand.

CONTINUUM

MR. HACKER GOES TO WASHINGTON:
An old debate takes a new form. Plus, eating fat for endurance, and taking power plants on the road

Twenty years ago it must have seemed improbable that the Internet, the obscure domain of researchers, academics and gray pinstripes, would one day inspire front-page debate over the freedom of the Republic. But then again, it seems just as unlikely that a far-fetched physics experiment in a remote town called Los Alamos could foster a global security environment that would last until the dawn of a new millennium. Yet history shows us time and again how arcane high-tech pursuits can have deafening political repercussions.

As the leaders of the Washington-based Electronic Frontier Foundation well know, the complex package of technical issues surrounding the regulations of the data superhighway represent a serious political problem. But it's another issue altogether whether the hackers, gamers and other digital devotees actually grasp the import of what's at stake in this high-stakes poker game that only a lobbyist could love.

"Our constituency is rising to a level of a political force, whether they are aware of it or not," says EFF policy director Jerry Berman. And even though the members of this constituency might be ignorant of the particulars of the political debate, the debate itself is strangely familiar, resembling nothing so much as a showdown between the ideas of Thomas Jefferson and his constitutional nemesis, Alexander Hamilton. Representing the Jeffersonians are the EFF and its allies, advocating open network architecture accessible to all, while certain precincts of government, worried about unregulated power in the hands of the masses, play the neo-Hamiltonian Federalists.

Recently the Jeffersonians, with a modern libertarian streak, have begun to turn the tide. Berman speaks of congressmen who, persuaded by the EFF's arguments and doubtless vaguely fearful of the nascent electoral power of the growing digital crowd, voted to restrict the government's carte blanche privileges under the new digital telephony bill. He speaks of a vice president who accommodated the EFF's and others' request to redraft the government's Clipper Chip encryption proposal, which would have handed the feds a set of keys to anyone's networked conversations. And he tries vainly to recall a story anywhere near as shocking as those 1990 too-frequent illegal seizures of computer equipment by feds who didn't know DOS from DRAM.

The developments of the past four years are tribute to the EFF's adroit play of the game Berman has called "beltway technopolitics." Newly relocated from airy Cambridge to the dirty trenches of Washington, DC, the EFF is wielding its clout with vigor. Still, a little discussed challenge remains: to transfer its genuine concern for Jeffersonian ideals to a constituency which is either studiously indifferent to politics or too polarized ideologically to engage constructively in the legislative process.

Jon Lebkowsky, co-editor of the Austin-based *Fringe Ware Review* and a member of EFF-Austin, seems to be an exception to the apolitical rule, calling the Clipper Chip battle "one of the most exciting debates I've plugged into in years." But while heavyweight pundits like William Safire and *The New Republic*'s Robert Wright have jumped eagerly into the debate supporting the inalienable rights of the cybercitizen, Lebkowsky doubts that many hackers share this passion for politics. Perpetually preoccupied with the technochallenge of the minute, many hackers seem to have little time or inclination for advocacy. Meanwhile, groups that might have complemented the EFF, such as EFF-Austin and ThisL, have lost their initiative, direction, and leadership, Lebkowsky says. It is perhaps a problem inherent in an organization which champions a group leery of champions, as badly as they might need one.

If hackers were the radicals bent upon subversion that some would like to claim, then they might indeed be a potent political force—for better or for worse. But at least Jerry Berman wouldn't have to speak so longingly of their "tremendous unmarshaled power." And we might see the silent silicon majority hearken, finally, to the strident voices of Jefferson and Hamilton echoing out from behind computer screens accustomed to so many rapt, blank stares. —*JAMES D. HORNFISCHER*

CONTINUUM

LASTING LONGER WITH FAT

Dietary fat has acquired a bad reputation lately amongst the health conscious—it's often blamed for extra weight, high cholesterol, and even heart disease. But if you're involved in physical activities that demand endurance, dietary fat may not actually be such a villain. In fact, says physiologist David Pendergast, trendy low-fat, high-carbohydrate diets "may be detrimental to endurance performance."

Pendergast and his colleagues in the Nutrition Program and Sports Medicine Institute at the State University of New York at Buffalo put six trained distance runners on diets with varying proportions of fat, carbohydrates, and protein for one week. The athletes then took a treadmill test in which they ran until exhausted. The runners on the highest-fat diet (38 percent of total calories from fat) ran the longest—an average of about 91 minutes, compared to only about 78 minutes for those on the lowest-fat (but highest carbohydrate) diet.

> THE INNER LINING OF THE ENTIRE STOMACH AND INTESTINE IS REPLACED EVERY THREE DAYS.

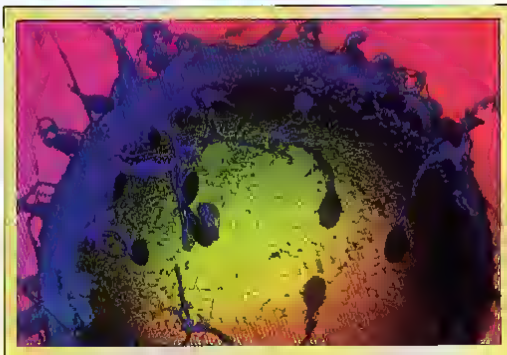
Would Pendergast's findings apply to other endurance activities besides running? "Most definitely," he responds. "Your body doesn't care if you're running, bicycling, swimming, or even shoveling snow. What matters is the intensity and duration of the exercise." In fact, he suspects, "fat may have an important role even in short-burst activities like football and tennis."

So if you're fueling up for a marathon—or even for a club racquetball tournament—you may want to increase your fat intake instead of lowering it. The day before a bout of endurance activity, Pendergast recommends, "you should plan to increase your fat intake to about 60 percent of your total calories."

—Bill Lawren

Should you raid the Twinkies before running a marathon?

"To teach men how to live without certainty and yet without being paralyzed by hesitation, is perhaps the chief thing philosophy can still do."—Bertrand Russell



Anxious sperm swarm around an egg. A new vaginal contraceptive may work as well as the pill in holding them back.

BETTER BIRTH CONTROL

Every woman knows that birth control is often an unhappy trade-off. The birth-control pill sometimes has nasty side effects, as do diaphragms and spermicides if used too liberally. But hold on. A group of scientists has come up with what may become the state of the art in birth control devices—a vaginal contraceptive that releases just the right amount of spermicide at just the right moment to keep the sperm from fertilizing the egg.

The secret, a vaginal chemical engineering, Miller of the University of Illinois at Chicago is a high-tech polymer called PMVE/MA (polymethylvinyl ether/maleic anhydride). PMVE/MA is very sensitive to acidity: it holds together in a low-acid environment, but dissolves when the local pH reaches 7.

Therein lies the key. The normal pH of a woman's vagina is a sperm-killing 4, but in the presence of seminal fluid, it rises within a few seconds to a much more sperm-friendly 7.

"This is when fertilization can occur, so this is when a spermicide is most needed," Miller says.

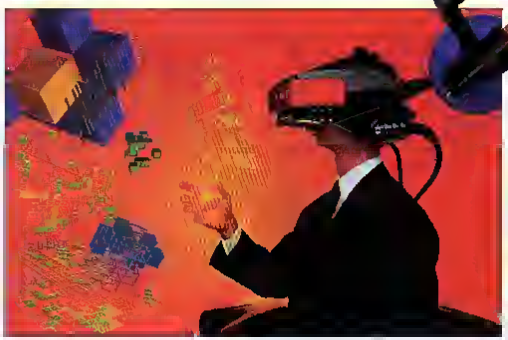
So Miller and his colleague Lourens Zaneveld at Chicago's Rush-Presbyterian St. Luke's Medical Center are designing a diaphragm that uses a PMVE/MA coating to release spermicide only at the right moment—even if the diaphragm is put in place as much as a day before intercourse. They'll test the device for safety on a small group of women later this year. If all goes well with this and subsequent testing, Miller says "we'll have a vaginal contraceptive that works as effectively as the pill. That should make a lot of women—and men—happy."

—Bill Lawren

VIRTUAL REALITY ON A THIMBLE

Today's virtual reality programs allow users to see, hear, and even move about in totally imaginary worlds with a striking sense of realism. Until now, though, it's been hard to get your hands on that virtual world. But J. Kenneth Salisbury, Jr. and Thomas Massie of the Massachusetts Institute of Technology have come up with a thimblelike device that can enhance the virtual reality experience with an authentic and even delicate sense of touch.

Present force-reflecting VR systems, explains Massie, rely on straps or motorized gloves, which are not only expensive—one such system sells for a whopping $250,000—but clumsy. "By the time you strap these devices on,' Massie says, "you're more encumbered than you are enabled." But Salisbury and Massie's device, dubbed Phantom, is simply a set of aluminum thimbles connected to the VR computer by motors, levers, and cables. Phantom allows users not only to touch objects in the virtual world, but also to perform procedures that demand dexterity. They can paint pictures, for example, or even play handball.



The thimblelike Phantom (top) can improve a user's sense of touch and control in virtual reality experiences.

Manufactured by the Vanceburg, Kentucky firm SensAble Devices, Phantom sells for about $19,500. At that price, its early uses will probably be educational—training surgeons, for example, or instructing submarine pilots. But within the next several years, Massie hopes to bring the cost down substantially, to about $400. "About the price," he says, "of a good radio-controlled car."

And what about what may be the most obvious application: virtual sex? "I've made a personal decision not to go for that market," Massie responds, "but if someone develops that kind of software for my device, there's nothing I can do about it."

—Bill Lawren

SOME MICE IN THE SAHARA PILE HEAPS OF STONES IN FRONT OF THEIR BURROWS TO OBTAIN DRINKING WATER FROM THE MOISTURE WHICH CONDENSES ON THEM OVERNIGHT FROM THE AIR

OPERATING ON STANDBY

To Moshe Alamaro's way of thinking, excess electrical generating capacity is a wasted resource, ripe for exploitation. And he's got a novel idea for tapping into these idle megawatts: nomadic industries that can rove from region to region, and even from country to country, taking advantage of cheap, surplus power wherever and whenever it can be found.

These mobile plants could manufacture nitrogen fertilizer, suggests Alamaro, an Israeli immigrant based in Newton, Massachusetts, who holds patents on a technique for making fertilizer using the simplest ingredients—air and water. The system relies on an artificial lightning bolt, an electric arc, to create nitric oxide out of nitrogen and oxygen in the air. Mixing the nitric oxide with water and then combining it with minerals produces a nitrate fertilizer. Although Alamaro didn't originate the concept—a Norwegian plant operating from 1905 to 1940 made use of the same basic technology—he did find a way to boost the process's efficiency and nitric oxide concentration by factors of three and five, respectively.

A second version of the mobile plant would produce hydrogen from water by electrolysis. Hydrogen offers promise as a clean transportation fuel, since the only exhaust emission from hydrogen power is water vapor.

The mobile factories would consist of interconnectable, modular units that could be transported on trucks or rail cars. Assembly and start-up might take a matter of days or weeks, rather than the years typically required to install permanent chemical plants.

The electricity-intensive hydrogen and nitric-oxide processes become economical, however, only when excess electricity is priced below 1.5 cents per kilowatt-hour, about one-fifth the U.S. average. A utility in Washington State has offered to provide its temporary surplus power for about a penny per kilowatt-hour. After a year or two, when the surplus vanishes, Alamora can move the plants to other regions that have excess electrical capacity.

—Steve Nadis

CONTINUUM

If you're tired of "this won't hurt a bit" being followed by a needle jab, an anesthetic patch may be just what the dentist ordered

"THIS WON'T HURT A BIT—REALLY"

Anyone who's ever gotten a Novocaine shot will attest that the dental industry could really use a painless way to administer painkillers. Noven Pharmaceuticals of Miami, Florida may have found one: a needle-free dental patch like those used to deliver everything from nitroglycerin to estrogen. It could do away with the gum-numbing pain of Novocaine injections, a chief cause of dental anxiety, as it's coyly called in the profession.

"The biggest challenge was adapting adhesive techniques for contact with oral mucosa, as opposed to skin," says Juan Mantelle, the company's director of development and new technologies. Gum from the karaya tree, an acacia-family plant with a remarkable capacity to absorb water, provided the solution to getting the patch to stick firmly inside the mouth. Noven mixes the karaya gum with dental anesthetics and a polyhydric alcohol solvent and then coats the back of the patch with it.

Unlike swabs and gels that some dentists have tried on needle-shy patients, the Noven patch won't slide or slip, and the anesthetic won't smear either. Thus it can be fixed to a specific spot, allowing dentists to apply concentrated doses of painkillers precisely where they want to drill.

Currently undergoing Phase III human efficacy trials for Food and Drug Administration approval, the patch will probably see initial use as a pre-injection anesthetic or for relief of mouth sores and lesions.

—George Nobbe

"The philosophers have only interpreted the world, the thing, however, is to change it."—Karl Marx

WE'LL BE BACK AFTER THIS BRAKE

According to its manufacturer, a relatively inexpensive electronic gadget can let you watch your videotaped ball games, soap operas, or *Star Trek* episodes without being assaulted by pitches for hot dogs and personal hygiene products.

The $199 Commercial Brake builds a sort of video map of the programs you're recording. The device, which attaches to your VCR, monitors the incoming television signal and stores the locations of advertisements on the tape.

Richard Leifer, president of Arista Technologies in Hauppauge, New York, says the Brake isolates the clusters of fades to black that invariably precede all commercials, methodically hunting those that are spaced closely together. It notes when the commercials start and end and encodes those locations on the tape.

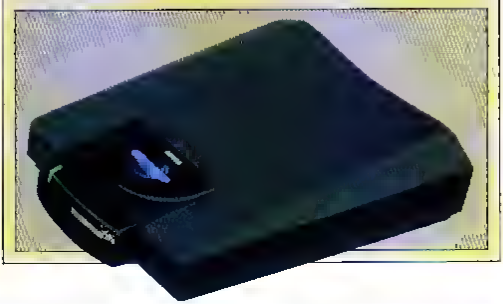
When you'd normally encounter commercials in your programs, you instead see a blue screen as the volume is turned off for three to ten seconds. The Brake is automatically fast-forwarding the tape to the point where the show resumes.

What about the fades to black that occur in many programs? "It's damn close to 100 percent accurate in eliminating false fades that come from out in left field," says Leifer proudly.

Arista's device, believed to be the first of its kind, is simplicity itself. To set it up, all you have to do is connect the remote control-sized unit to the VCR, television, and wall outlet, turn on the VCR, and insert a tape. The Brake does the rest, automatically identifying your VCR's control codes and performing a self-diagnosis. It won't, however, stop your clock from blinking "12:00."

—George Nobbe

"The optimist proclaims we live in the best of all possible worlds, and the pessimist fears this is true."—James Branch Cabell



CONTINUUM

Having trouble getting a good night's sleep? Your brain may not be making enough of the hormone melatonin

RESETTING INTERNAL CLOCKS

An Israeli scientist has found a way to give elderly insomniacs a restful night's sleep. Giving patients two milligrams of the hormone melatonin about two hours before bedtime resets the internal clock that regulates sleeping.

"This is the first time melatonin has been found to correlate with insomnia," says Dr. Peretz Lavie, dean of medicine at the Technion-Israel Institute of Technology in Haifa, whose findings were reported at an annual meeting of the American Sleep Disorders Association. The substance is produced in rhythmical cycles by the brain's pineal gland, telling us when to sleep by producing large amounts of the natural hormone at night and very little during the day.

The clock goes awry in many elderly people who suffer from insomnia because the brain stops making proper amounts of melatonin. In an initial test group of insomniacs, melatonin pills markedly improved the quality of their sleep.

"There's no doubt it has hypnotic properties," says Lavie, whose research group attached a device called an actigraph to the wrists of the subjects and compared the movements of the hand against a predetermined set of normal sleep movements to determine how effective melatonin would be in reducing sleep onset difficulties.

The experiments now involve over 100 patients. In a companion study, Lavie has begun giving synthetically produced melatonin to patients with Alzheimer's disease who also have reduced melatonin levels. The hormone works for them, too, according to preliminary results.—George Nobbe

BACTERIA-INFESTED WATER DROPLETS FROM A SNEEZE CAN FLOAT IN THE AIR FOR 40 MINUTES.

SHRIMP ROLL

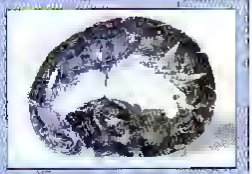
Some critters walk, while others swim, fly, creep, or crawl to get around. Not the stomatopod, though. This tiny, shrimplike marine animal from the Pacific beaches of Panama rolls. And it's the only known species in the animal kingdom that does.

So says Robert Full, an associate professor of integrative biology at the University of California in Berkeley, who has videotaped the strange cartwheeling crustaceans, which were discovered by a colleague who brought several back to the United States for laboratory study.

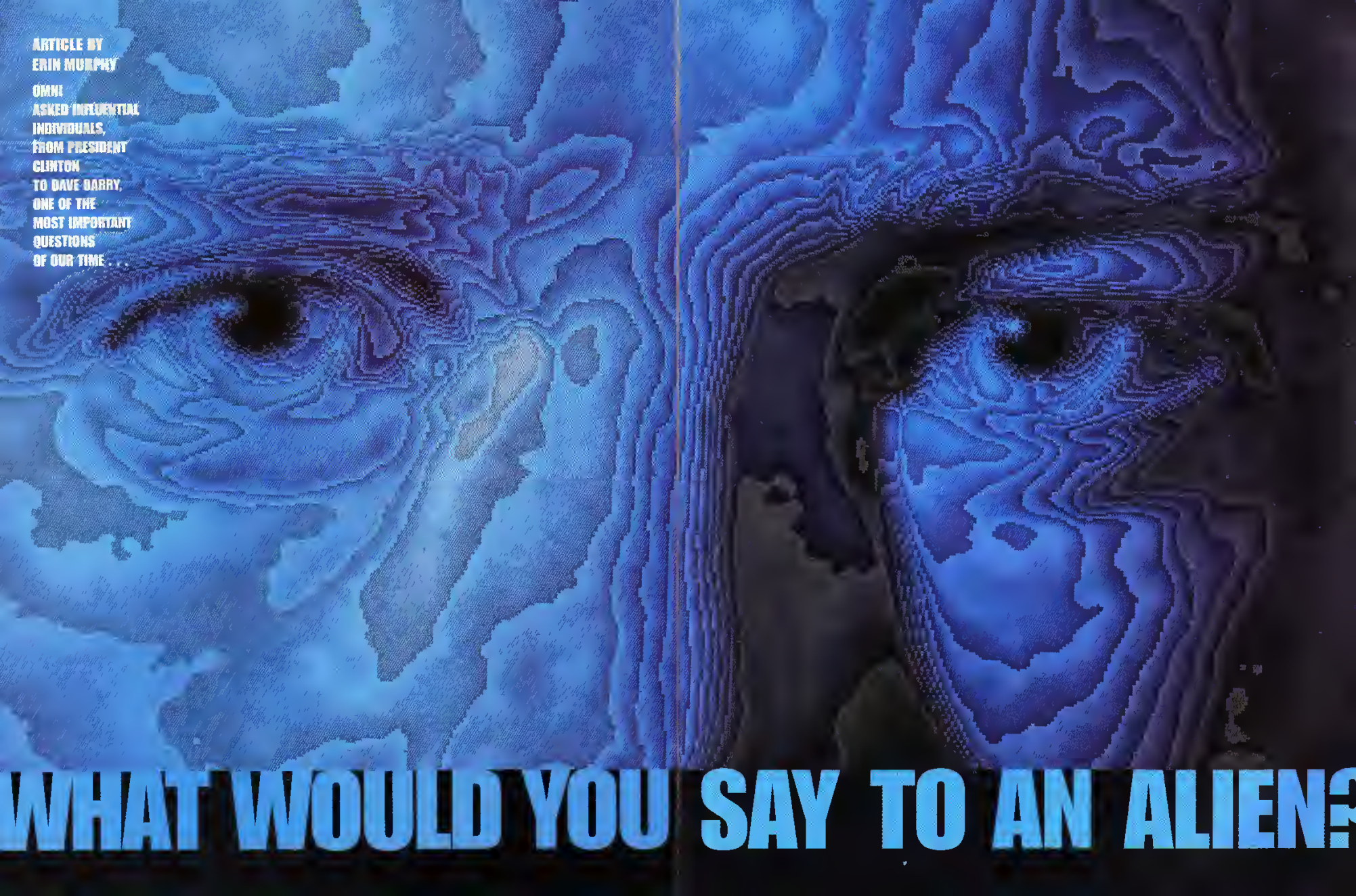
Full says the creatures, whose Latin name is *Nannosquilla decemspinosa*, normally live in underwater burrows so cramped that they may have gradually learned to roll because evolution taught them that was the only way to turn around. Periodically waves or tides wash them ashore, and it is there, when surprised, that they arc their bodies tail-over-head into a ring and roll back to the safety of the water at a glacial 3.5 centimeters per second.

While the stomatopod can handle grades of 10 per cent, it is unable to maneuver around obstacles and can only move in a straight line. It's [illegible] roll less than half of the time, according to Full's observations. The rest of the crustacean's time is spent generating power by pushing off with its head and tail, the same way we use our legs.

"The results of 350 million years of evolution tell us that wheellike movement is a possible but improbable method of locomotion on land," says Full, noting that the curious rolling facility could have some practical applications in locomotion mechanics for tiny robots. "By studying the mechanisms of locomotion and learning how the muscles and skeleton work—looking at exceptions to rules like this—we could get some biological inspiration for robotics."
—George Nobbe



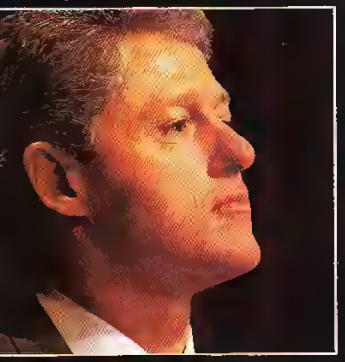
When it comes to getting around, this shrimp's on a roll



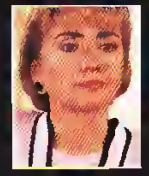
ARTICLE BY
ERIN MURPHY

OMNI
ASKED INFLUENTIAL
INDIVIDUALS,
FROM PRESIDENT
CLINTON
TO DAVE BARRY,
ONE OF THE
MOST IMPORTANT
QUESTIONS
OF OUR TIME . . .

WHAT WOULD YOU SAY TO AN ALIEN?



"Welcome—we hope you find us peaceful, too. What took you so long? We always believed you were out there! Would you like some champagne and caviar to celebrate your arrival? And did you see E.T.?"
—Robin Leach
Host,
Lifestyles of the Rich and Famous



"I don't mean to be too sensible or realistic but I doubt I would be able to get anyplace near the peaceful extraterrestrials who visited Earth. They would immediately be snapped up by Hard Copy, Prime Time, or 20/20. . ."
—Helen Gurley Brown, Editor,
Cosmopolitan

"Get out! Go back! Save yourselves! You don't know what you're getting into. Prolonged contact with our species can only degrade your present standards, whatever they are."
—George Carlin,
Comedian

"Don't take this wrong, esteemed visitors, but your decidedly extraterrestrial appearance—coupled with your magnificent vehicle—have given me an irresistible idea: Could you possibly stay around long enough to do a couple of tourism-promotion commercials for us?"
—Pedro Rosselló
Governor,
Puerto Rico

WHAT WOULD SOME OF THESE PEOPLE SAY TO A VISITING ALIEN? ABSOLUTELY NOTHING.

The alien spacecraft settles noiselessly to the ground. Having been alerted by radio signals several weeks before of the extraterrestrials' peaceful diplomatic mission to Earth, world leaders stand ready to welcome the visitors. As the aliens emerge, President Clinton steps forward on behalf of his peers to greet them. He extends his hand and says . . .

Well, your guess is as good as ours on that count.

Omni asked Clinton recently what he would say to such an unprecedented delegation. He never responded. Neither did First Lady Hillary Rodham Clinton, Vice President Al Gore, White House senior adviser George Stephanopoulos, or the members of the cabinet. Health-care reform, the crime bill, and not invading Haiti *do* make for a busy schedule, but couldn't they have found just a couple of minutes to ponder such an intriguing scenario, particularly in an era when more people than ever before believe that we are not alone in the universe? Or, for the conspiracy-minded, do they have something to hide?

We posed our question to every member of Congress, too, and we're glad to report that one intrepid senator from Tennessee sent us a delightful and insightful answer, welcoming our fictional visitors as only a denizen of Capitol Hill could. We canvassed staffers in virtually every branch of the federal government as well, and the three responses prove that while humor may be rare indeed in the government, it's not altogether extinct.

We didn't restrict our survey to the U.S. government. We asked world leaders, governors of all 50 states and the U.S. territories, mayors of major U.S. cities and influential figures in the arts, science, the media, and other fields. Four governors and one mayor sent us thoughtful responses with the wily governor of Puerto Rico concocting a truly stellar ad campaign for his island's tourism industry.

We heard from three Pulitzer Prize–winners. Playwright Arthur Miller delivered a cautionary message to would-be visitors; humorist Dave Barry has a pressing question of his own, and *Bloom County* and *Outland* cartoonist Berkeley Breathed relayed his version of Opus the Penguin's close encounter of the third kind.

Cosmopolitan editor Helen Gurley Brown reminded us in her response that traveling hundreds of light-years must be terribly draining. Not to worry. *Lifestyles of the Rich and Famous* host Robin Leach and author Harlan Ellison have figured out the perfect refreshments to offer peckish extraterrestrials.

Those are just a few of the fascinating responses we received. Actually, some of the notes from our survey subjects telling us why they couldn't answer our letter were even more entertaining. James Earl Jones, who gave voice to the most imposing fictional alien around, Darth Vader, told us via his publicist that he's "not comfortable with this kind of article and does not feel he has anything to say in this context." Maryland governor William Donald Schaefer "prefers *not* to comment on possible extraterrestrial beings visiting Earth." David Letterman, according to his executive assistant, is "currently putting all of his energies into making the show a complete success." We were hoping that Dave would deliver one of his trademark Top Ten lists out since he didn't come through, we went ahead and made up our own.

Now we'd like to hear from *Omni*'s readers. What would *you* say to a peaceful alien delegation to Earth?

Every day, radio telescopes around the world listen for signals emanating from civilizations outside our solar system—read the letter *Omni* sent out last summer. "What would happen if they picked up those long-awaited signals? What would happen if, when translated, those signals said, 'We are peaceful, and we're dropping by for a visit'?

"What would *you* say to those visitors when they landed?"

Send your greeting, along with your name, city, and state, to: Readers' First Contact, *Omni*, 324 West Wendover Avenue, Suite 205, Greensboro, North Carolina 27408. Or you may E-mail your response to omnireply@aol.com. All responses must be received by February 28. We'll print the best in an upcoming issue.

Joseph Duffey
Director, U.S. Information Agency

I would be torn, as many might be, between the impulse to be oh so serious and the impulse to be very very silly. In any case, I submit to you two greetings, one for each impulse.

"At last! An impartial jury for the O. J. Simpson trial."

"Welcome, strangers. Were you lonely, too?"

Jane Alexander
Chairman, National Endowment for the Arts

I would say, "Let me show you what it means to be human." And then I would take them to the theater, the symphony hall, the opera house, the movies, the museums. I would show them our great architecture and design, read poems, tell stories to them, take them to see the paintings of

da Vinci, Georgia O'Keeffe and Picasso, to a Greek tragedy or a comedy by Shakespeare, to hear Louis Armstrong, Mozart and *Oklahoma!* I would show them the grace of dancers, the elegance of a bow passed across the violin's strings, and the profundity of a child drawing a picture of her mother. And then, after a crash course in our culture, when they gain insight into our imaginative life, our truest expressions of our humanity, I would ask them: 'What is art where you live?' And I would hope to be swept up by their story. And I would hope that we could go on telling each other our stories long after they had intended to fly away.

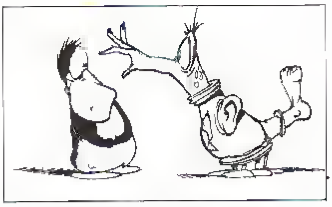
Leonard Nimoy
Actor and director

Due to language barriers and other sociological considerations, it is highly unlikely that we will have any success with verbal communications. I have therefore handed the assignment to my friend Spock, who is highly skilled in nonverbal diplomacy. I have great trust that he will handle matters successfully.

Berkeley Breathed
Cartoonist, Bloom County, Outland

Prior ties would have to be decided, of course. Naturally, official victim status would need to be established, a grievance group founded, and letterheads designed. A suitable term for their minority would need to be determined even before their feet or tentacles or ambulatory hair follicles reached the ground from their craft. For instance, "alien of color" or "non-color" in pigment-challenged. The *Los Angeles Times* would have to be informed of these terms and their stylebook appropriately changed.

At that point we could move forward to nailing down a merchandising deal. Anything else would be small talk.



Outland's Opus the Penguin compares snouts with an extraterrestrial.

Pedro Rosselló
Governor, Puerto Rico

Friendly star-travelers arrive. How do I greet them?

All right. Let's see.

Well, I guess I could do worse than to give them our standard treatment.

"Welcome to Puerto Rico, the United States Island of Enchantment in the Caribbean Sea . . . and—since the honor seems to have fallen to me—on behalf of all God's creatures on *this* planet, welcome to Earth."

Assuming they understood that much in either Spanish or English, I might then be inspired to add:

"Don't take this wrong, esteemed visitors, but your decidedly extraterrestrial appearance—coupled with your magnificent vehicle—have given me an irresistible idea. Could you possibly stay around long enough to do a couple of tourism-promotion commercials for us?

What an opportunity! I can see it now:

for a certifiably
OUT OF THIS WORLD
Vacation Experience
sail, fly or warp-speed yourself to the
Cosmic Continent of Puerto Rico!
Great folks. Our favorite Earthlings.
—The Alpha Centauri Six

Obviously disposed to humor the homeboys, our guests readily assent. Then, after I scramble my troops via cellular phone (trying to assemble a camera crew at 3:00 in the morning), we engage in some small talk while waiting to shoot the immortal endorsement spots. Sure enough, I ascertain that our sunny soil has been selected as Landing Site One because the first Search for Extraterrestrial Intelligence (SETI) signals they received were transmitted from the world-famous radio telescope situated in the mountains above Arecibo, Puerto Rico.

What a deal! Are we on the map or *what*? Is our admission as America's 51st state a cinch or *what*? Am I as good as re-elected or *what*?

What, what, what? Alas, the alarm clock rang and I woke up. But it sure was fun while it lasted.

Arno Penzias
Vice President of Research, AT&T Bell Labs

Personally, I'd like to make sure that both sides got a lot of preparatory

TOP TEN THINGS OMNI THINKS DAVID LETTERMAN WOULD SAY IF AN ALIEN DELEGATION VISITED EARTH

10. Want tickets to *Miss Saigon*?

9. And now, a new segment on the show: "Stupid Alien Tricks!"

8. From our new home office on the planet . . .

7. Hey Mujibur and Sirajul, have we got a great trip for you this year! Exotic locations, interesting um, life-forms . . .

6. Those aliens have only been here two days, and already they've signed a movie deal and dated Madonna.

5. So how's Elvis doing these days?

4. Is it true that the face on Mars is really an uncanny likeness of Michael Jackson?

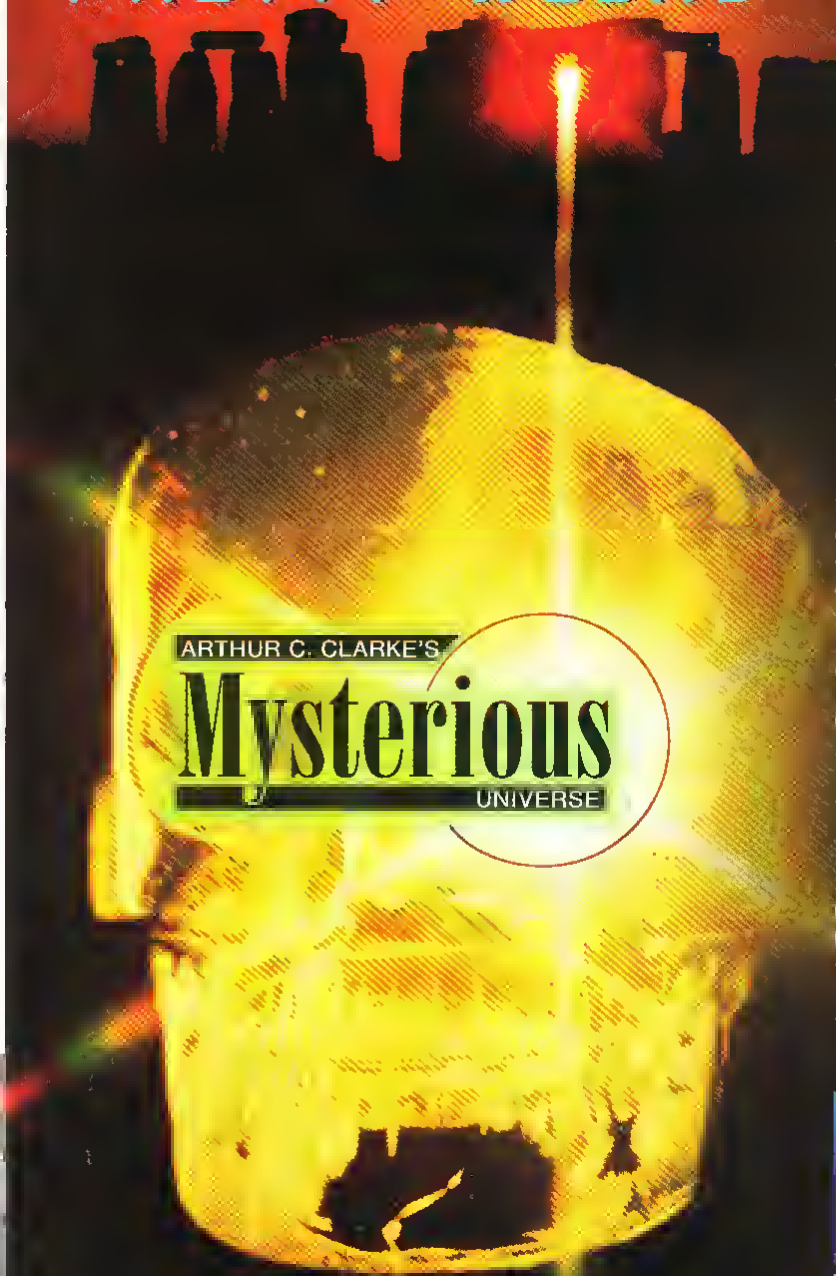
3. You know, I saw *E.T.* and you guys are *much* taller in person.

2. The world leaders gave the aliens all kinds of fabulous expensive gifts, and it turns out all they really wanted were some T-shirts that said, "My friends visited Earth, and all I got was this lousy T-shirt!"

1. Buttafuoco!

WORLD PREMIERE EPISODES

PRETTY WEIRD STUFF.



ARTHUR C. CLARKE'S

Mysterious UNIVERSE

JANUARY 5

GIANTS OF EASTER ISLAND

For 250 years, these huge stone statues have baffled explorers. Who are these giants? Where did they come from?

JANUARY 12

MYSTERIOUS INDIA

What has preserved the body of St. Francis Xavier from decay for over 400 years? Do cobras really dance to their masters' tunes?

JANUARY 19

MYSTERIES FROM HEAVEN

Can the hand of a martyred saint work miracles? Does the blood of St. Januarius predict the eruptions of Vesuvius?

JANUARY 26

SPONTANEOUS HUMAN COMBUSTION

Human bodies burn — leaving the surroundings undamaged. Explore the theories behind this explosive issue!

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material before the folks in question actually set flipper on the Earth. Given their evident technological superiority we would probably have to take their peaceful intentions at face value and help them get as much data about us as they would care to have. Hopefully that would give them enough insight to avoid triggering a social calamity when one of them gets on a talk show or meets an overly ambitious politician.

Assuming then that I could leave such practical cares aside, I'd tell them about our attempts to find the meaning of life. Like us, they probably know more than they can prove. Perhaps we can find some common ground in our contemplation of the universe we both inhabit. I'd sure like to find out.

Dave Barry
Humorist

"Do you guys have cable?"

Paul Bohannan
Anthropologist and writer

What would I say to an extraterrestrial delegation visiting Earth?

It seems to me that it makes little difference what we *say*. Far more important is that we listen and pay attention to what we *hear*. The most important single factor would be overcoming our fears. Human nature developed evolutionarily in a situation that made it wise for us to distrust strangers. First contact between Columbus and the Caribbean natives began on a friendly note—but both were soon overcome by fear, the situation deteriorated fast, and Columbus kidnapped several of them. The Pilgrims were greeted in English when they landed—a local Indian had spent twenty years as a slave in England, recognized them, and could talk to them. Unfortunately we have no record of what either of them said. Cortes had a clumsy system of interpretation (from Aztec to Mayan via his Indian mistress and from Mayan to Spanish via a Spaniard he had rescued after some years among the Maya, including a Mayan wife).

The major question: Who is going to be the interpreter? Do we trust the interpreter? How do we deal with our own terror that these extraterrestrials have come to destroy us? How do we keep from mobbing or killing or enslaving them?

The problem is with ourselves at least as much as with the aliens, no matter what problems they present. We have to be sure we understand what, if any, problems they do in fact present. What we hear from inside ourselves—our own fears—is of far greater moment than what they hear from us (and without that interpreter wouldn't understand in any case). Only then *can* we talk to them!

Bruce Campbell
Actor, The Adventures of Brisco County Jr., Evil Dead

If friendly aliens happened upon our planet, my message to them would be very simple: "What took you so long?!"

Kirk Fordice
Governor, Mississippi

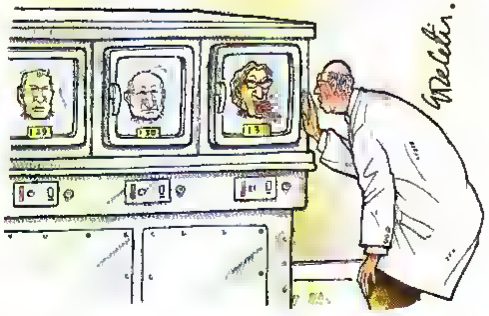
"Welcome to the State of Mississippi, one of fifty United States of America, on a planet known as Earth, third planet from the sun, located in this beautiful outer fringe of the Milky Way. We greet you in peace.

We welcome you in the same adventurous spirit that led you to break away from your home planets—if indeed you come from planets—for we have a history of courageous adventure all our own. Our country was discovered by a man who bravely went against conventional wisdom that the world was flat in order to found a New World—America. Brave souls from all continents of Earth left the only homes

GREAT MOMENTS IN SCIENCE

May 7, 1963 - Pintail Falls, Missouri: It wasn't until 2 years after his alleged abduction by aliens that Charlene suspected that portions of her husband's brain had indeed been removed by the extraterrestrials.

Although they hadn't spoken in years, it suddenly dawned on chief cryonics technician Walt P. that the Jane Doe in 131 was in actuality his first wife, Eunice Marie.



SATIRE BY ERIC JAY DECETIS

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DEEP SPACE NINE™

Authorized and fully authenticated by Paramount Pictures.

Shown approximately actual size of 7¼" (18.42 cm) in diameter.

It's the first and only official pewter and gold sculpture to depict the gigantic 24th-Century Space Station at the heart of STAR TREK: DEEP SPACE NINE.

Based on the actual filming model, and fully authenticated by Paramount Pictures, it's packed with fascinating detail—from the sweeping architecture of the docking pylons to the windows around the promenade in the inner ring. You can even see the nine cargo halds.

The Operations Control Center and defensive weapon sail towers are oblaze with 24-karat gold electroplate. The fusion power plant and the large docking ports glow with the scarlet fire of hand-set crystal cabochons.

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Franklin Center, PA 19091-0001

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I need SEND NO MONEY NOW. I will be billed for $39* prior to shipment of my specially imported sculpture, and for the balance in 4 monthly installments of $39* each.

*Plus my state sales tax and a one time charge of $3 for shipping and handling.

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12135-385 001

they had ever known to come to this New World in search of freedom from oppression of all kinds

We hold these truths to be self-evident, that all men are created equal, that they are endowed by their Creator with certain unalienable Rights that among these are Life Liberty and the pursuit of Happiness —Declaration of Independence

We welcome you also in the names of the brave men and women of Earth's space programs, who gave enormously of their talents and lives to reach the moon and beyond As you pass our only natural satellite please note the American flag symbolizing the 'giant leap' of faith resources, and determination we made in achieving this victory over the cold void of space I deeply regret to say that it has been almost a quarter of a century since we have ventured so far out again This is attributable to the shortsightedness of many of our past and present elected leaders It is my sincere hope that this, too, will pass and that once again we will take to the stars in quest of knowledge and excellence—and the many benefits that obtaining such knowledge bestows on all humankind

We commend your obvious technological achievements from which we hope to learn We invite you to sample the great literature artwork of all kinds pinnacles of philosophical and religious thought, and marvelous botany and wildlife comprising our planet and history We are a world and a species of enormous potential If you come to evaluate us, judge us on our successes as well as our failures While we have not always made the best use of our potential we are a species of much courage capable of great understanding conviction, and achievement

Harlan Mathews
U S Senator Tennessee

I would welcome extraterrestrial visitors to Washington, DC by telling them I thought I'd landed on a different planet myself when I came here two and a half years ago If they'd arrived during some days of the 103rd Congress, I'd have asked for a lift back to Tennessee They'd probably be dropping Elvis at Graceland, anyhow, and my native Nashville is on the way

My first words would be directed to my fellow senators I'd say that if extraterrestrials can traverse a galaxy to reach Capitol Hill Republicans and Democrats should be able to cross a carpet to reach a compromise

1994 was an election year, so extraterrestrials might be mistaken for newly arriving senators and congressmen—many of whom already are suspected of being from another planet Of course, the extraterrestrials probably spent less to get here, and they arrived by spaceship, whereas politicians usually reach Washington by telling voters what an awful place it is

Most of all, I would welcome our new friends with a particular hope that the people of our worlds—not the governments or ambassadors but the everyday folks who constitute the life of worlds—will share wondrous possibilities I would assure them we are not perfect nor is our Earth ideal But I also would say there is something in humanity that tries to rise above our shortcomings For that, we are worth knowing I would add my hope that the meeting of our worlds will make us both better than we are alone

Douglas Rushkoff
Author Cyberia Life in the Trenches of Hyperspace

My response may come off as flip at first, but it really does encapsulate what I'd say if they came "Please pardon our appearance while we remodel"

Tom Servo
Urbane robot co-host of Mystery Science Theater 3000

Okay first off let's not make the classic and erroneous assumption that anybody who's able to hurl a can a few dozen light-years is automatically smarter than us I mean, sure, it's a momentous occasion and all but we don't have to fall all over ourselves to show them how friggin' great they are do we?

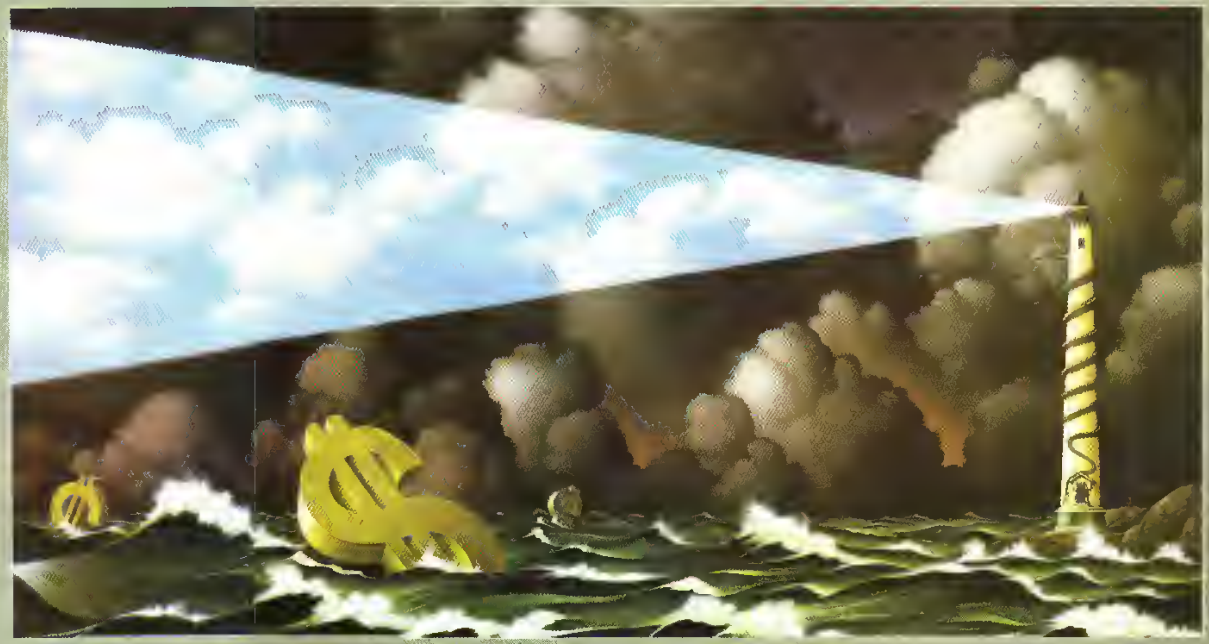
I think you should let me handle this First, I'd open with a joke Let's assume that if they're so damn smart to come here in the first place, they'd know a little of the local tongue If the aliens had butts I might try the classic "Can I touch your butt?" That'd catch 'em off guard it always does If they understood this risky yet sensitive greeting they might immediately sense our strength and vulnerability the essentially dualistic nature of the earthbound eternally struggling for balance and equanimity grasping for the serene supernal yet mired in the physical plane the poignant ironic, fragile state of the world community Then perchance they might offer us their butts to touch and a new age for humankind would open the childhood endeth, the future made manifest a communion transcending beyond time and space

Then again they might hit me and go right back where they came from, so I probably wouldn't open with "Can I

CONTINUED ON PAGE 82

SEARCHING FOR DOLLARS: FUNDING SCIENCE TODAY

$$$ CANDIDATE BILL CLINTON PLEDGED TO TAKE A MORE AGGRESSIVE ROLE IN NURTURING AMERICAN RESEARCH AND TECHNOLOGY DESPITE A MANDATE TO CUT THE DEFICIT, PRESIDENT BILL CLINTON, FACED WITH A NUMBER OF HIGH-PRIORITY AND HIGH-BUDGET CONCERNS SUCH AS HEALTH CARE AND CRIME, FOUND THE PENNY-PINCHING ZEAL ON CAPITOL HILL A MAJOR OBSTACLE TO OFFERING A HELPING HAND TO THE SLUMPING HOMEGROWN SCIENCE COMMUNITY. FISCAL CONSERVATIVES IN THE HOUSE OF REPRESENTATIVES QUICKLY SENT A MESSAGE TO THE NEW CHIEF EXECUTIVE ABOUT THEIR WILLINGNESS TO BACK BIG-TICKET SCIENCE



projects by voting down the continued funding of the mammoth superconducting supercollider the multibillion-dollar proton smasher in Texas

Nevertheless, Clinton and Vice President Al Gore, in a joint White House memorandum released in August of 1994, reiterated their support for major funding of science and technology projects stating that "This Administration is committed to making today's investment in science a top priority for building the America of tomorrow." Clinton has thus far managed to convince a reluctant Congress to give him a sizable portion of his science budget. By the end of September 1994, he had signed thirteen general appropriations bills, including funds earmarked for science research and technology, becoming the first president since Truman to get such a sizable amount of funding past the lawmakers on Capitol Hill in so timely a manner. According to the Office of Science and Technology Policy, the 1993 Research and Technology budget hit $69.9 billion, with a drop in 1994 funding to $68.3 billion. However, a modest 4 percent increase has been proposed for the 1995 budget for a total of $71 billion.

Even so, many scientists are beginning to wonder if American research can survive dwindling federal funding and closer public scrutiny. With the conclusion of the Cold War, a fundamental reassessment of federal funding for American research was demanded by a bipartisan bloc of congressional budget-watchers. Most of these skeptics, in the name of fiscal responsibility, called for an immediate shift of resources from military to civilian projects. The glory days for local research and development came to a screeching halt under the pressure of a sluggish economy and a growing federal deficit. According to 1991 science and engineering data released by the National Science Board (NSB), the average yearly increase in total American research and development spending jumped 1.2 percent between 1985 and 1991, compared to a vibrant growth rate of 6.9 percent between 1980 and 1985.

Despite Clinton's pledge to reverse this funding slide, Congress has tightened its purse strings. American scientists watched intently as the president's ill-fated economic stimulus package containing a $445 million supplement to the 1993 federal research budget was savaged by lawmakers from both political parties. These funds were not added to a smaller budget that passed months later, temporarily depriving of needed capital several federally assisted small-scale projects funded by the National Science Foundation (NSF). Costly research projects are getting the cold shoulder—even prestigious items such as the ambitious space station *Freedom*. Fortunately, a last-minute surge of support permitted the expensive project to squeak by congressional opposition by one vote in the spring of 1993, and by a more comfortable margin in 1994. The problem, of course, is the escalating costs attached to long-term projects. Eleven years ago, for instance, the estimated cost of *Freedom* was about $8 billion, but by 1993, the price had soared to more than $30 billion. That size of investment worries an American public eager to put bad fiscal times behind them.

"We have noted a trend in the public and private sectors to give less funding to long-range projects, especially research and development," says Representative George Brown (D-California), chairman of the House Science Committee. "A lot of people feel such projects can be canceled or postponed. This is not surprising in hard times." According to Brown, congressional subcommittees have been cutting about $1 billion annually from research funds in recent years to put into social programs. "This scaling-back is likely to continue until there is an economic turnaround and an easing of the federal deficit," he adds.

> "THIS ADMINISTRATION IS COMMITTED TO MAKING TODAY'S INVESTMENT IN SCIENCE A TOP PRIORITY FOR BUILDING THE AMERICA OF TOMORROW."
>
> —PRESIDENT BILL CLINTON AND VICE PRESIDENT AL GORE, AUGUST 1994

If the funding for research and technology continues to dwindle, America's technological prowess will decline. Nevertheless, current NSB statistics indicate that total U.S. outlays for research continue to surpass those of its four nearest industrial competitors, although Japan and Germany spend more of their gross national product on the development of new technology.

Congressman Brown says one obstacle to higher spending levels for U.S. research is a growing antiscience bias among the American public that no longer sees the relevance of science to societal goals. Each year since the heady days of John F. Kennedy's New Frontier and the glowing successes of the Apollo missions, Americans have become less and less enthusiastic for basic science research, particularly when the amount of available federal capital has shrunk. "We are no longer competing with the Soviets for space supremacy, and our national pride is no longer at stake. Science has never been popular with certain segments of the population, especially those who are opposed to technology," says Albert Teich, director of science and policy programs for the American Association for the Advancement of Science (AAAS). "You will never have total public support for science. A president however can set the tone—as Clinton is doing now—by seeking to involve the government in promoting technology."

Experts such as Teich worry that the proposed 1995 federal research budget may not be sufficient after the bulk of the funds goes into priority defense projects. Of the federal research billions, $39.5 billion, or about 55 percent, is slated for the Defense Department for further development of weapons. The remainder of the funds is split among other agencies such as the National Institutes of Health (NIH) and the NSF, which backs much of the independent research around the country. A major concern of many scientists is that the reduced portion of funds allocated for the type of basic research benefiting the average American is very small—much too small.

American scientists and researchers however are an enterprising lot. At NASA, agency officials shifted gears after facing growing opposition to their expanding space program to stress technological advances. At their aeronautics research wing at the Langley Research Center at Hampton, Virginia, a host of long-term projects are underway, including improved sensors to detect wind shear, high-speed transport jets capable of traveling at supersonic speeds with advanced noise-reduction technology, and new equipment to reduce fuel emissions from high-performance aircraft.

"Some of our projects will produce incredible technological advances, especially our work in the aeronautics field," says Paul Holloway, director of NASA's Langley Research Center. Vice President Gore called aeronautics the

Actual size

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crown jewel of American industry and he's right. Without the space station and manned space flight, Holloway insists, America will give up its lead and other nations will turn to Russia to fill it.

We must find a way to support our primary mission while also providing support to industrial America in order to keep the United States economically competitive in the marketplace," he says.

Funding in the biomedical research field has flattened out and even slipped in related areas such as pharmaceuticals and biogenetics, according to Dr. Frederick Goodwin, director of the National Institute of Mental Health (NIMH). Started in 1946 as one of the four foundation agencies of the National Institutes of Health, the NIMH lost about 35 percent of its research funds in the 1970s after it split away from NIH—a move associated with a broadening of its mission to include setting up mental health centers across the country. Goodwin adds that it recently returned to the fold after enjoying several years of "catch-up" funding for its research mission. Researchers supported by the NIMH are currently working to target drugs to specific brain sites for treatment of various disorders including depression and schizophrenia. The effort includes screening drugs formerly discarded by pharmaceutical companies for new purposes and is showing some promise. For example, an unmarketed drug originally targeted for depression, idazoxan, has shown some positive results in treating Parkinson's disease and bipolar mood disorder, a form of depression, when used in combination with the standard drugs prescribed for these conditions. Experiments are also progressing on creating new compounds designed to modify behavioral states such as depression by stimulating various brain receptors. One new study with startling future ramifications involves working directly with cell and blood components to determine if alterations in behavior can be induced through genetic manipulation. Researchers such as Dr. William Potter, the head of the NIMH's pharmacology section, say this futuristic approach to treating mental illness by intervening on a genetic level may not be available for at least another 30 years, even with the use of advanced techniques gleaned from molecular biology labs. When this mode of treatment goes public, mental disorders will be treated with genetically altered cells which, for chronic illnesses like schizophrenia, could replace long hospital stays and drug treatments with potentially serious side effects.

But all of this cutting-edge research depends on an uninterrupted cash flow from Congress, and that so-got has been closing bit by bit in recent years. "We were in a holding pattern last year as overall research grants dropped by 20 percent," Goodwin says. "Economic problems have caused some important work in biomedical research to be delayed. Our work is very important when you think that 22 percent of the adult population will be affected by a mental disorder in a given year. We need new treatments for illnesses that do not respond well to psychotherapy."

Cutting costs and tightening belts are the order of the day at the NIMH. Last year, NIMH officials started the Human Brain Initiative, a national data bank permitting scientists to share research findings to sharpen their focus on projects and to slash costs. Centers for this project will be stationed throughout the country. Data will be provided to other countries with some provisions for privacy.

Like biomedical research, work in other major research areas including environmental biology, pesticide monitoring, and the Human Genome Project are also feeling the squeeze from a

CONTINUED ON PAGE 26

Strange Wonders

IN A STRANGER LAND

For me, Antarctica begins in the middle of the night as I am reluctantly drawn from a heavy sleep. The ship I am traveling on has begun to roll back and forth—back and forth—with a long cra-a-a-aking sound in each direction that makes it feel as though the very bones of the vessel have been disturbed. With each successive move, my body is thrust down the sheets to the end of the bunk, then back up again until my head is jammed into a cabin wall.

I am crossing the Drake Passage, one of the roughest seas in the world, with a group of 80-odd tourists from the American Museum of Natural History in New York City. Here in the Southern Ocean, the wind whips around Antarctica unimpeded by any land mass to break up the storms, as if to guard the continent from those who may seek access. It's no wonder that sailors nicknamed these latitudes the "Roaring Forties" and "Furious Fifties."

The Drake is, in essence, a rite of passage to the bottom of the earth that Antarctic travelers must still endure. In the 1800s sealers and whalers first voyaged this way. Then came the early south-polar explorers, heroic men like Shackleton, Scott and Amundsen who only managed to set foot on the icebound continent in the last 100 years. Now many of the scientists who come to study this land—and the visitors, like us, who follow—take this same perilous route.

Venturing to Antarctica is like journeying to another planet right here on our own. It is a foreboding destination where ice, often more than a mile thick, covers much of the surface and 200-mile-an-hour winds can relentlessly blow for days on end. During the winter months, temperatures of minus 75 degrees Fahrenheit are common at the interior.

Antarctica is not a country, province or territory, but a huge icecap (about the size of the United States and Mexico combined) governed by an international treaty and set aside exclusively for peaceful, scientific research. Technically, it is owned by no one—there are no native inhabitants—and anyone who comes is truly an "alien" who could not survive without special clothing and shelter to

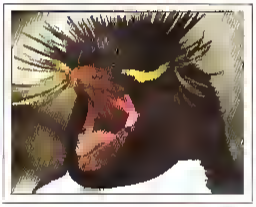
ARTICLE BY SHARON McAULIFFE

wield off the terrible elements. On early maps the continent was considered so mysterious and different from the rest of the world it appeared simply as Terra Australis Incognito or unknown southern land.

Over the next 18 days our group will cover more than 4,500 miles, making 14 separate landings. By the time the trip ends we will have seen some of the most spectacular icebergs and glaciers on Earth, stood on the edge of vast penguin colonies more than 100,000 birds strong, and met up with everyone from Antarctic scientists and soldiers to a couple of adventurers out to relive an early historic expedition. Our journey seems, however, to unfold in a series of moments—sometimes brief and extraordinary in nature—rather than as a set of stops at specific places. And after a while I realize this wild and utterly foreign place has captured my heart. But Antarctica does so slowly, in stages, rather than all at once.

Some 40 hours will pass before the Drake finally eases off and our ship—a Russian icebreaker known as the Kapitan Khlebnikov—stops its constant rolling. And when the outside decks are opened again I realize everything has a different feel. The air temperature has dropped, the bird population has changed, and it is foggy and overcast. We have crossed the

AST SEAS OF TRUMPETING, WHISTLING, THREE-FOOT BIRDS GATHER ON A BROAD, MUDDY STRETCH KNOWN AS THE SALISBURY PLAIN.



Convergence—an invisible biological barrier that separates the Antarctic from the rest of the world.

This is where the cold, northern-flowing polar water collides with the warmer waters of the Atlantic, Pacific, and Indian oceans. Below this line, which can leap and swirl as much as 90 miles in either direction, the water temperature dips way down, and krill, a small shrimplike creature, feeds on the minute plant life. This two-and-a-half-inch-long crustacean, sometimes called the "power lunch" of the Antarctic, is the staple diet of everything from black-and-white Adélie penguins to huge, migrating humpback whales.

The Convergence is also a place of great upwellings, where nutrients and food are pushed to the surface. And that makes it a wonderful area for foraging seabirds. Several hundred follow the ship our second day out: everything from tiny Wilson's storm-petrels that seem almost to trot across the top of the water (they are named petrel in honor of Saint Peter, the apostle who is supposed to have walked on water) to great, gliding, wandering albatrosses with their eleven-and-a-half-foot wing spans. That afternoon, we sight five different species of albatross—all masters of flight that gracefully ride the ocean's air currents without ever seeming to flap their wings.

It is January, high summer season in the Antarctic, where the light is almost continual (at these latitudes the sun sets only briefly at this time of year) and temperatures hover around freezing. Out on deck, small groups of passengers frequently gather, maintaining an informal, but faithful vigil.

And then one evening, the first iceberg is spotted. In a misty snow, out of absolutely nowhere, the Khlebnikov has come upon something that appears more like a floating island than anything else: a huge, mythical-looking object some 4,000 feet in length, with smooth, straight sides that rise up another 100 feet above the water's surface. "It's a sight," says Ken Haslam, the ship's doctor, "that makes you feel like, this is Antarctica. I've finally arrived in Antarctica."

As mammoth as this iceberg seems, we are seeing only the small portion that is visible above the water line. These giant-sized tabular bergs break off from huge ice shelves that surround parts of the continent, then float out to sea, four-fifths of their bulk hidden underneath the ocean, completely out of view.

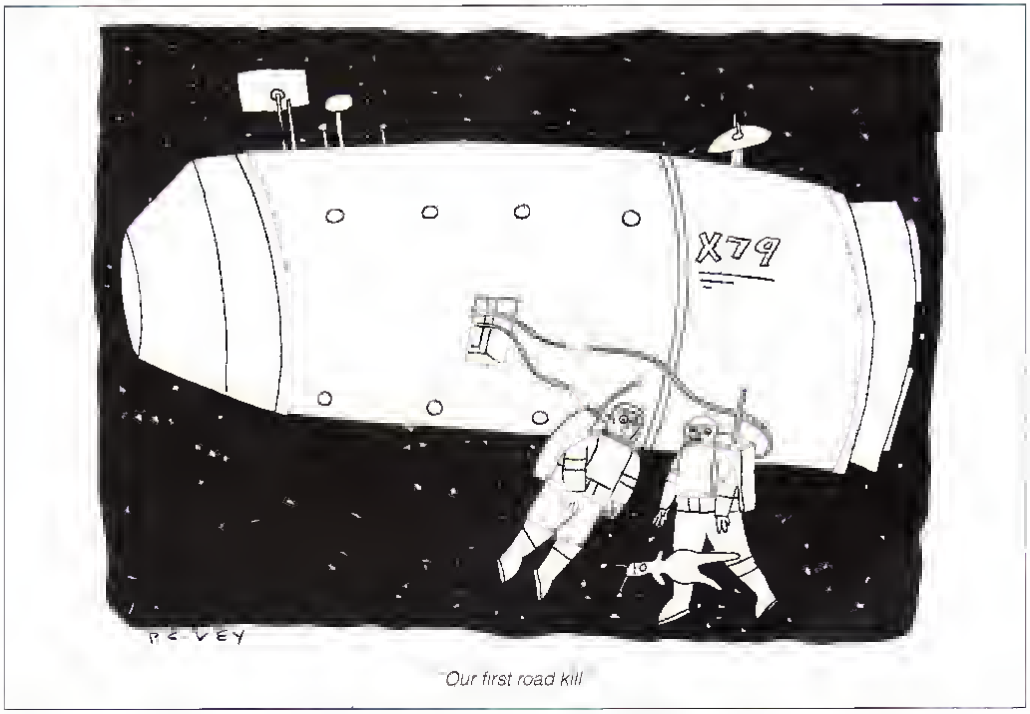
But nothing, not even the sight of a tabular iceberg, quite prepares one for the stark, physical grandeur of the continent itself. It is another world, without scale or dimension. I have no way to place this immense landscape into any context. There is a lack of perspective in distance and height," explains Norm Lasca, the expedition geologist from the University of Wisconsin, Milwaukee, "partly because of the clarity of the atmosphere, partly because of the sharp contrast between white ice and dark rock, and partly because there's nothing to clutter the view."

When I first see the mainland—a region called the Peninsula, which protrudes up and north toward South America—it is more vast and desolate than anything my mind had ever conjured up, like a frozen lunar landscape right here on Earth. Rugged mountain after mountain, thousands of feet up, seem almost to spring from the water. The black, jagged peaks—known by the adopted Inuit/Eskimo name of "nunataks"—look like giant pieces of coal, draped in white, icy cloaks.

Pristine snow fields are everywhere, and alpine glaciers—frozen rivers of ice that move under their own weight—snake through the valleys and spill down to the water's edge. Occasionally a loud crack or muffled, thunderlike noise can be heard off in the distance. This is the birth cry of a small iceberg, one that has just "calved off" from the deeply crevassed ice cliffs of a glacier. There is no sign of man anywhere: no other boats, no power lines, no jet contrails. And the air seems almost too clean to breathe. This is the wildest, loneliest place I have ever been.

More and more glacial icebergs appear, often bright blue in color. This is not a reflection off the water or sky, but the sign of old, very compressed ice where all the air has been squeezed out. And over time, the wind and water eat away at these frozen hulks, sometimes sculpting them into fantastic shapes: ice whales, ducks, a Sphinx-shaped lion.

Deck-watching is a time-consuming process, stretched over days and days, but the payoffs are sometimes enormous. We pass by slumbering crabeater and Weddell seals napping on ice floes. At one point, two huge, polished, dark blue icebergs appear, peppered with line after line of chinstrap penguins (a variety named for the thin black mark that appears under their beaks). There are at least 500 of these animals resting on each iceberg, two huge congregations of birds at sea. "I could stand here all day," says passenger Ethe Chiang, a young emergency department physician from the Mid-



Our first road kill

west "I feel like I'm part of the waves part of the wind part of the force around this continent It's an incredible kind of feeling that I've never had anywhere else"

Another time we start picking up minke whales First it appears as though there are four or five then the count jumps to ten, and finally reaches at least sixteen Wherever there is an opening in the pack ice huge exploding bodies are popping out

Some days the waves break 30 feet over the bow spraying even the top decks with water And one gets a real appreciation for what the early explorers—the voyagers who made it across in the so called era of wooden ships and iron men—must have endured Later on in the trip we will meet four amateur English sailors who have tried to repeat a famous Antarctic expedition led by Ernest Shackleton back in the early 1900s In a 22-foot-long replica sailboat this little crew spent 12 days crossing the Southern Ocean—sometimes facing gale force winds for hours on end—then tried to climb several glacier-topped mountains but failed "We only got halfway across and had to turn back because of the deep wet snow and crevasses" says Trevor Potts their tired weatherbeaten-looking leader "I don't know how Shackleton did it Our feet were permanently wet and at night when it cooled down there was a serious risk of frostbite I had no idea it was going to be this difficult

And then there was the evening the Khlebnikov turned into a narrow S-shaped channel known as the Neumayer where the mountains and glaciers and ice cliffs were just yards away There we were looking straight up and up and up and up at peaks that seemed to ascend directly to heaven And for close to two hours we attempt the impossible to chase an endless-summer Antarctic sunset where the clouds catch on fire and the ice turns yellow and orange

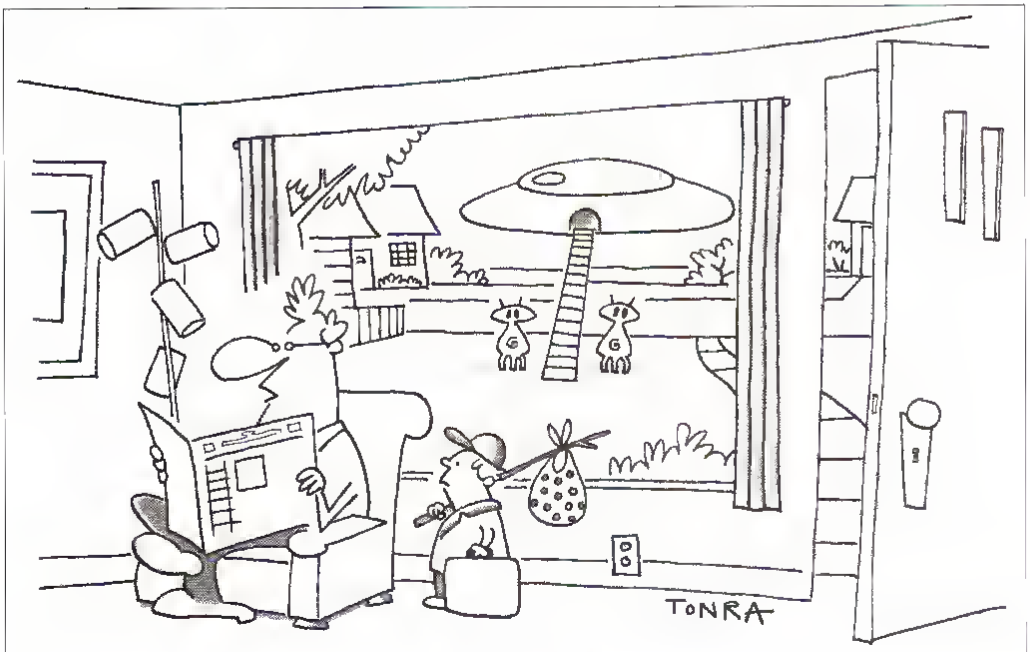
The Neumayer is one of nature's own great cathedrals carved out of rock and ice-over And everyone—even the off-duty Russian sailors and chambermaids—comes out to pay his and her respects There is a quiet hush a kind of reverence in the air and people are careful about speaking My soul is full of a landscape of ice a Mexican passenger whispers to me "Full of the beauty of nature"

"Look the light is coming out of that cloud" shouts one photographer And everyone turns and starts to click "Like poetry in the heavens" says another

Both words and film seem inadequate media to try to fully capture the experience but they are all we have At every moment at every angle this strait seems to change look and form One could snap a picture every second however and still capture only a fraction of what there is to see and feel

It is 11 25 p m before we finally lose the light and even then it does not get dark At this time of year only twilight sets in And in an hour or so the sun rises once more and the day starts all over again

Now our landings step up We use helicopters when the ice conditions are tough but most of the time we rely on inflated rubber zodiac boats Each departure has the feel of a military assault We all wear the same bright red ski parkas a kind of uniform issued by the American Museum so that staff members can track us against the white ice and snow We are also carefully briefed on Antarctic operations There is no smoking no littering and no eating on shore rules about how far to stand from the wildlife and what to do if you encounter anything growing (Down here the latter event is such a rarity that the regulation can be summed up in just one line If it's green don't step on it)



"Ask your mother"

The Antarctic Treaty is one of the most wonderfully concise documents ever produced—just three pages in total—but the accompanying environmental protocol now runs another 198 pages with five additional annexes for further reference. To keep an eye on us all, the National Science Foundation (NSF) has put its own environmental observer, Jim Johnson, aboard. A few people call me 'Big Brother,' he says, 'but I roll with it.'

Our first big landing, or I should say landing attempt, is a total wash—a reminder that weather and ice always rule in Antarctica, that they dictate what you can and cannot do. We are below the Antarctic Circle at Stonington, the site of the first U.S. research base down here, and the place where most of the original mapping of the Peninsula was done. The harbor is covered in rotting pack ice, making zodiacs impossible, but the wind is light, so we crank up the helicopters and prepare to take off. Then suddenly a gale comes rushing off a nearby glacier at close to 50 miles per hour, with gusts going up over 60. Where the water was once calm, there are now big waves and whitecaps. From the deck, we can clearly see the buildings of the base perched up on a rise. But there is just no way to reach them. 'The scary thing down here is that it can all change so quickly and dramatically,' says Tom Schornak, our expedition leader. 'And we're here in summer. Can you imagine what it's like in winter?'

The rest of the trip we are lucky. Nature seems benevolent and gives us a pass. And soon we are hitting Antarctica's research stations, meeting the pioneers—the frontier men, women and children—who have come to live and work in the Deep South. Some 46 full-time installations are currently operated by 17 different countries, each a tiny, isolated government outpost in this alien land. At the height of the summer season, there are just 2,500 residents in total. Here is a continent more than 5 million square miles in area, with the population of only a small country village.

The outposts themselves have a hodgepodge look. New metal modular buildings are often mixed right in with the remains of historic stone huts, remnants of man's early landings on the continent. Big tractor sledges for moving heavy supplies and equipment frequently lay about. (Sledge dogs were officially banned from the continent in April for environmental reasons, but they were hardly used in recent years anyway.) Small penguin colonies are situated on the edge of town. And memorial crosses and graveyards are a common

sight—a reminder of just how unforgiving Antarctica can be at times.

There are some serious territorial disputes between different countries in Antarctica—especially among Argentina, Britain, and Chile—but you would never know it down on the continent itself. The science communities and politicians in Buenos Aires and London and Washington—they twist their hankies and agonize daily over the conflicts between science and politics, explains Schornak. But all that melts away once you get down here. All these people know they are very isolated and dependent on each other should something happen. And everyone relies on each other.

At one stop, the base staff has set up a little souvenir table with T-shirts, patches, and pins for sale. It has the look and feel of a kid's lemonade stand, only the goods are a little more elaborate and the prices slightly higher. At another station, I am invited in for coffee, cookies, and orange soda—this time, free of charge. There is a loose camaraderie in Antarctica. Everywhere we go, people seem genuinely happy to see us. As one homesick researcher told me: "This is still a part of the world where a new face is a welcome sight."

At Almirante Brown, a modest little Argentine outpost, eleven people—nine men and two women—hove summer each year, measuring tides, sampling the water, doing general meteorological work. There is one small laboratory, a powerhouse with a generator, and a two-room building where the whole camp crowds in to eat and sleep. Much of the crew's time seems to be devoted to just keeping the place going—a demanding task in this thick snow and one they report that develops incredible muscles in their upper thighs. I get stuck again and again just trying to get around.

Our next stop is smaller and even more primitive: a little offshore island called Cuverville, where four British doctoral students are studying the local flora and fauna and how it is affected by visits from tour groups. With some 8,000 visitors now cruising the Antarctic each summer, there is growing concern about the possible impact on the environment.

These young researchers live in small yellow tents full of dirty socks and bootliners, survive on pasta, rice, and big stores of canned food, and get their drinking water by melting glacier ice. There is no place to bathe or do laundry, and until that morning, when a German boat finally came in and invited them aboard, no one had shower-

ed for 19 days. By the time of our arrival, however, the crew is freshly clean, and their radio mast—the one they use for checking in with a government base each day—is doubling as a clothes line, draped in newly washed pants and shirts.

At the tip of the Antarctic Peninsula we finally reach Esperanza, a year-round Argentine station with more than 70 people and a real sprawling frontier town flavor. There's a bar, a bank, a library, a post office that opens occasionally, and even a small church. A large support team from the Argentine Navy walks around in bright orange fur-trimmed snowsuits and thick white boots, a real spacesuit look that makes you very aware of the extreme weather they face. In line with Argentina's policy of trying to populate the continent and thereby solidify its territorial claims, officers are encouraged to bring down their wives and children. It was on this base that the first child was born in Antarctica, Emilio Marcus Palmer, back in 1978. His mother, seven months pregnant, was flown in by the Argentine Air Force just for the occasion. As we come ashore, two giggling little girls in bright purple and red jackets come out to greet us.

But there's also some interesting research going on at Esperanza. The U.S. National Oceanic and Atmospheric Administration (NOAA) has teamed up with the Argentine Navy in one of a network of stations to see if sea levels are on the rise, something that would signal global warming was in effect. To this end, they have installed a very sophisticated water level measurement station here at the base.

Antarctica is undoubtedly a great natural laboratory for doing weather, climate, and astronomy research. But there is a real dichotomy here. Scientists come down to do real research, but governments back them and maintain bases mostly for political reasons. On one small offshore island, for example, where it is easy to get ships in and out, eight countries—Russia, Chile, Brazil, China, Uruguay, Poland, Peru, and Argentina—have all put up wintering stations. To have a say in Antarctic affairs and part of the wealth if it some day becomes practical to exploit the oil and mineral resources that are thought to be buried under the ice (something which is currently not authorized by the Treaty System), countries must maintain a physical presence down here. So ultimately, all of these bases are really pawns for their governments in a much bigger political game.

The last leg of the trip is a biological extravaganza. We head north toward

Fiction by Terry Bisson ~ Illustration by Daniel Adel

THERE ARE NO DEAD

"All repeat after me," Pig Gnat said. "Oh Secret and Awesome Lost Wilderness Shrine."

"Oh Secret and Awesome Lost Wilderness Shrine."

"The Key to Oz and Always be Thine."

"The Key to Oz and Always be Thine."

"Bee-Men. Now cover it up with that rock."

"Rock!"

"First the rock and then some leaves."

"We'll never find it again!"

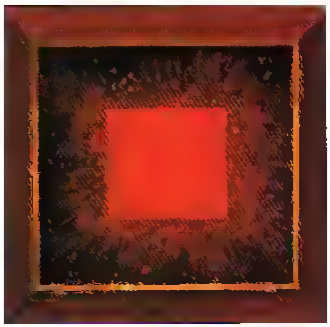
"When we need to, we will. I made a map. See? But hurry, I think it's late."

It was late. While Nation arranged the rocks and leaves, and Pig Gnat carefully folded the map, Billy Joe scrambled to the top of the culvert. Across the corn stubble, in the subdivision on the other side of the highway, a few early lights gleamed. Among them, Mrs. Pignatelli's.

"I see a light," said Billy Joe. "Doesn't that mean your mother's home? Maybe we should cut across the field."

"You know better than that," Pig Gnat said. "He who comes by the trail must leave by the trail."

Billy Joe led the way. Pig Gnat was in the middle. Nation, who owned and therefore carried the gun (a Daisy pump), brought up the rear, alert for game, for danger.



Billy Joe and Nation both grumbled but agreed. They were at the fabled head of the Tibetan Nile. The trail followed the muddy stream away from the highway and the houses on the other side, down the culvert along the steep side of what became (if you squinted, and they squinted) a thousand-foot deep gorge. Where the gorge was narrowed by a junked car (a Ford), the trail crossed the Nile on a perilous high bridge of side-by-side two-by-fours. It then left the stream (which only ran after a rain) and crossed the broomsage-covered Gobi-Serengeti toward the distant treeline.

Billy Joe led the way. Pig Gnat, who had moved to Middletown from Columbus only a year ago, was in the middle. Nation, who owned and therefore carried the gun (a Daisy pump), brought up the rear, alert for game, for danger. "Hold!" he said.

The three boys froze in the dying light. A giant grasshopper stood poised on top of a fence post. Nation took aim and fired. The great beast fell, cut almost in half along its abdomen, its legs kicking in dumb agony.

Nation recocked the Daisy, while Billy Joe put the beast out of its misery. Like rogue tigers, these magnificent man-killers had to die. 'Good shooting,' Billy Joe said.

'Luck,' said Nation.

The desert ended; the trail tunneled through a narrow tangle of brush and old tires, then looped through the Arden Forest, a dark wood of scrub locust and sassafras, then switchbacked down a steep clay bank to the gravel road that led back to the highway.

'Tell me the name of the cliff again,' said Billy Joe as they started down.

'Annapurna,' said Pig Gnat.

They single-filed it in silence. One slip meant 'death.'

It was dark when they said their goodbyes at the highway's edge. Pig Gnat ran to find his mother, home from her job as Middletown's librarian, fixing supper and expecting him to keep her company. Billy Joe hurried home but to no avail; his father was already drunk, his mother was already crying, and the twins were already screaming. Nation took his time. Each identical house on his street was lighted. He often felt he could choose one at random and find his dinner on the table, his family hurrying to finish in time to watch "Hit Parade."

They grew apart as they grew up. Billy Joe started running with a fast crowd in high school, and would have spent a night or two in jail if his father hadn't been a cop. Nation became a football star, got the Homecoming Queen pregnant and married her a month after graduation. Pignatelli got into Antioch where his ex-father (as he called him) had been a professor, and lasted two years before the antiwar movement and LSD arrived on campus the same semester.

The Sixties ran through America like a stream too broad to jump and too deep to wade, and it wasn't until their tenth high school reunion, in 1976, that all three were in Middletown at the same time (that they knew of). Nation's wife, Ruth Ann, had organized the reunion. She was still the Homecoming Queen.

"Remember the trail to the Lost Wilderness Shrine?" Billy Joe asked. He was drunk. Like his father, he was a law-man (as he liked to say) but an attorney instead of a cop. "Of course I made a map," said Pignatelli. He had returned to the reunion from New York, where his first play was about to be produced off-off-off-Broadway, and he was hurt that no one had asked about it. "What're you two talking about?" Nation asked. He and Ruth Ann had just sat down. Pig Gnat whispered, "Come with me." They left the girls at the table and slipped out the side door of the gym. Across the practice field, across the highway, where the corn-field used to be, shopping center lights gleamed under a cold moon, beyond were endless coils of night. The door clicked shut behind them, and with the music gone, they imagined the narrow trail, the dark between the trees, the high passes to the secret Shrine, and they shivered. "We're supposed to stick to high school memories," Nation said. Billy Joe tried the door but it was locked. He was suddenly sober. The Homecoming Queen leaned on the bar, opening the door from the inside. "What are you guys doing?"

"BJ, it's time to go home," said Billy Joe's wife, a Louisville girl.

Two years later Pignatelli gave up playwriting (or set it aside) and took a job at Creative Talent Management's New York office on 57th Street. That October he came back to Middletown for his mother's sixtieth birthday. He stopped by Nation Ford and was surprised to find his friend already going bald. He was under a car, an unusual position for Assistant Manager of a dealership. "Dad and Ruth Ann run the business end," Nation explained. He washed up and they found Billy Joe at the courthouse, and drove to Lexington where Pignatelli's ponytail didn't raise so many eyebrows. Billy Joe had hired a friend to handle his divorce. "It's like a doctor never operating on himself," he said. "We should go camping sometime," Nation

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Two years later, they did. CTM was sending Pignatelli to LA twice a year and he arranged an overnight stop in Louisville. Billy Joe met him at the airport with two borrowed sleeping bags and a tent, and they met Nation halfway between Louisville and Middletown, and hiked back into the low steep hills along Otter Creek. It was October. Billy Joe gathered wood while Pig Gnat built a fire. "Did you ever think we'd be thirty?" Nation asked. In fact they were thirty-two, but still felt (at least when they were together) like boys, that is, immortal. Pig Gnat stirred the fire, sending sparks to join the sfars in heaven. They agreed to never get old.

Two years later, again in October, they met at the airport in Lexington and drove east into the low-tangled folds of the Cumberland Mountains, and built their fire under a cliff in the Red River Gorge. Nation's twin daughters had just celebrated their "Sweet Sixteen." Pignatelli was dating a starlet whose face was often in the supermarket tabs, beginning to wonder if he was supposed to have kids.

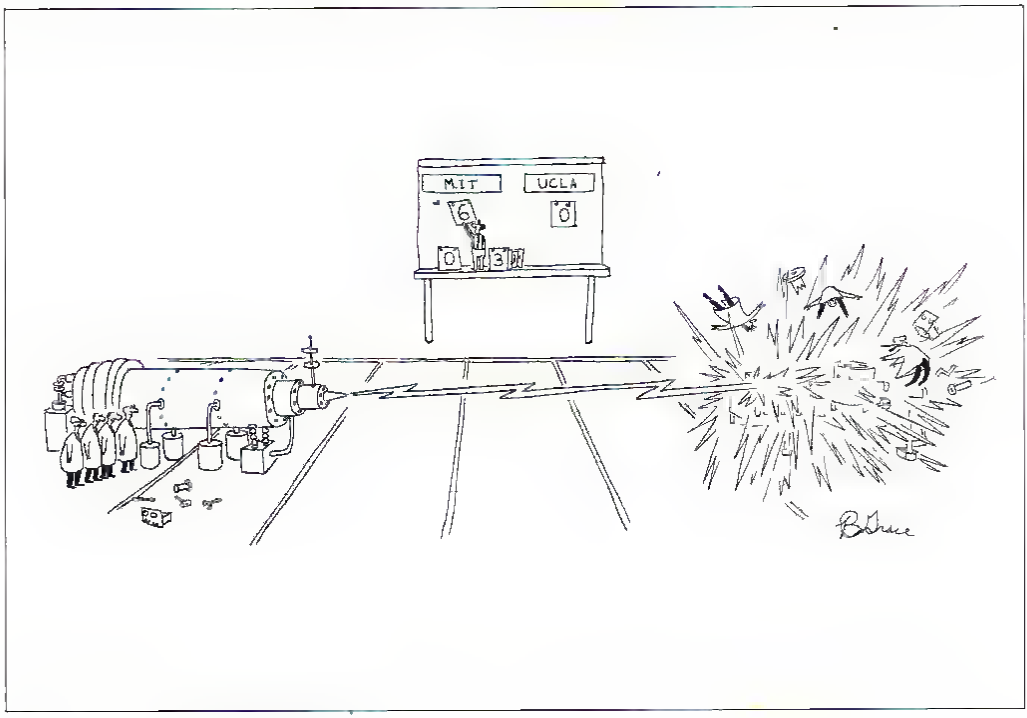
The next October, they backpacked into the gorges of the Great South Fork of the Cumberland River almost on the Tennessee line. These were real mountains: small, but deep. At night the stars were like ice crystals - and just as permanent," Pig Gnat pointed out. They stayed two nights. Billy Joe's lawyer had married his ex, moved into the house she had won in the settlement, and was raising his son.

They met every October after that. BJ would pick up Pignatelli at the Louisville airport, and Nation would meet them in the mountains. They explored up and down the Big South Fork, through Billy Joe's second marriage, Pignatelli's move to LA, and Nation's divorce. The Homecoming Queen kept the house on Coffee Tree Lane. They settled into a routine, just like the old days, with Nation picking out the site, Billy Joe gathering the wood, Pig Gnat building the fire. They skipped their twentieth high school reunion: their friendship had skipped high school anyway.

The year they turned forty it rained, and they camped at the mouth of a shallow, dry cave where they could look up at a sky half stone, half stars. "How old do you want to get?" Nation asked. Fifty seemed as old to them as forty once had seemed. Funny how time stretched out, long in front, short behind. Nation's girls were both married, and he would be a grandfather soon. BJ did the paperwork on his second divorce himself. The year Pignatelli's mother died, he found a hand-colored map in a drawer when he cleaned out the house. He knew what it was without unfolding it. He took it back to California with him in a plastic bag.

Some Octobers they tried other mountains, but they always came home. The Adirondacks seemed barren compared to the close, dark tangles of the Cumberlands. The Rockies were spectacular but the scale was all wrong. "We're too old to want to see that far," Pig Gnat said. He was only half kidding. He was forty-six. There are no long views in the Cumberlands. There are high cliffs overlooking deep gorges, each gorge as like the others as trees or years are alike. The stars wheel through the sky like slow sparks. Sometimes it felt that in all the universe only the three of them were still: everything else was spinning apart. "This is reality," Pig Gnat explained, poking the fire. "The rest of the year just rises up from it like smoke."

When Nation's father died he found the Daisy, filmed with rust and missing its magazine, in the attic. He cleaned it up and left it in Ruth Ann's garage. She had come back to run Nation Ford; she owned half of it anyway. "Still the



Homecoming Queen' Nation laughed: they were better as friends than as man and wife. How Pignatelli envied them. They were camped that year among the sycamores in a nameless bend of No Business Creek. "How old do you guys want to get?" Billy Joe asked. It was becoming like a joke. Nobody wants to get old, yet every year they get older.

The year 2000 found them walking the ridge that leads north and east from Cumberland Gap like a road in the sky, while the wind ripped the leaves from the trees all around them. Two thousand! It was the coldest October in years. They slept in a dry cave floored with dust like the moon, where footprints would last a thousand years—or at least forever. Life was still sweet. Billy Joe married again. Nation moved back in with Ruth Ann. It was not yet time.

Somewhere there are pictures that show how they looked alike in the beginning, in that way that all boys look alike. Later pictures would show how they diverged: BJ in blue suits and ties, Pignatelli in silk sport coats and hundred-dollar jeans, Nation in coveralls and gimme hats. Some fifty years later they looked alike again, sitting on the edge of a limestone cliff high over the Big Sandy River, thin in the hair and getting thick in the middle. That was their last October. One week after Christmas, Nation died. It was very sudden. Pignatelli hadn't even known he was sick; then he got the call from Ruth Ann. It was a heart attack. He was almost fifty-nine. How old do you want to get?

Pig Gnat took out the map, which he kept in his office, but didn't unfold it. He had the feeling he could only unfold it once. Billy Joe and his young wife picked him up at the Louisville airport, and they drove straight to Middletown for the funeral. Billy Joe was angry; his wife seemed apologetic. After the burial there was a reception at the house on Coffee Tree Lane. Pignatelli went out to the garage and two little girls followed him; all Nation's grandchildren were girls. He spread out the map on the workbench, and sure enough, the old paper cracked along the folds. He found the Daisy under the bench, dark with rust and smelling of WD-40. The girls helped him look, but he couldn't find the magazine or any BBs.

Back in the house, he kissed Ruth Ann goodbye. He wondered, as he had often wondered, if he would have married if he could have married the Homecoming Queen. Almost all the mourners had left. Billy Joe was drunk, and still sulking. "We waited too goddamn long!" he whispered. Pig Gnat

CONTINUED ON PAGE 103

INTERVIEW

Happiness is something we make happen, says the Doctor of Flow
And here's how you can heighten that experience

MIHALY CSIKSZENTMIHALYI

At first there was only the blank page, the mind filled with anxiety. But I am well into it now—thoughts coming in the right words, building a story that is a joy for me to write. Whether anyone else will enjoy reading it doesn't matter now. There is nothing I'd rather be doing. I'm not hungry or thirsty and have lost all track of time. There is only the thing itself. I am in flow.

Flow—this enviable state of optimal experience where the challenge is high, but not beyond the skills brought to bear—is the domain of Mihaly Csikszentmihalyi (pronounced CHICK-sent-me-high-ee; friends call him "Mike"). A Hungarian-born polymath and professor of psychology and education at the University of Chicago, Csikszentmihalyi has pondered the meaning of happiness since his childhood in wartime Europe. His books *Flow: The Psychology of Optimal Experience* and its sequel, *The Evolving Self*, are popular explanations of the theory he's been developing for two decades.

PHOTOGRAPHS BY DAVID MICHAEL KENNEDY

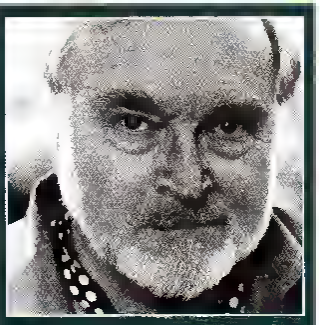
Indeed, Csikszentmihalyi has stepped in where other psychologists have feared to tread, focusing on the best moments of life—joy, creativity—rather than on the unconscious or loss, suffering, and neurosis. The focus on enjoyment is relatively novel in psychology, but the field may be ready to recognize the importance of normal states of mind. And if distressed people can learn to better experience flow, they may be able to quell their unhappiness.

Aristotle wrote that people seek happiness more than anything else. But after 2,300 years, most of us are still seeking and still unhappy much of the time. Why? In the psychoanalytic view, happiness is the pale shadow of dark desire. Since we rarely indulge our sexual drives, we find acceptable substitutes, practicing "sublimation." Anyone who enjoys mountain climbing, a psychoanalytic explanation holds, is merely exhibiting a sublimated penis envy. A game of chess allows players to cope with their castration anxiety.

"Nobody seems to do anything according to this point of view," Csikszentmihalyi complains. "except to resolve a festering childhood anxiety." But to him, 'Life is shaped as much by the future as by the past.' In his scenario, happiness is there for the asking. "The best moments usually occur when a person's body or mind is stretched to its limits in a voluntary effort to accomplish something difficult and worthwhile," he writes. "Optimal experience is thus something we *make* happen."

Those 'best moments' are not limited to leisure or even good times, he argues, since "people who have survived concentration camps or lived through near-fatal physical dangers often recall that in the midst of their ordeal, they experienced extraordinarily rich epiphanies in response to such simple events as hearing the song of a bird in the forest, completing a hard task, or sharing a crust of bread with a friend."

Csikszentmihalyi grew up in Italy—Fiume (later Yugoslavia, now Croatia), Venice, and Rome—where his father became head of the Hungarian diplomatic mission. What his father really liked to do, Csikszentmihalyi recalls, "was run around antique stores all over Europe and find paintings which he then restored." So it was no accident that Csikszentmihalyi developed an interest in art, becoming an accomplished painter before age 22 when he left Europe to study at the University of Illinois. As a boy he spoke Hungarian with his family, German with his nanny, and Italian with friends. He flunked English in high school, but eventually learned it by following Walt Kelly's *Pogo* cartoons in a newspaper for American servicemen. Finishing his studies in psychology at the University of Chicago, from 1965 to 1970 he taught psychology and sociology at Lake Forest College in Illinois. In 1970 he was drawn back to the University of Chicago and the opportunities it offered for long-term projects.



TITLE:
Professor of Psychology, University of Chicago

SOME BOOKS WRITTEN:
Flow: The Psychology of Optimal Experience, *The Creative Vision* with Jacob Getzels; *Television and the Quality of Life* with Robert Kubey; *The Evolving Self*

TIMES IN FLOW:
Oh, close to every day

ON MICROFLOW:
"You start drawing this doodle, this thing, and it begins to look like a fish. So you want to make it look more like a fish. If part of it doesn't look like a fish, you feel bad, and if it looks like a fish, you feel good. Maybe it's not quite a fish; maybe it becomes more abstract, so you try to maximize the abstract shape, making it more complex, although after you finish it, you never look at it again. But you could see a continuity between this activity and even the paintings of Michelangelo."

Today at 59, Csikszentmihalyi is doing what he likes best. None of the myriad ways his theories have been used in real-life situations please him nearly so much as a good theoretical go-round with colleagues and grad students who share with him a sprawling series of ancient, unglamorous offices. Only the computer equipment and the baby's crib and playpen for the married students' children attest to the modernity of the ideas born here.

During our talks I told Mike that after reading *Flow* I looked at my activities to see which produced flow. Now I set aside time for some of them, whereas before I'd say, "I'm too busy." Now I feel it's important to my emotional health to have this experience as often as possible.

"That's interesting," he mused. "Someone else might have diagnosed what produces flow and then said, 'Okay, I'm just going to do the one thing that's most enjoyable and forget about everything else.' Another could say, 'I feel so good in this activity I want to transform all my other activities to make them feel like this.' Each person needs to take control of this issue and make of it whatever he or she will."

—Dava Sobel

Omni: How did you come to make a formal study of happiness?

Csikszentmihalyi: When I was 15 or 16 and by chance in Switzerland, I heard a talk by Carl Jung about the mass delusion Europe had suffered during the war. That struck me, because as a child in the war I'd seen something drastically wrong with how adults—the grown-ups I trusted—organized their thinking. I was trying to find a better system to order my life. Jung seemed to be trying to cope with some of the more positive aspects of human experience.

After hearing Jung I read all his books I could find, then Freud and other psychologists to see what they had to say about a good life. There wasn't much. Finally I came to this country because in Europe there was no program in psychology. I quickly discovered that most psychology here involved rats and pathology. Luckily I eventually found a mentor at the University of Chicago, Jacob Getzels, who was interested in creativity. We worked out a proposal for my

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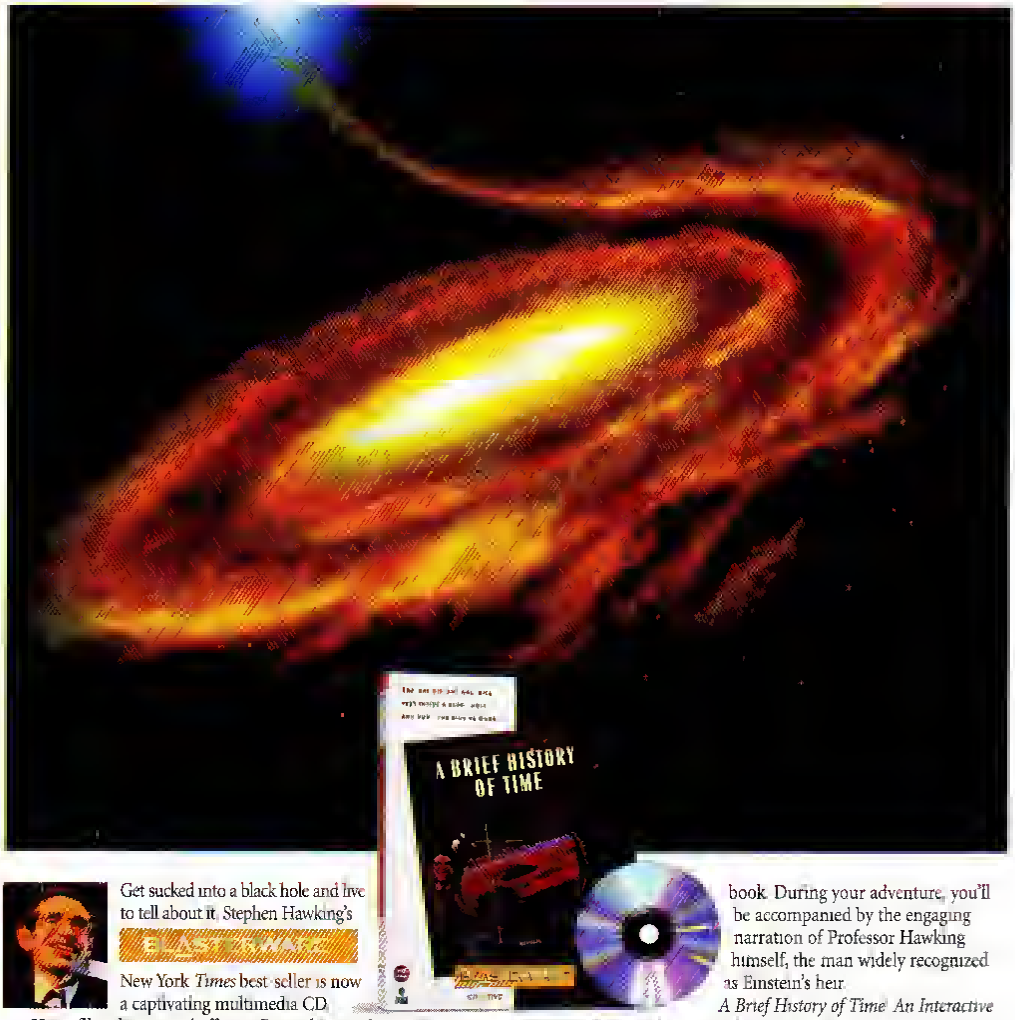

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CREATIVE

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dissertation on creativity among artists.

I tried to look at artists' cognitive processes—how they formulate a problem, decide what they want to paint. But the more I observed these artists, the more I saw that the really interesting question was *why* this activity was so terribly enjoyable to them that they would get completely carried away in it. Again, very little in psychology shed light on that. Most psychologists would've interpreted the phenomenon in terms of defense mechanisms or compensation—sublimation at best. None reckoned with the positive joy artists experience when creating. So my dissertation explored ways of expressing this in a theoretical conception. Next, I began to study others who did things for which they got no external rewards.

Omni: Originally you looked at enjoyment in terms of creativity alone?

Csikszentmihalyi: Right. But in observing how supposedly creative people go about setting up a problem and solving it, I noticed the tremendous emotional involvement, even ecstasy, they seemed to experience. At the time I saw the exhilaration as a means to an end, something that kept them pursuing the activity. But then I became interested in the feeling itself as an end product. What really counts is how you *feel*, not what you accomplish. When I thought about it that way, I had to know more about it. In the early Seventies, the Public Health Service funded my three-year project to study enjoyment in work and play, including people on assembly lines. I developed a new method to systematically study the quality of experience. My students and I collected fascinating on-the-spot data on people's feelings throughout the day.

Our subjects wore electronic pagers so we could signal them at random times. At the beep, the participants filled out a questionnaire about where they were, what they were doing, who was with them, how they felt, how hard they were concentrating, how challenging the activity was, and how well they were meeting the challenge. This "experience sampling method" became so rich in results that for almost eight years I didn't study flow directly. Many of our subjects had been teenagers, and Reed Larson and I wrote a book about them called *Being Adolescent*.

In 1973 or 1974, the term flow grew. It came out of listening to people describing how it felt when what they were doing was going well. Over and over we heard, "Oh, it was like being in a *flow*, being carried away by what I was doing. It was very complex, yet seemed effortless." Originally we called that the "autotelic experience," meaning an experience whose goal was simply to be itself. But the term seemed stuffy, pretentious, too much like scholarly jargon. One student said, "Why don't you call it flow?" Sometimes I regret calling it that, because "going with the flow" sounds like something out of the Sixties from California—too relaxed and undisciplined, which the experience is not. So we are caught between this Scylla and Charybdis of being too professional and too popular.

Omni: Can you remember your own first flow experience?

Csikszentmihalyi: It was toward the end of the war, in 1944. Many relatives and friends in Budapest had been killed. One of my brothers died in combat, and another had been taken prisoner by the Russians and sent to a forced labor camp in Siberia. I discovered chess was a miraculous way of entering into a different world where all those things didn't matter. For hours I'd just focus within a reality that had clear rules and goals. If you knew what to do, you could survive there. No other kids my age were around, so I played against colleagues of my father in the diplomatic corps. I usually beat them, which was a great boost.

When I was 14 or 15, mountain climbing became a source of flow. Then painting and writing. There were minor ones all the time, but those four allowed me to get really involved. They are difficult in the beginning. With climbing you have to get up at two or three in the morning and walk for a few hours in the cold until you get to the rock face. But once you get involved, it's a different world. You can keep it up for hours—with no sense of time passing. The same is true of almost any of these activities.

Omni: Does the element of risk heighten the experience of flow?

Csikszentmihalyi: Some flow experiences involve low danger, like reading a good book. But certain people are disposed to respond to risk, and their flow will depend on it more than somebody else's. Danger is the hook. But their descriptions are not that different from, say, a Thai woman's description of weaving a rug. The quality of concentration, forgetfulness, involvement, control are similar.

Omni: Are there physiological indications of flow?

Csikszentmihalyi: Years ago, I started looking at EEGs, galvanic skin response, brain waves, and heart rates. At that time you couldn't get people into realistic situations to measure their physiological responses. I came closest with chess players, because they

are sedentary when they play. But most EEG studies are not worth the paper they're printed on. The best EEG man I know doesn't touch any EEG data except from people who are asleep.

Last year I started trying again with new imaging machines. We selected 40 high school kids, 20 of whom had many flow experiences and 20 who didn't. We monitored their evoked potentials in a standard learning situation where they responded to questions presented on a computer screen. Jean Hamilton, a psychiatrist and former student, measured cortical activity in people solving problems and found that ones who had many flow experiences spend much less effort on the task. When we tried to replicate her experiments, we found kids who reported flow more frequently performed better in the test situation with much less cortical activity, were less aroused by the tasks, or spent less mental effort responding to the stimuli. When we asked them to rate their subjective states, those often in flow turned out to feel much less self-conscious in the test situation.

Kids who don't flow make a greater mental effort because they not only respond to the problem on the screen, but also monitor themselves and wonder, "Will I do right? What does the experimenter think?" Their self-consciousness puts an extra burden on their mental effort. Marlin Hoover, one of my students, wired people with a heart monitor, and for five minutes before we beeped them, we recorded heart rate without the person knowing it. We compared their heart rates before they knew they were going to report with what they wrote down. Clearly, the self-report is neatly tuned in to the physiological process. But we found large individual differences.

Omni: Do students report flow because you've explained the concept to them?

Csikszentmihalyi: No. In general, people in our studies are not aware of the concept or word. Our information comes from their self-reports when the beeper sounds. The self-report then asks them how they feel about what they're doing, to rate the challenges of the activity and their skills in it from low to high. [Points to data chart.] This student rates her skill in some activity almost twice as high as the challenge.

Omni: What does that mean?

Csikszentmihalyi: She's bored. Over a week we establish the average level of skill and challenge for a person. These estimates would be the midpoint on a graph where the horizontal axis is challenge and the vertical axis is skill. If she reports an activity where both challenge and skill are high, we call that a flow experience. This student reports high-challenge, high-skill once when she's singing, once studying, once playing tennis, and twice while reading.

Omni: What's happening to her on the graph outside the flow sector?

Csikszentmihalyi: Here she fights three times with kids in school—encounters she rates as high-challenge, low-skill. That's anxiety. Other times the beeper found her talking, preparing for a quiz, reading comics, eating—all of which she judges high-skill, low-challenge. Boredom. She watches TV only three times and rates that the same as being in the bathroom: low-challenge, low-skill. And that's apathy. Some people are never in flow. They are either always anxious or always bored. They're always out of whack. This particular kid has an inordinately high number of flow experiences. Then you look at what she's doing: singing, studying, computer tennis.

Omni: What are some other states?

Csikszentmihalyi: In arousal, there's a little more challenge than skill. In control, you have fairly high skills, higher than your challenges, but not by much, so a person feels essentially in control of the situation, but not in flow. In these graphs of adults, we're comparing flow, anxiety, boredom, apathy—whatever channel they happen to be in, with self-reports of how motivated, active, concentrated, creative, satisfied, and happy they feel.

You can see when they're anxious that they feel active and concentrated, but their motivation and satisfaction are low. In boredom everything is very low but affect: meaning that even though they're bored, they're fairly happy. Look at apathy. People are usually in apathy when they watch TV or shoot the breeze with peers. They don't concentrate, feel active, creative, happy, or even satisfied. But they still want to do whatever they're doing. This is the paradox of apathy; it's a really negative state in many ways, yet people tend to gravitate to it.

When teenagers engage in sports and games, they're in arousal 30 percent and in flow 35 percent of the time. You find almost no boredom, relaxation, apathy, and little anxiety. Compare that with TV-watching: no arousal, practically no flow, no control, 40 percent boredom, 10 percent relaxation, 30 percent apathy. Completely different profiles. Then you look at how much time they spend doing these things, and it's ten to one TV-watching. So we asked them why they do it. They say things like, "Coming home from school, I know I'll feel better when I go biking or play basketball, but it takes time to

CONTINUED ON PAGE 90

ANTIMATTER

UFO UPDATE:
In their new instruction manual, firefighters are briefed on the art and science of UFOs

It only makes sense that civilian emergency personnel from police to firefighters may be called to the scene of a close encounter, real or not. But despite their role on the front lines of virtually any emergency, our country's "first responders" have never been given any kind of background on the UFO phenomenon, until now.

For a detailed briefing on the topic, all professional rescuers need do is refer to the new, second edition of the *Fire Officer's Guide to Disaster Control* (Fire Engineering Books and Videos). Used by the Federal Emergency Management Agency (FEMA) in its National Fire Training Academy Open Learning Program, the book covers, in addition to more traditional fire fare, the ABCs of UFOs. In practical language, the manual examines potential problems like disruption of transportation and communication, possible psychological and physical impacts, and speculations about government secrecy. To fire up imaginations, the manual also presents a hypothetical alien encounter.

This radical primer was the brainstorm of the late Charles W. Bahme, a former Los Angeles Fire Department deputy chief, who researched UFOs for years. According to Bahme, his interest was ignited August 26, 1942 during the famous "L.A. Air Raid." As sirens and news bulletins announced an enemy invasion, Bahme, then a young Navy fireman, watched some 20 objects zoom and zigzag overhead. "They changed course at incredible speeds while gun crews along the coastline pumped more than 1,400 rounds at them," he said. Two hours later, all was quiet on the Western front. "Rumors that they were extraterrestrial craft, that one was shot down, were never confirmed," he said. "The official explanation—weather balloons—was never taken seriously."

After serving as security coordinator for the Chief of Naval Operations, Bahme went on to write the original *Handbook of Disaster Control* in 1952, and the first *Fire Officer's Guide to Disaster Control* in 1978. Finally, in 1993, he teamed up with William M. Kramer, a district chief with the Cincinnati Fire Department, to write the current manual.

So, if confronted with something alien, what's a firefighter to do? Considering the federal law (14 CFR, Ch. V, Part 1211) giving NASA arbitrary discretion "to quarantine under armed guard any object, person, or other form of life extraterrestrially exposed," the primer suggests it would be "inadvisable to make personal contact" unless one is willing to submit to quarantine should the law be invoked.

That notwithstanding, the manual advises, "In the absence of overt acts indicating hostility, there may be no danger in approaching a UFO with a positive, solicitous attitude of wanting to be of service," which may be "telepathically sensed by those aboard." But "Any display of weapons could be construed as unfriendly."

The guide's UFO section is primarily informational, says Kramer, "intended to get fire officers thinking. Nearly everyone has told me they were impressed that a mysterious subject was taken out of the closet, and many believe we are, somehow, eventually going to make contact with other forms of intelligent life."

In general, the UFO community approves. "While a few of the sources aren't the best," says Mark Rodeghier, scientific director of the Center for UFO Studies in Chicago, "nobody else has even tried to devise a plan for public officials before."

—A. J. S. Rayl

ANTIMATTER

THE INNER LIFE OF LAKE MONSTERS

Want to catch a peek of Nessie or Champ? Studies by one Japanese anthropologist suggest that observing these elusive critters may not be a hit-or-miss affair. Instead, says Yasushi Kojo of Waseda University in Tokyo, your chances of bearing witness to the serpent in the lake may be increased if you study its habits.

When Kojo first studied the schedule for Champ, the large unknown critter said to inhabit Lake Champlain in Vermont, for instance, he expected to find more reports during the height of the day, when people themselves tend to visit the lake. Not so. "Sightings increase after about 4:00 p.m., and take place most frequently between 7:00 and 8:00 p.m., just before sunset at Lake Champlain in summer," Kojo writes in the journal *Cryptozoology*. "The steady increase of sightings from the late afternoon toward sunset indicates that the animals are nocturnal."

One skeptic is chemist Henry Bauer of Virginia Polytechnic Institute and State University, author of the *Enigma of Loch Ness*. Reviewing just one of several possible explanations for Kojo's findings, Bauer says the timing of the reports might well be due to waves. While lakes tend to be calm in the morning, winds become stronger late in the day, increasing the height of waves. The slanting of the light toward dusk, he adds, makes the waves more obvious still.

If this were true, counters Kojo, then other lake monsters, like Nessie, should show up on a similar timetable. But, he notes, the Scottish lake monster is most often seen either in midmorning between 10:00 and 11:00, or in the mid-afternoon between 3:00 and 4:00. To Kojo, this means that whatever inhabits Loch Ness is not nocturnal like Champ and may actually be a different species.

Yet another expert, biochemist Roy Mackal, formerly of the University of Chicago and author of the book, *The Monsters of Loch Ness*, takes issue with this as well. Kojo's findings, notes Mackal, might suggest more about the cultural patterns of the lake and the loch than about the inner lives of the monsters themselves.

Again, Kojo disagrees. "Based on my cursory observations of the people," he states, "I'm skeptical of the possibility that there are significant differences in siesta or lunchtime habits around Lake Champlain and Loch Ness."

—Patrick Huyghe

FREEZER WARS

The strange world of cryonics is in a state of upheaval. The shake-up occurred last fall at Alcor, the world's leader in freezing people at the time of death in hopes of future medical breakthroughs and eventual revival. A group of about 30 former Alcor activists, unhappy with key financial and administrative decisions, decided to split and form their own rival organization dubbed CryoCare. The new group is being run

HIS MOTHER'S FROZEN HEAD REMAINS LEGALLY—BUT AGAINST HIS WISHES—IN THE CARE OF ALCOR

by Brenda Peters in Chicago and Charles Platt in New York and has been financed in part by Saul Kent, whose mother's frozen head remains—legally, but against his wishes—in Alcor's care.

To avoid such arguments at CryoCare, says Platt, the science-fiction author who spent the last few years trying to help Alcor reach a larger audience, "we decided to split cryonics into separate functions. CryoCare, which is non-profit, will take the legal responsibility

for patients under the anatomical gift act, but will employ outside providers to manage the money, freeze the person, and store patients for the long term."

CryoCare, says Platt, "is signing up Alcor refugees at a great rate," with 50 to 100 people now in the sign-up process. "That's significant given that the Alcor membership is around 400," he notes.

Despite the defections, Alcor remains upbeat about its own future. Last winter it moved from its old Riverside offices in earthquake-prone Southern California, to much larger and more stable quarters in Scottsdale, Arizona. Alcor's liquid nitrogen–cooled storage units reportedly made the 350-mile trip safely; these contain their 27 "patients-in-suspension," ten of whom are "whole body," the rest being "neuros," or head-only suspensions.

Alcor vice president Ralph Whelan doesn't think the recent split will do any long-term harm. "Alcor hasn't had any competition for years and competition is good," he says. "The people forming this new organization are smart, competent people, and they're going to give us competition. And I, for one, am looking forward to it. What I want is to save these peoples' lives."—Patrick Huyghe

BIRDS II

It's a story best told in numbers. In August there were only four or five, a curiosity. But by January 1994 their numbers had grown to nightmarish proportions—about 200. What Lynn O'Hara-Yates and her neighbors in Stafford County, Virginia, were counting with increasing dread were the black vultures with five-foot wingspans that had come to roost on their properties, killing ducks, attacking cats and horses, and circling over children getting off school buses.

Stafford was just one of nearly a dozen places

in Virginia reporting vulture problems last winter, according to Phil Eggborn of the Virginia Department of Agriculture and Consumer Services in Richmond. "And the situation in Stafford was not the worst," he says.

Experts note that the likely cause of the vulture attacks was the particularly harsh winter. The snow cover reduced the amount of road kills they normally feed on and left them little to scavenge. "Black vultures are on record killing the young of just about everything," says Les Terry, a wildlife biologist for the USDA's Animal Damage Control Program in Annapolis, Maryland, "but as far as I know there've been no recorded attacks on humans."

Ridding Stafford of its buzzards proved to be no easy task, since vultures are federally protected and cannot be killed without a permit. "Unfortunately," O'Hara-Yates notes, "it took three months to get the permit," and by that

AT ONE HORSE FARM, THE VULTURES ATE EIGHT OF THIRTEEN DUCKS AND ALL THE SONGBIRDS, TOO

time neighbors had taken the situation into their own hands.

The vultures, like all birds, have strong instincts and are likely to remember last winter's "duck delight." Authorities have told the residents to expect anywhere from 400 to 600 buzzards this year. "But," says O'Hara-Yates, "we are not going to let their numbers build up again."

—Patrick Huyghe

ALIEN

CONTINUED FROM PAGE 46

touch your butt? Probably don't have butts anyway, poor misshapen geeks.

I'm sorry, what was the question again?

Walter J. Hickel
Governor, Alaska

In 1936, I graduated from high school in Claflin, Kansas. I remember our teacher telling our graduating class that within our lifetime, man would walk on the moon. Now Claflin, Kansas, which is populated by German Catholics, was a very religious community and any talk of man going to the moon—God's moon—was not warmly received. But I could picture it in my mind. I saw it as clear as a bell, and knew it would happen.

Thirty years later, as Secretary of the Interior, I stood at Cape Kennedy and watched as *Apollo 11* lifted off, destined for the moon.

Since that time, I have been privileged to sit on the National Space Board, where the focus of our mission was to design the first manned colony on the moon.

I have always believed that mankind should stop warring and, instead, channel our energies into pioneering projects that serve the progress of civilization. Whether that civilization is within a region, or across international boundaries, or interplanetary, is not what's important.

My message to such a delegation of extraterrestrials would be: "We welcome you in peace. We have much to learn, and much to teach."

Arthur Miller
Playwright

"Go back! Go back! You can get killed here!"

Edward G. Rendell
Mayor, Philadelphia

After a quick hello, I'd ask them if they had a cure for AIDS, unemployment, crime, drugs, hopelessness and the breakdown of the family.

Hope springs eternal!

Steve Allen
Writer and comedian

To Our Visitors

We have translated the key part of your recent message as: "We are peaceful, and we're dropping by for a visit."

If ours were a largely rational universe, your statement could be taken at face value. But our own judgment, on Planet Earth, must inevitably be conditioned by long centuries of experience, and it has been our finding that such protestations, when made by Earthlings, have often been lies. If you are indeed peaceful you are unlikely to consider us warlike. This is not because of any innate decency on our part but rather because we fear you, and this largely because we know practically nothing about you.

We assume that because you have managed to reach our part of space you far exceed our own competence in matters scientific. This, in turn, suggests that your intelligence is superior to our own. Unfortunately, there has been no necessary connection, at least on our planet, between intelligence and virtue, so as regards your either short-term or ultimate intentions, we can do little more for the present than hope for the best. But I must issue a warning, and it is one that I hope you will take seriously. In saying this I intend no threat. I do not warn against acting on such aggressive tendencies as you might harbor, but rather of our own long habituation to the most bloodthirsty behavior. There is scarcely a page of our history that is not stained with blood.

Secondly, you should be aware, for your own protection, that of all the hundreds of thousands of living creatures you will find on our planet, we humans are, beyond the slightest question, the most dangerous. It is true that there are other creatures that can inflict harm, but they do so purely in self-defense or in accordance with their own nature, to satisfy their hunger. That fearful creature known among humans as the man-eating shark, for example, knows nothing of the human emotion of viciousness. He is simply dangerous to other creatures when he is hungry. The aggression of animals, therefore, is entirely understandable. The more ominous aggression of humans has a large component of irrationality to it. You will not even be able to depend on our acting in self-interest, for if that were our only concern we would scarcely ever have initiated a war. And yet wars have not only sporadically broken out to separate long periods of peace; it has rather been the other way around. War seems to be our natural state; times of peace come about because of either emotional, physical or economic exhaustion. Except for a few of us—who are often harshly criticized—we humans do not seem to have any natural aptitude for peace whatever, partly, perhaps, because peace is a blank, a negative, an absence of something, whereas war is concrete, definite and active. You will find that we humans are remarkably gifted

at waging war whereas we are clumsy amateurs when maintaining a peace

There is a certain amount of grim humor I suppose in the possibility that although we have traditionally historically been embroiled in tribal rivalries your unexpected coming may serve to bring us together by forcing us to realize that we are after all one human family But whether this happy outcome results or not I would suggest that you do not long turn your backs on us

And yet—such is the mystery of life in our peculiar corner of the universe that many of us are also capable of the most exquisitely tender concern for our fellow creatures, an ability to love that extends even to the lesser animals It is from this primary, primitive emotion, I suspect that there comes our sometimes astonishing ability to create beauty whether that attribute takes the form of painting music sculpture, poetry drama or any other art

Perhaps the greatest favor you can bestow on us is to share your opinion of the purpose of life, for we have never known what it is There is no shortage of theories of course but they are legion and many are mutually exclusive It is tragic, in fact that some of our most savage wars have been among groups that differed in regard to this one basic question Most of us in the total absence of an ability to explain either the physical universe or the reason for its existence in the first place, simply assume that there is some all-powerful spirit that has created literally everything But even our most intuitive theologians have always been at a loss to explain why a benevolent deity would create poisonous snakes and spiders, deadly plants, and billions of bacteria and viruses that daily kill millions all over our planet It follows, therefore that if you are in a position to enlighten us on such age-old questions, we will be profoundly grateful

Helen Gurley Brown
Editor Cosmopolitan

I don't mean to be too sensible or realistic but I doubt I would be able to get anyplace *near* the peaceful extraterrestrials who visited Earth They would immediately be snapped up by *Hard Copy, Prime Time 20/20,* I.C.M., Creative Artists and other talent agencies, Elite and Eileen Ford and other modeling agencies and asked to be guests of honor at a dozen fundraisers how could you get *to* them? If I ever did I would just say "Hello, I'm glad you finally got here Are you feeling jet-lagged dehydrated or debilitated in any way from your long trip? It's nice to see you."

George Carlin
Comedian

Get out! Go back! Save yourselves! You don't know what you're getting into Prolonged contact with our species can only degrade your present standards whatever they are "

Bernard Shaw
Principal Anchor, CNN

I would not assume the delegation could speak or understand English Nor would I presume to be Earth's spokesman *I would run!*

Brereton C. Jones
Governor, Kentucky

I was extremely intrigued by your question of how we would welcome an extraterrestrial delegation visiting Earth

If a member of the delegation stated, "Take me to your leader" I could explain that I *am* the leader of a proud group of people known as Kentuckians I also would explain that we are a peace-loving people and we are interested in learning about the other beings in the universe

In addition, I would want to give them two items that I believe would best explain who we are as a country I would present to them a copy of the U.S. Constitution and a copy of the Bible

The Constitution, I would tell them is the compilation of rules that we as a people have chosen to follow

The Bible, I would continue is the compilation of rules that our Creator has chosen for us to follow

I would explain that we do not always abide by all of these rules but that we are striving to do so and that is our ultimate goal

Then I would conclude by inviting them to stay awhile and sample some of the many advantages Kentucky has to offer They are simply out of this world!

"PLEASE DON'T REVEAL THIS IS YOUR FIRST VISIT OR YOU WILL BREAK THE HEARTS OF THOUSANDS OF UFO BELIEVERS."
—PHILIP J. KLASS, UFO DEBUNKER AND CONTRIBUTING EDITOR OF AVIONICS IN *AVIATION WEEK* MAGAZINE

Chuck Yeager
Brigadier General (Retired), U.S. Air Force

It would depend on who when and where In my opinion one cannot predict what one would say to a bunch of extraterrestrial beings unless we knew a few things about the conditions of the meeting

William Beecher
Director, Office of Public Affairs for the U.S. Nuclear Regulatory Commission

My first instinct was a flip response What would you like for lunch?

But since you're obviously serious I would ask how we could put together teams of outstanding specialists from a cross-section of disciplines to explore ways of trying to improve the quality of life on each planet based on disparate lessons learned in science medicine history literature and the arts

Harlan Ellison
Writer

If by some frenzied desalination of our murky gene pool between then and now exultantly ridding us of our hideous and undying xenophobia I suggest that we go out to meet them buck naked our hands empty and palms up extended and open And I suggest we say only this "Help us We are very young and we want to know"

Alternately if we don't get the clean up time if it happens tomorrow or Thursday then there is only one thing we should say to visiting aliens, and it is this

"So? You had a nice trip? Are you tired, want to wash up have a bite to eat? A nice piece of brisket maybe some fresh fruit? Sweetheart you'll suck an orange you'll feel so refreshed! Then we can chat "

Lawrence Ferlinghetti
Poet

Who could translate?

Robin Leach
Host Lifestyles of the Rich and Famous

"Welcome—we hope you find us peaceful too What took you so long? We always believed you were out there! Would you like some champagne and caviar to celebrate your arrival? Then we have a million questions to ask you especially, how long have you existed and how long have you known about us? And did you see *E.T.*?

SEARCHING

CONTINUED FROM PAGE 54

lack of funding. At a time when America's waterways are being rapidly destroyed by illegal dumping, pesticide residues, neglect and excessive sedimentation caused by deforestation and strip mining, congressional lawmakers seem more content to give lip service than dollars to projects to reclaim damaged sites. Funding has never matched the enormity of the problem since a tiny team of environmental biologists, affiliated with the Center of Environmental and Hazardous Materials Studies at Virginia Tech in Blacksburg, Virginia, first started working to restore compromised water ecosystems in the late 1960s. On a shoestring annual budget of $1 million, biologists reconstructed wetlands and restored natural wildlife habitats to a user-friendly state in a number of locales such as Lake Michigan bottomland sites in the Mississippi drainage region, and the Mattole and Santa Cruz rivers. Under the direction of Dr. John Cairns, Jr., the team started restoration work in the Appalachian area in the fall of 1991 to reduce sediment runoffs, revive wildlife, and curtail damage from flooding. Artificial wetlands are being constructed to assist in rebuilding aquatic ecosystems in eastern U.S. forests, luring wildlife back to natural habitats. "Our work is to create wetlands as a natural Band-Aid to damaged ecosystems very similar to ones naturally created," says Robert Atkinson, environmental biologist at the Center. "The restoration of our waterways is in its infancy. We do not have much money, so we try to make sure that we scientifically maximize our results with careful monitoring of each project. More funding will only come through increased public awareness of the severity of the problem."

In an effort to curb spending and maximize efficiency, many researchers rely on common-sense approaches to tackling difficult scientific challenges. Lester Ehler, for instance, a researcher in entomology at the University of California at Davis, applies traditional biological control methods of insect pests first used over a century ago: using a pest's natural enemy to control a species. The technique reduces our dependence on harmful pesticides which cause harmful environmental damage and long-term hazards to human health. Since 1973 on a small university budget, Ehler has been experimenting with lace-wing larvae, lady beetles, soap sprays, and other natural controls to rid crops of insect pests. One of his long-term projects, backed by sugar beet growers, has employed larvae and beetles to control aphids gorging themselves on the valuable vegetables, drastically cutting crop loss on sugar beets. However, Ehler's work may be curtailed by additional cuts in California's state budget which backs much of UC's research. "The savings to the consumer and grower can be tremendous," says an optimistic Ehler. "It's nontoxic and nonpolluting. There is no environmental hazard. We don't have a problem with pest resistance because the pest cannot evolve a resistance to its natural enemy." Given the fact that there is genuine concern about pesticide residues in food and the environment, Ehler adds, anything that can be done to cut pesticide use is a benefit.

Researchers plow ahead with the intricate work of the Human Genome Project, which may cost an estimated $3 billion and could take nearly 20 years to complete, despite funding shortages. The dream of reading and reproducing the entire genetic code of a human being is becoming reality thanks to research initiatives including DNA cloning, deciphering of gene sequences, and analysis of chromosomes with sophisticated microscopes. "The entire genetic search could be done in five years," says Glen Evans, a molecular biologist at the University of Texas Southwestern Medical Center at Dallas, and one of the key players in the international genome search. "It may take longer because the funds are not there." To save money, researchers constructed robots to handle some of the more tedious work such as intricate gene sequencing and time-consuming computer functions. Evans credits the use of robots with cutting costs "somewhat," but insists the project needs an even greater funding investment to reach target goals.

At its completion, the medical community will possess the ability to construct a gene map and complete genetic information for any human being. As for the possibility of abuse, Evans says researchers realize crucial ethical questions of access and privacy need to be answered before the technology becomes widely available, and various safeguards to protect availability are being studied.

Nearly 6 percent of the budget is geared toward this goal. In fact, Evans says, "compiling this gene map will uncover the genes which could uncover diseases like cancer, heart disease, and mental illness. If we get a cure for

AIDS. It will come from this work." Monitoring and finding cures for AIDS, other viral diseases, and serious microbial threats such as Human Parovirus B-19, Delta virus, and *E. coli* disease, have also been a part of the ongoing mission of the Centers for Disease Control (CDC) in Atlanta. Since America currently spends 14 percent of its gross national product on health with millions going for treatment methods, the CDC is operating on a fresh premise. Anticipation and prevention of infectious diseases are possible, needed, and cost-effective.

CDC researchers are worried about the spread of new strains of potentially fatal organisms such as Hanta virus from the U.S. Southwest and Lassa and Ebola fevers from Africa, as well as a variety of drug-resistant bacteria working their way into other areas of the world because of societal changes, environmental alterations, increased international travel, and widespread transfer of foods. Once transplanted, bacteria and viruses often exchange genetic material or mutate into more lethal infectious forms. 'A series of organisms has newly emerged or mutated in the last 20 years, and we must be vigilant that they do not spread,' says Mitchell Cohen, director of the CDC's Division of Bacterial and Mycotic Diseases. "Some of these diseases are just a plane ride away. Some have emerged within our borders. We must design effective prevention and control measures. We have had enough experience to know that we must use our resources to contain the spread of microbial invaders. Otherwise, we'll have increased illness, death, and medical care costs."

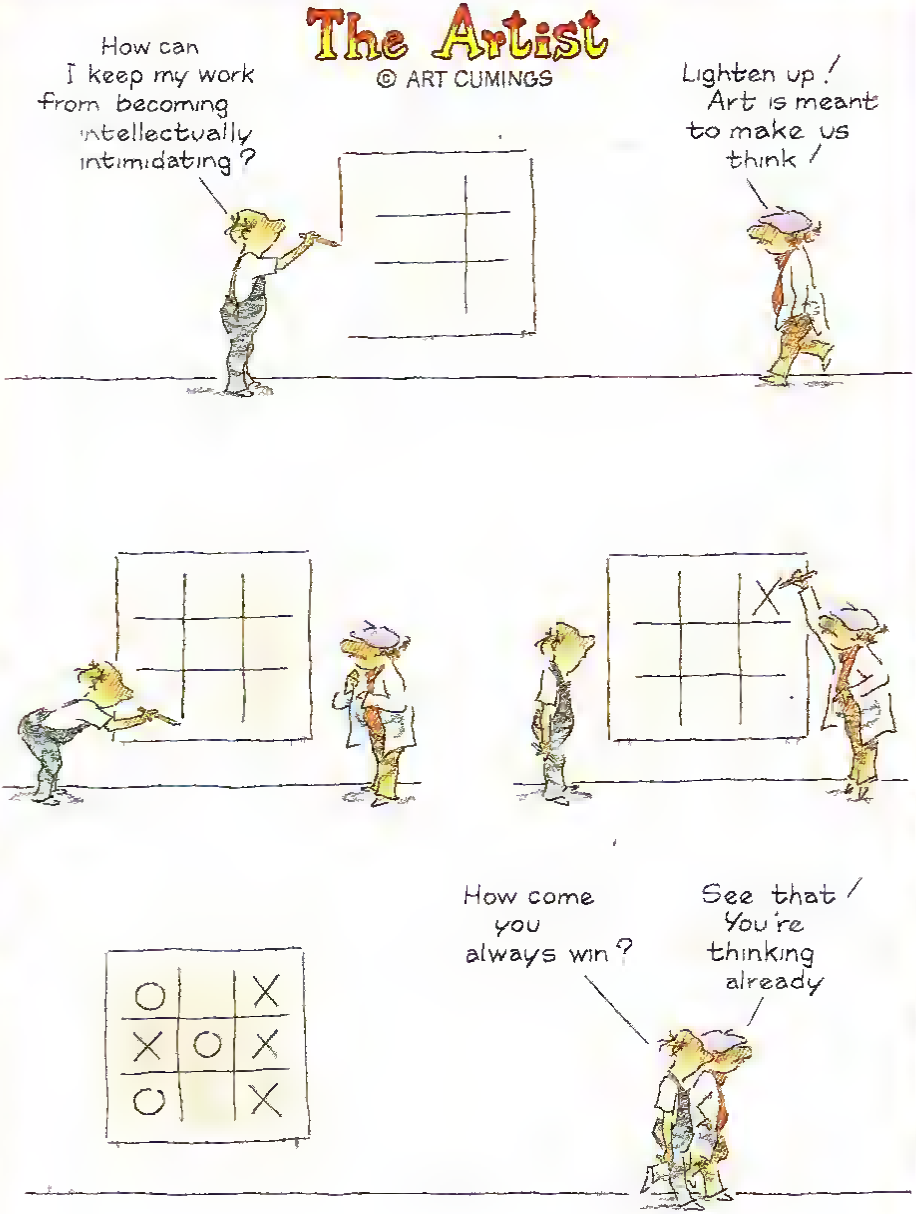
Funding for the CDC's National Center for Infectious Diseases has remained relatively stable due to its work in monitoring the current tuberculosis (TB) epidemic and AIDS research. The agency's active effort in seeking more effective treatments to stem the TB outbreak comes at a time when most states from Maine to Oregon have slashed their TB prevention budgets, thinking the problem has been eradicated. In fact, other research areas such as heart and lung disease have suffered because of the increased incidence of TB and AIDS, causing some researchers to question how some federal funds are applied.

Not only are funding levels remaining constant in AIDS research, private companies are also spending money for medical devices. For example, in Columbus, Ohio, researchers at Battelle Institute designed and perfected a helmet-mounted video display monitor for surgical procedures. Surgeons can use the device when they perform endoscopic operations requiring small incisions, employing a small monitor which provides them with a detailed close-up view of the part of the body they're operating on. Rather than straining to look up at a TV monitor overhead, the device is "right there" near their faces. All images are in color. The helmet, constructed of styrofoam, is lightweight and carries a two-pound counterweight to ensure balance and mobility. Much of the funding to Battelle, the company which gave us the technology to make photocopies, comes from government health and defense agencies and foreign countries such as Germany and Switzerland. The company has 48 locations globally and a staff of 8,000 working on 4,900 projects yearly.

"The helmet has fared well in tests," says Jeremy Harris, co-designer with Donald Hackman of the 1992 creation. 'Surgeons like the quality of the image and the mobility. You can look down past the monitor at your hands, and the view of the monitor is never blocked. Precious seconds are never wasted. Every surgeon likes that aspect.'

Money, or the lack of it, is also a major issue in research. Funding issues have complicated the development of the controlled fusion project, an energy alternative currently underway at the Princeton Physics Laboratory. The research seeks to harness the

The Artist



energy source of the stars produced by processing deuterium and tritium plasma within strong magnetic fields while heating it to fusion temperatures. Despite a series of triumphs, federal funding has fluctuated since the project began in 1951 with a meager $40,000 budget, reaching peak levels in the 1970s but dropping significantly during the Reagan-Bush era. Clinton supports the project, which will complete a key phase of its program this fall when it produces a landmark 10 million watts of energy, enough to light up a small town.

For 1993, Congress appropriated about $330 million for the project, which should culminate in the construction of a joint international Thermonuclear Experimental Reactor slated for operation in 2001. Countries including the European Community, Russia and Japan are cooperating on this project. "This process is cleaner and safer than the fission process for the nuclear power plants," says Dale Meade, deputy director for the laboratory. The long-term project, according to Meade, needs consistent funding support. "Can you imagine if the Japanese and Europeans developed fusion, and our fuel resources were depleted?" he asks. "Should our nuclear power plants become obsolete in 50 years, what will we do? This is a national security issue: to remain tops in fusion research. We've always assumed that we will hold this edge."

It is the fear that we will not "hold the edge" in international competition which propels scientific research. Technological advances do translate into political and economic power, such as our creation of the atomic bomb during World War II, as John Gibbons, Clinton's science adviser acknowledges. "This administration is placing a heavy bet that the science and technology community, given support and encouragement, can provide one of the principal engines for growth. We are developing programs to give pre-competitive assistance to technologies that promise commercial payoff."

Critics are skeptical of Clinton's plan which allows federal labs to spend up to 20 percent of their research budgets on partnerships with industry. The key program, costing $17 billion over four years, offers tax incentives and direct funding to foster technology. Clinton hopes to bolster technological research by converting some military research to civilian purposes, which would act as a catalyst for innovations in automobiles, biology, aerospace, computers, and other fields. He plans to give tax credits for industrial research and development. Some scientists worry about the mountains of red tape generated by such liaisons. Others wonder if Clinton's stress on applied research might deemphasize the importance of basic research and the pursuit of knowledge.

Both the White House and the American science community know the issue of technological superiority is crucial to this country's economic and political survival. Other countries devote much larger portions of their gross domestic product (GDP) to civilian research and development, according to current NSF data. Japan, for instance, devotes 3 percent, and Germany 2.7 percent of their respective GDP for non-defense related R&D, as compared to fiscal commitments of only 1.9 percent for the United States. "This country has too many needs to just let its research potential go to waste," says AAAS' Albert Teich. "So many of the global challenges, whether environmental, health, or economic, involve research, but not everybody recognizes that need. Sustaining our research levels is essential to America's political, economic and technological future. It's as simple as that." DC

INTERVIEW

CONTINUED FROM PAGE 77

arrange and get other kids together, and I'll have to change my clothes. It's just so much easier to turn on the TV.

Omni: That's scary. Have the beepers turned up any other surprises?

Csikszentmihalyi: It shows how dependent we are on some external structure to keep our minds well flowing. Not even in flow, but just on an even keel. Remember in the Sixties many psychologists did sensory deprivation experiments. They put you in a dark room alone, and your mind started wandering, and you couldn't control the movement of your consciousness. We find that is also true in everyday life. You don't need an isolation tank. All you need is to be alone with nothing specific to do. Just on the basis of statistical probability, most thoughts that come up will be worries.

Omni: Is this just human nature?

Csikszentmihalyi: As Gregory Bateson put it, for everything that can go right, there are 100 things that can go wrong. You want a million dollars. Fine. But what's the probability of not having a million dollars? Much higher, right? And the same thing with youth, with love. If your mind is going on its own, without some control over it, the number of messages that say, "You are not getting what you want" will be much greater than the positive messages. So you have to get either a filter allowing you to modify these negative thoughts, or you have to focus on something else to keep them from coming in.

Omni: Does flow accomplish this?

Csikszentmihalyi: Yes. I wouldn't say it's the primary task, but certainly one of the powerful side effects. When you're in flow, you don't have to deal with all these random thoughts.

Omni: So what's its primary function?

Csikszentmihalyi: I don't really know. We feel good about flow because somehow, through time and evolution, it got linked to good feelings, just as eating and sex did. Maybe flow feels good subjectively because it's a good way to make sure the species will take on higher and higher challenges and try to develop skills that match.

Omni: Don't you think that's kind of a teleological argument?

Csikszentmihalyi: It's not teleological because it just means that people who couldn't achieve flow would have had less chance of survival. It's a random coupling of a behavior type with a feeling, which over time achieved a greater survival or reproductive advantage. And now we are in a sense "designed" to want to be in flow. That doesn't explain how an individual in flow has a sense of complete participation in life and full expression of the potentialities of the self. You feel integrated on a personal level, and that goes with the absence of worries. Whether the absence of worries is primary or a fortunate by-product, it's certainly important. So it's almost like an escape.

But Einstein once said science is the greatest escape there is. And sure, when you go into abstract realms of the mind, it's nice to have another place to live besides the real world—a beautifully ordered, logical space. You could say that's an escape, but an escape forward! I make a distinction between an escape that's a reduction of challenge and skill, which occurs, for example, when you get drunk or take drugs. That's qualitatively different from an escape involving upping the challenges and skills.

Omni: There's the element of growth?

Csikszentmihalyi: Right. I call it complexity. You're operating with higher skills without reducing challenges. Picasso was jealous and insecure in his interpersonal relations and didn't cope well interpersonally. He put all his effort into his work, which became more complex. That's one way. Perhaps a better way would have been for him to "complexify" his relationships with people, try to understand why he didn't get along with them, and resolve those problems while still investing energy in his art. But Picasso was escaping from conflict by "complexifying" another type of challenge.

Omni: If he'd been able to cope directly, might he have freed even more energy for his art?

Csikszentmihalyi: If Picasso had resolved his problems with his wives, girlfriends and children, maybe he would not have been as driven. Maybe he would have enjoyed life more. Look at the great chess masters who exhaust all the challenges of their field. At that point many of them go crazy, to use a simple characterization. Take the first great American chess master, Paul Morphy, and 100 years later, Bobby Fischer—100 percent involvement with chess, reaching the top quickly, and then trying desperately to find flow after that. Morphy offered to play anybody at great handicaps and give them lots of money if they won, but nobody wanted to play with him because he was too good. He had one psychotic break after another.

Omni: So there's also a negative, dark side to flow.

Csikszentmihalyi: Addictive quality, yes, which may in the long run restrict

your ability to have more than one type of flow experience. The ideal would be to be able to move from one game—structured activity—to another.

Omni: Flow demands rules?

Csikszentmihalyi: Yes, or you should be able to impose your own. Take housework. People who really enjoy ironing say, inevitably, they've developed a set of rules so they can have feedback—"I did it right, better than yesterday or worse than yesterday." Nobody else may know those rules, but they do. So when they iron, they can tell how well they're doing and get sucked into the activity to that extent. The same with mowing the lawn or washing dishes. If you want to enjoy these activities, you create rules.

Omni: How can you compare an experience like ironing, where the rules may be arbitrary or even silly, with chess, which has complex, external rules, or climbing, where obeying the rules is a matter of life or death?

Csikszentmihalyi: I like to think of flow as being a continuum, a combination of dimensions of experience beginning with a challenging activity requiring skills with clear goals and feedback. The person becomes utterly absorbed in the activity, concentrating so intently he or she drops all self-consciousness and loses the sense of time. I've never gotten around to saying how many of those elements you must have.

Omni: Do you have to reach a certain age before you're capable of experiencing flow?

Csikszentmihalyi: I'd guess that small children probably feel it most of the time. Partly because they don't see many possibilities other than the ones they're involved in. Of course, children get frustrated if they try to build a tower of blocks and it keeps falling, but generally they do what they can handle, or transform things into what they can handle, and don't see a higher challenge than what they're doing.

By high school they discover they could be many different types of people and each is a potential challenge. They could be bigger, stronger, smarter, better looking, more this, more that—and they are overwhelmed by the possibilities. There is a loss of innocence in the realization that there is so much more to it than you thought, and you don't know whether you can be like that. It's not easy to flow and concentrate when all those distractions enter your awareness. Kids who do it best are those who can focus on something do-able. That could be athletics, playing a musical instrument. If you don't have those opportunities, you resort to less complex forms, like watching TV, listening to music, taking drugs.

Omni: What about things like Nintendo, hanging around shopping malls?

Csikszentmihalyi: They're not very complex, of course, and so I don't like them. Such interests are self-destructive because their challenges are quickly exhausted. Most kids quickly learn they've reached the ceiling of that activity. It gets boring and they go on to something else. Not necessarily better, but something else. Only TV seems to have a constant appeal.

Omni: What percentage of people experience flow?

Csikszentmihalyi: We've tried to determine that by reading to people quotations describing flow, including those of a mountain climber, chess player and dancer, then asking them, 'Did you ever feel like that?' If the person says yes, we ask, 'What would you be doing? How often?' and so on. Among both Americans and other people we find that 87 percent say, 'Oh, sure I've felt like that,' and 13 percent say, 'I don't think I ever quite feel like that.' Within that 87 percent, some say, 'I remember feeling like that when I was twenty and playing football,' and not since. Others say they feel it every day. And the same percentage happens in other countries.

How much time do people spend in flow? If by flow you mean the highest level of unself-consciousness, concentration, challenge, and skill—oh, maybe one-tenth of one percent of your time, or less. But if you mean being above average in challenge and skill, then about 20 to 25 percent of the time. Now, some people never get to that point, and some are there *half* the time.

Omni: What are some therapeutic applications of flow theory?

Csikszentmihalyi: Psychiatrists in Italy and the Netherlands are using the theory and techniques. With electronic pagers and self-reports, they discover how much time their patients spend doing things, and how they feel doing them, then try to understand why, for instance, the patient is so unhappy at home or so happy in certain activities, in order to build an individually tailored intervention therapy. Every two months they give a new beeper study. Over time, the amount of flow the people are finding mounts as challenges and skills increase.

For some schizophrenics who have been hospitalized 15 or 20 years, the doctors simplified the protocol. Then they discovered that some patients had disturbed mentation all morning, but were completely normal between

2:00 and 7:00 p.m. They found that identifying the optimal experiences in these people's lives and building on them could have a better effect than merely trying to ward off the negative aspects of their situation.

Omni: What else are you working on?

Csikszentmihalyi: I direct two big projects. In one, I'm interviewing people in their seventies, eighties, and nineties who've achieved something culturally important. They include Nobel laureates, innovative business leaders, statesmen, and scientists who continue learning and growing into advanced old age. We're trying to develop a model for optimal aging. The other involves teenagers again, how they decide their future careers, what values, attitudes, and habits prepare them for a productive adulthood. With lots of graduate students working on it. I'm more like an orchestra conductor than principal investigator. I feel like the old artist in a Renaissance workshop who walks by, looks at sketches, and says, "Make the nose bigger," or "You have the background all wrong."

Omni: Both projects extend concepts about flow into the individual's and society's future.

Csikszentmihalyi: That's where the work has led me: to people's ability to invest psychic energy in the future. Most of us, most of the time, invest our energy in programs laid down either in our genes or consciousnesses either by biological or cultural selection. Essentially we tend to spend time doing things that don't really open up possibilities in the future, but are simply fulfilling needs or desires that made sense in the past. Part of that, of course, we have to do to survive. But we must realize we can also create the future—according to lines that were *not* laid down, programs *not* formulated in the past, but which we discover as we learn more about our lives. To the extent that people do that, it seems they are building the future into their own selves.

Omni: So we have the capacity to direct our own evolution?

Csikszentmihalyi: This is the point I try to make in *The Evolving Self*. Individual enjoyment seems an evolutionary potential in humans, responsible in large part for technical and social advances in future-oriented goals. It's intrinsic interest that keeps people discovering, exploring for the sheer pleasure and enjoyment of it. After a while other considerations come into play: "Is this invention going to make me a lot of money? Is it going to be useful?" In talking to creative people who become famous, it's clear they were motivated almost completely by intrinsic motives, without much concern for fame. Yet because they were so focused and interested, they ended up pushing the boundaries and ended up achieving success and becoming famous—sometimes even wealthy.

Omni: How would you envision a society that floated on flow?

Csikszentmihalyi: First, enjoy life. It makes no sense to go through the motions of existence if one doesn't appreciate as much of it as possible. But each also has to find flow in activities that stretch the self: continuing curiosity, taking new challenges, developing new skills. We can't afford to become trapped within ourselves, our jobs, and religions, and lose sight of the entire tapestry of life. When the self loses itself in a transcendent purpose—whether to write great poetry, craft beautiful furniture, understand the motions of galaxies, or help children be happier—the self becomes largely invulnerable to the fears and setbacks of ordinary existence. Psychic energy then becomes fixed on meaningful goals that will advance complexity and continue to have an effect in the consciousness of new generations long after we leave this world. ∞

CONTINUED FROM PAGE 22

ing to represent problems; they're trying to provide solutions."

A fundamental rethinking is underway in the art world, agrees Doug Ashford of Group Material, the New York artists collective that designed the ICA show. "Beyond considering alternative places to display their work, people are contemplating broader questions like what is an artist supposed to do? Whom do we serve and how?" The next step, he says, is to "generate a discourse that might actually change things."

The idea of trying to start a dialogue was, in fact, the explicit goal of the piece installed by sculptor M. Simon Levin and architect Mike Tyrrell at RA's North Point show. They parked a pickup truck in the middle of the site and adorned it with a nonfunctioning antenna and satellite dish. Cellular fax machines set up between North Point and the ICA enabled people to share their thoughts about the land with Massachusetts' highway, transit and park authorities. These fax transmissions, Levin claims, were "guerrilla acts. Instead of taking over by force, we frustrate them by taking up their paper and toner." Suggestions forwarded to the state agencies include turning the area into a mountain range, a pine forest, a wetlands, or just a nice park. "These faxes alone aren't going to change anything," Levin concedes. "We're just happy people started communicating."

The project appealed to him because of his interest in creating transitory works of art that "bridge the gap between life and art." Many who saw the truck/sculpture couldn't tell, for example, whether it was supposed to be an artwork or whether somebody just parked a truck in the middle of an art show. Levin believes that anytime you get people asking questions like that, you're doing okay. "In galleries, people might think they know how to look at a painting. You stand a certain distance from it, look for a minute or two, and move on to the next." When people get confused about the context, and are unsure of where they stand, they have to rediscover how to look at things. For me, that's what real art is all about.

"All of a sudden, you start to realize that beauty is not just in the designated art pieces, but in the nondesignated pieces as well. People start noticing mounds of dirt and say 'Wow, that's actually a nice shape!' It can open their eyes. And the show can still be a success even if the people like the mound of dirt better than the so-called sculpture." ☒

Strange Wonders

CONTINUED FROM PAGE 64

South Georgia island, a lonely outcrop where the climate is slightly more temperate. The island is still below the Convergence and is cold and frozen most of the year, but along with the classic dark peaks and white glaciers of the Antarctic there are now brown muddy bogs, patches of green tussock grass, and more penguins, seals, and flying seabirds than one can possibly imagine.

Here we land on beach after beach, and the viewing is so rich, the sounds and smells so overwhelming that our senses are almost saturated. There are huge elephant seals, giant sluglike creatures that are named for the protruding snouts or trunks that are found on mature males. At this time of the year they lie together in big mud wallows shedding their skin and fur, and grunt, wheeze, snort, and belch.

"I'm a professional seal biologist," says Peter Carey from the University of Canterbury in Christchurch, New Zealand, and one of the guides on our tour. "And even I think elephant seals smell bad." Occasionally two young bulls rear up and go chest-to-chest in a shoving match, opening their huge pink mouths and showing their teeth. "This is how they develop the social skills they'll need when they grow up and actually try to hold a territory," Carey explains. "But right now, it's not all-out combat. It's practice, just play. They close their mouths on each other's necks, but they aren't actually biting."

At a spot called Salisbury Plain, more than 100,000 king penguins gather—fantastic-looking birds with silver-gray backs and splashes of yellow and orange at their throats and ears. It is a vast sea of these trumpeting, whistling, three-foot birds across a broad, muddy stretch. And for the most part, they do not seem at all perturbed by our presence. The kings go right on feeding, fighting, molting, and incubating right in front of us. Their chicks take more than a year to fledge and, at this point in the season, look like brown, woolly bears almost the size of adults. Parents return with their crops full of fish to regurgitate into the mouths of these huge, hungry children—a daunting, neverending task.

Right off of South Georgia is tiny Prion Island, a little mile-wide gem packed with velvety coated fur seals and their black woolly pups, giant petrels with their large tube noses and huge webbed feet, orange-billed gentoo penguins, and brown skua birds looking for prey. Underneath the tussock grass there are thousands of burrowing seabirds. And up on top of the island, as a kind of crowning glory, is nest after nest of magnificent wandering albatrosses. Paying us no mind at all, these enormous, gentle-looking creatures engage in complete courtship behavior, locking and rattling their foot-long beaks, throwing their heads back into the air and extending their wings to their full glorious spans. "It was just so beautiful to witness," says photographer Perry Conway. "And they did it with eight people around them, acting as if we were just another blade of grass."

At Prion, no rats or mammals have ever been introduced by man. Its ecology is completely undisturbed and thus provides a kind of snapshot of the world before our species arrived, a beautiful, but at the same time disturbing, look at what has been lost. "When you get to a place like Prion," says Peter Carey, "you get a window on the past, to a time when things were naturally intact and hadn't been meddled with by us."

> LIKE THE GIANT TABLES OF ICE SURROUNDING IT, ANTARCTICA DRIFTS IN THE MEMORY, A FROZEN LANDSCAPE, A TIMELESS CONTINENT, A CONSTANT REMINDER OF A WORLD WHICH CAN STILL INSPIRE WONDER.

And once arrived in the Antarctic, man most certainly has. In the 1800s sealers came again and again, slaughtering hundreds of thousands of fur seals for their skins and elephant seals for their oil-rich blubber. Probably fewer than 100 of these animals were left on South Georgia by the early 1900s. But their killing was eventually strictly controlled, and the species has gone on to make a remarkable comeback. Their numbers are now close to two million strong.

Whales, however, were not as lucky. What you see in the Southern Ocean today—as striking as these mammals sometimes appear—is thought to be only about 10 percent of what once was there. At Grytviken, just one of seven old whaling bases that used to operate on South Georgia, factory workers once processed 25 fin whales a day, each 60 feet in length.

"They called this the Gates to Hell," yells Bob Headland, standing on the old flensing platform at Grytviken. He is our tour historian and a researcher at the Scott Polar Research Institute in Cambridge, England. "Whales were brought through the bay and dragged up here by a winch attached to the tail flukes. They were then dissected. The blubber was peeled off and went in one direction, and the rest of the body rolled to the other side. All the men working here had big spikes on their boots. It was extremely slippery with blood and guts. Come on, let's follow the blubber." Louis Pici, a passenger from New Jersey, later confided, "To me, Grytviken was like an Auschwitz for whales." In 1982, an international moratorium was finally declared on this industry. However, countries like Norway, Japan, and Iceland continue to argue for the right to reopen whale fisheries.

Not surprisingly, whales are not the only resource in danger of exploitation here. Krill are now caught in large quantities and used for animal feed (luckily they are an unappetizing human food). An international convention currently regulates the size of this harvest. But the whole Antarctic ecology is so dependent on this one species, that anything which threatens it may cause serious reductions in populations of many of the other species. While there is now a moratorium on mining and oil extraction, many observers believe that it would be lifted quickly if substantial deposits were discovered.

My last night on the Khlebnikov I cannot sleep again. Everything has gone by in such a fleeting way, and I want desperately to hang on to it all, to somehow keep Antarctica under my skin. If only there was a way to take a chunk of the ice home or bottle the wind.

It is close to 1:00 a.m. now, and I wander up to the bridge where Sergey, a lone Russian officer, is left on duty. For the first time in weeks, I notice it is completely pitch black—we are well north of the midnight sun by this time—and the sky is clear and full of stars. Sergey points to a constellation marked by four brilliant stars—the famous Southern Cross—and explains that if you follow one of the arms on down to the horizon, it points almost directly to the South Pole. This is the first time I have ever seen the Cross, and I take it as sign, as a marker showing me the way back. ◻◻

GAMES

CONTINUED FROM PAGE 104

in common. Casinos don't hang clocks (or have windows) so that players will lose track of the time; public phones are illegal at race tracks; and rats don't vomit. (In fact, that's how rat poison works—once they swallow it, they can't regurgitate it.) The others on the list are pretty self-explanatory—or did you forget the pea*hen* eggs?

5. The men in the second list, in reverse order, were the fathers-in-law of the men on the first list. The correct pairings are Jackson/Presley, Rivera/Vonnegut, Jr., Chaplin/O'Neill, Horowitz/Toscanini, Quinn/DeMille, and Wagner/Liszt.

6. All died in automobile accidents.

7. All renounced their U.S. citizenships.

8. All are part Cherokee.

9. All competed in the Olympic Games: Patton in the modern pentathlon, Stockholm, 1912; Spock in rowing, Paris, 1924; Princess Anne in equestrian cross-country, Montreal, 1976.

10. All had sexual affairs with Marlene Dietrich.

11. One was born the day the other died: Hawn and Benchley on November 21, 1945; Keach and Gehrig on June 2, 1941.

12. If you had *answered the quiz* first, you would surely have recognized these strong hints to the *answers*.

Questions 13, 14, and 15 will be answered in a future issue. Meanwhile, send me your theories!

OLD BUSINESS. In June, I printed three fractions, each with an empty one-digit numerator and two-digit denominator:

$$\frac{\square}{\square\square} + \frac{\square}{\square\square} + \frac{\square}{\square\square} = 1$$

The puzzle was to distribute the digits 1 through 9 into the nine boxes so that the equation is correct. The only three such fractions that add up to 1 are 9/12, 5/34, and 7/68.

Unfortunately, the puzzle was printed with brackets instead of boxes, and several readers wrote to say they had gotten the impression that the denominators were to be a *product* of the two digits. But fortunately and fortuitously, it turns out that there is only one correct answer to this puzzle, too, which was previously unknown to the original puzzle's creator, Nob Yoshigahara. What is it?

ANSWER: The single solution is 5/(8 x 9) + 7/(2 x 4) + 1/(3 x 6) = 1. ☐☐

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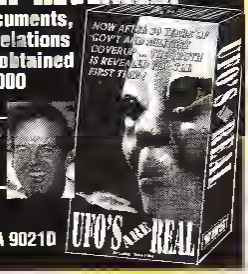

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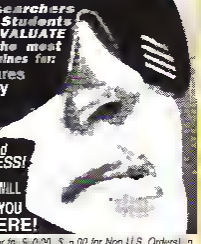

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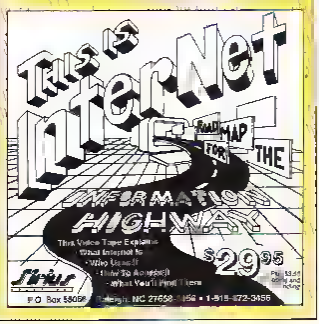

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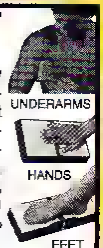

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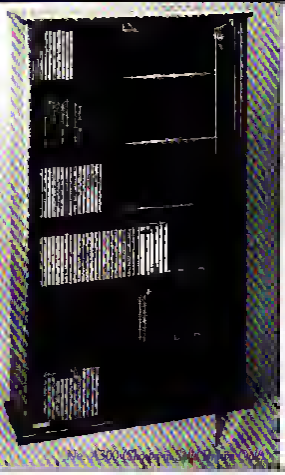

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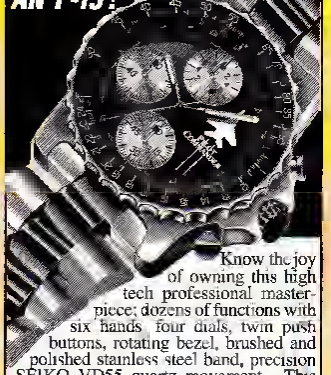

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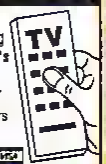

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SATISFACTION GUARANTEED

DEAD

CONTINUED FROM PAGE 71

shook his head, but he wasn't sure. Maybe, maybe they had. He felt sorry for Billy Joe's young wife. They left her at the house with Ruth Ann and the last of the mourners. There was no time to lose. In January it gets dark early. The cornfield was now a shopping center had been for forty years, but the woods and the broomsage were still there behind it like a blank spot on a map. The road that led back from the highway was still gravel. They parked the electric (no one had ever been able to call them "cars") by an overflowing dumpster at the bottom of a steep clay bank.

"Tell me the name of the cliff again," said Billy Joe.

"Annapurna," said Pig Gnat. "You okay?"

"I feel like shit but I'm not drunk anymore, if that's what you mean."

The narrow trail switchbacked up the bank to the forest. One slip and they were "dead." It was spitting snow. At the top the trail led into the trees, the dark, dark trees.

Billy Joe carried the Daisy. Of course it was useless without a magazine. They came out of the woods, through the brush, into the field. "This is the deepest and most mysterious part of the trail," Pig Gnat said from memory. "As we begin our journey up the ancient Tibetan Nile." They crossed the gorge (the Ford was gone) and followed the great river to its source in a culvert, now almost hidden under a broken slab at the rear of the shopping center. "All kneel," said Pig Gnat.

They knelt. Pig Gnat raked away the leaves with a stick. "Don't we say something, or something?" Billy Joe asked.

"That's after. Give me a hand with this rock."

Billy Joe set down the Daisy and they heaved together, and slid the big stone to one side.

Underneath, in the dark brown earth, a two-inch ruby square glowed. "Hadn't it oughta say *press me* or *caution* or something?" Billy Joe joked nervously.

"Sssshhhhh," said Pig Gnat. "Just press it."

"Why me? Why don't you press it?"

"I don't know why. That's just the way it works. Just press it."

Billy Joe pressed it and instead of pushing in like a button it sort of pushed back.

There.

"Now, all repeat after me," Pig Gnat said. "Oh Secret and Awesome Lost Wilderness Shrine."

"Oh Secret and Awesome Lost Wilderness Shrine."

"The Key to Oz and Always be Thine."

"The Key to Oz and Always be Thine."

"Bee-Men, and so forth. Now help me with this rock."

"Rock!"

"First the rock and then leaves."

"We'll never find it again."

"When we need to, we will. Come on, I think it's late."

It was late, but still warm for October. While Nation and Pig Gnat pulled the rock into place, Billy Joe scrambled to the top of the culvert. The funny feeling in his legs was gone. Across the corn stubble, in the subdivision on the other side of the highway a few early lights gleamed. Among them, Mrs. Pignatelli's.

"It *is* late," said Billy Joe. "I think your mother's home. Maybe we should cut across the field . . ."

"You know better than that," Pig Gnat said. "He who comes by the trail must leave by the trail."

The trail followed the great stream away from the highway and the houses on the other side, down the culvert and across the gorge on a high, perilous bridge of two-by-fours.

Billy Joe led the way. Pig Gnat was in the middle. Nation, who owned and therefore carried the gun, brought up the rear, alert for game.

"Hold," he said.

Three boys froze in the dying light. A giant grasshopper stood poised on top of a fence post. Nation took aim. Billy Joe squinted, imagining a rogue tiger. Pig Gnat kept his eyes wide open, staring off into the endless coils of night. DC

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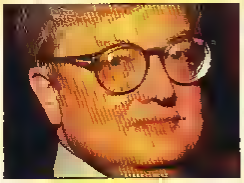
GAMES

COMMON KNOWLEDGE
What traits do the things in our quiz share?

By Scot Morris



Here are some puzzles to exercise your axons and dendrites, all about things in common.

1. "I've Been Working on the Railroad" and "The Eyes of Texas" share a musical connection with "My Sweet Lord" and "He's So Fine." What is it?

2. Liberty, macaroni, checkers, and socks.

3. What do these six people—Princess Diana, Linda Lovelace, Sally Jessy Raphael, Roger Ebert, Lenny Bruce, and Norman Mailer—have in common with these six people—Carl Lewis, George Foreman, George Harrison, Paul McCartney, Margaret Thatcher, and Carol Channing?

4. My editor says these things have nothing in common: clocks in a casino, public phones at a race track, photographs of Abraham Lincoln smiling, witches burned in Salem, peacock eggs, and rat vomit. What do you say?

5. What do these six people—Michael Jackson, Geraldo Rivera, Charlie Chaplin, Vladimir Horowitz, Anthony Quinn, and Richard Wagner—have in common with these six people—Franz Liszt, Cecil B. DeMille, Arturo Toscanini, Eugene O'Neill, Kurt Vonnegut, Jr., and Elvis Presley?

6. Jayne Mansfield, Margaret Mitchell, Tom Mix, Jackson Pollock, Bessie Smith, and Albert Camus.

7. Lee Harvey Oswald, Elizabeth Taylor, T. S. Eliot, Henry James, and John Huston.

8. The heritage of Cher, Jimi Hendrix, Burt Reynolds, and James Garner.

9. George Patton, Dr. Benjamin Spock, and Princess Anne.

10. George Patton, Adlai Stevenson, Burt Bacharach, Yul Brynner, Kirk Douglas, Gary Cooper, and Frank Sinatra. What woman bedded them all?

11. Goldie Hawn and Robert Benchley share a cosmic connection. So do Stacy Keach and Lou Gehrig. What is it?

12. ANSWER THE QUIZ QUESTIONS above before trying this puzzle, derived from Sam Loyd's classic Only Color Problem.

What do these words have in common: tune, pet, born, nothing, dad, crash, renounced, redskin, Olympic athletes, Marlene Dietrich, reincarnation, and answer this quiz?

13. EVEN HARDER. There's just one four-letter word that summarizes what the following have in common. What's the only word? President James Buchanan, the two-toed sloth, the chow chow dog, the hyoid bone, mercury, -40 degrees, the pyramids, *Midnight Cowboy*, the flags of Nepal, Libya, and Ohio, and a logophile's attraction to Pierre, South Dakota?

14. FOUR-PARTER.

A. What do these ten companies/products have in common: Coca-Cola, Budweiser, Dentyne, Marlboro, Baby Ruth, Campbell's soup, *Time*, Avis, STP, Old Spice?

B. And these ten: Coor's, Kodak, Hertz, Cutty Sark, Squirt, *National Geographic*, Shell, Bayer, McDonald's, Preparation H?

C. And these: Kraft parmesan cheese, 7 Up, Heineken, Doublemint, Salem cigarettes, Tanqueray, MJB, Fuji, Quaker State, American Express?

D. And these: IBM, Minolta, Ivory, Alka-Seltzer, Entenmann's, Maxwell House, Lowenbrau, *USA Today*, WD-40, Phillips' Milk of Magnesia?

15. MOST DIFFICULT OF ALL. What do these have in common: sole, shark, sloth, vampire, parasite, booby? (This is a very tough puzzle. You'll have to know all about these animals to derive the answer.)

ANSWERS

1. "Railroad" and "Texas" have the same melodies. So do George Harrison's "My Sweet Lord" and the Chiffons' "He's So Fine."

2. These are all presidential pets. Liberty was Gerald Ford's golden retriever. Macaroni was Caroline Kennedy's pony. Checkers was Richard Nixon's famous spaniel, and Socks is the current First Cat.

3. You may have noticed the lists are arranged youngest to oldest. Each pair of persons was born on the same day. Joined at birth were Princess Diana and Carl Lewis, both born on July 1, 1961; Foreman and Lovelace (January 10, 1949), Harrison and Raphael (February 25, 1943), McCartney and Ebert (June 18, 1942), Thatcher and Bruce (October 3, 1925), and Channing and Mailer (January 31, 1923).

4. My editor is always right. They have *nothing*

CONTINUED ON PAGE 97