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APRIL 1986 \$2.50



**MOOD ALTERING
SCENTS:** EXPERIMENTAL
PULLOUT SAMPLER INSIDE—P. 50

**LOVE IN THE 21ST
CENTURY:** MONEY TALKS—P. 78



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FIRST WORD

By Sherry King

After seven and a half hours of very difficult labor, I gave birth to my sister's baby, my niece.

Three years after the birth of my daughter, Gene, I was about to have another baby (although it was different). After seven and a half hours of labor, I gave birth to my niece.

As fabulous as his sounds, it was, in fact, the culmination of busy careers, although unusual, circumstances. My older sister, Carolee, had a hysterectomy when she was twenty-one. Several years later, when she got married, she and her husband, Ernie, desperately wanted a child. But because Carolee had no uterus and no eggs, she could not carry for her child. Family gatherings and family pregnancies became increasingly intolerable. Ernie had heard about surrogate motherhood in the press. He realized that it was possible for Carolee to have a baby that was genetically related to them both if I were willing to be a surrogate mother for their baby—that is, to become artificially interested by my brother-in-law's sperm and carry their baby to term.

The next time I was alone with my sister, she said, "I have something to ask you. You don't have to answer right away, and if you say no, I won't hold it against you. Have you ever heard of surrogate motherhood? Immediately, tears came to my eyes. Nothing else had to be said—we both started weeping. When we had my husband, Owen, all he could say was, "Well, I'll write about it." We discussed very well over the pros and cons. The price was okay—it was the only way Carolee and Ernie could have a child that was at least in part genetically related to them both.

Although we wanted to have another baby and I was already thirty-three, we decided that Carolee and Ernie's desire for a child should come first. Even if I were ever able to have another child, we'd still be happy because we already had Sarah.

There were also pros: My husband and I would not be able to have intercourse while I was trying to conceive—certainly could not be in doubt. Also, my eyes were a factor. But I could have amniocentesis, and if the fetus had genetic problems—we all agreed that I could terminate the pregnancy. We examined the stability of Carolee and Ernie's marriage (good) and what we would tell other people (including our daughter) (the truth). When Carolee and I informed our parents, they were very pleased. Only my mother-in-law had a negative reaction: "Artificial insemination is for cattle!" she said.

We found an infertility specialist in the yellow pages and made an appointment for the next day. He measured my cervix for a cervical cap, explained how to insert it without spilling the sperm, and sent us on our way. We were fascinated. "That's all? We can do it ourselves at home?"

The procedure was, indeed, remarkably simple. Ernie would place his sperm at the cervical cap and then hand it to Carolee, who would carry it to me. (He would do that Carolee was the best to carry the baby.) I would simply insert the cap and lie down

with my legs elevated for an hour.

After a few months, I still wasn't pregnant. My medical records were reviewed, so my doctor put me on Clomid, a fertility drug, in order to regulate them. The next month I became pregnant—all four of us were ecstatic. Carolee and Ernie would have their baby, and my life would go back to normal. At 16 weeks I had a routine prenatal checkup. The doctor could find no fetal heartbeat, and I was sent for a sonogram. The fetus had stopped growing—I had to have a D & C. We were all devastated, especially Carolee, who wanted to end the "family project." We were, however, able to convince her that we should keep trying until now we know that a pregnancy was possible.

We tried for another seven months, but with no luck. Owen was being awarded in Florida. Monthly trips from Florida to Boston were out of the question, so we knew we would soon have to give up. The month I became pregnant, I was seven weeks into it—scared—we knew the pregnancy could also end in a miscarriage. It was our last chance. We heard the best heartbeat during the seventh week. We taped it and played it over the phone for Carolee and Ernie. At 17 weeks, I had amniocentesis, and Carolee flew down to be with me. She first saw her baby in the sonogram. When the grasshopper came in three weeks later, everything was fine.

We decided that when the baby was six weeks we would be in Boston. Our fertility doctor would go our obstetrician. Labor began one week later than expected, and it was a totally different experience from what I had had with my daughter, Sarah, who was born after a very easy three-hour labor. This time, not only was my husband present for the birth, but so were Carolee, Ernie, and my mother (Ernie's father, who is deaf-blind, came in for the cord cutting). After seven and a half hours of very difficult labor, I gave birth to my sister's baby. They named her Kristen. The doctor asked to hand her over to me, but I said, "Carolee, come and get your baby." While Kristen was still attached to me by the umbilical cord, I gave her to her mother, Carolee. Ernie cut the cord. There wasn't a dry eye in the room.

For us, our "family project" has been a success, which is why we have gone public. We were interested couples to realize that this is a real (and inexpensive) option for them. If they have a loving friend or relative willing to be a surrogate mother, I do, however, oppose surrogacy as a business—it should be done for love, not money.

Kristen is now just months old, healthy and beautiful. I love her as a niece. She will grow up knowing about her conception, but her life will be a fact of life. As she grows older, her parents will fill in the details. By then there will be many more children, of all ages. What else is unimaginable, yesterday is acceptable today. **OO**

Sherry King (left) with her husband in Florida

CONTRIBUTORS

OMNIBUS



WINKLER



PERFUMED



SHARED DESTINIES



SEDIMENTAL JOURNALS



RONNY



WILLIAMS

Imagine wrapping your fingers with gauze, blinding your ears with cotton, wearing layers of sunglasses on your eyes. No one would choose to live permanently with such sensory barriers. But twentieth-century humans routinely barrage the most ancient of senses—smell—with deodorants, air fresheners, filters, pads, oils, and incense. The effects of this bombardment may be more profound than anyone dreamed. Today research is reestablishing the sense of smell as one of the prime determinants of psychological mood, biological rhythms, and even choice of mate.

In "Scentimental Journeys" (page 48), senior editor Pamela Winkler examines the ongoing efforts to understand the neurophysiological function of odors and how they regulate the body and influence the mind. As a result of such research, pioneers in the field of aroma therapy, for instance, will revolutionize the home and workplace with scents that arouse us, relax us, and ease us into sleep. And pharmacologists will create drugs that hitch a ride on molecules of odors, reaching specified targets in the brain. Their formulas, they say, will one day cure such maladies as emesis and Alzheimer's disease.

This month, *Omnibus* readers will also be able to participate in this fascinating research. By responding to "Test Your Scentability" (page 50) you'll help investigators better understand the intricacies of olfaction, while sampling the most interesting public odors of the century to come—

Wintersaub, who often suffers from allergies to floral scents, initially created the idea of investigating olfactory laboratories. "I envisioned people taking me through rooms congested with department-store perfumes," she says. But instead, I was struck by the wafting aromas of chocolate, fresh-baked dough, and incense, all created in the lab.

Olfactory researchers have found that we all produce odors, as distinctive as fingerprints. But psychoendocrinologist John Money also believes we each possess a love-map, a personal imprint of what sexually attracts us to another. And in this month's interview (page 76), *Omnibus* staff writer Kathleen Stein asks Money to discuss his concept of the three-dimensional map of the human sexual brain. Elched during childhood, the contours of our sexual identity determine what we look for in our intimate relationships. And thwarted sex play, Money believes, can damage natural development, creating new elements—such as shoe fetishes, cross-dressing, or even asphyxiation—that distort love.

"Money savors the ironic aspects of human behavior," Stein says. "He relishes probing beneath superficial layers of the persona and analyzing significant patterns. But that never seems to diminish his delight in observing the way people act."

Personal interactions are also the topic of the Mind column. In "Friends" (page 26), journalist Paul Byrne describes how one couple buys hour-long friendship sessions

for \$9.99. According to some experts, their project offers insights into the current and future state of friendship.

Humans aren't the only organisms with a need for bonding, according to "Shared Destinies" (page 62). With text by Robert Masello, this pictorial explores such unlikely couplings as the clown fish and the sea anemone, and the mutually supportive relationship of algae and fungus.

This month's fiction explores love scenarios, too. In "Snake Eyes" (page 44) by Tom Maddox, a former soldier wrestles with behavior proscribed by his hardened nervous system. His involvement with an equally evolved woman releases involuntary passions that may destroy him. It's somewhat of an evolutionary tale, Maddox says. "As the human race develops and changes, the way we love and lust will also have to alter."

In "Pormatros" (page 54), Roger Zelazny focuses on love and hate and paradoxical relationships among men, women, deities, and machines. A once-successful entrepreneur returns to a frozen world tended by a vigilant computer and manipulated by a vengeful goddess. A traditional story with a nontraditional structure, it contains variations on several of his previous stories, including "Hell Jack" (June 1978).

And in part two of "Sarah Runs the Wastel" (page 70) by Walter Jon Williams, a young prostitute comes out a terrifying assignment for the off-world controllers of a deteriorated Earth. **OO**

FORUM

Advances in science and technology in the twenty-first century may greatly alter the way we live. But certain constants will remain: love being chief among these. Love has sustained civilization and set us forever apart from other forms of life. What role will this powerful force play in the future? Omni has asked the following experts to offer their views on the subject of love in the twenty-first century.

Love 2000

There are two scenarios. The first is the destruction of civilization, with little pockets of survivors starting again on a long journey to learn of love, just as the monks in the Dark Ages wrote poetry to love.

I prefer, however, the following scenario. In 21st there will be a renaissance based on human values rather than the mad drive to make money. Because we have developed consciousness and can never revert to sheer animalism, we must make for ourselves—with the guidance of the poets and the artists—a new valuation of human love, based upon beauty.

The beauty I speak of is not some cosmetic Hollywood concept. It is the basis of our sense of values. Beauty will be seen as harmony of thinking, which is why beauty has always been the father of truth. Beauty is also harmonious action, which is why beauty has also been called the mother of goodness. Out of this will come a new valuation of life and of love.

Love will be based upon compassion, a sense of sympathy with all other peoples. Freud once remarked that Christianity and Puritanism were necessary for the vitality of love; they raised love out of the animal stage and made it applicable to God to nature, as well as to the sexes. The new values will take into consideration the night, and we will realize that love and fidelity are related.

Love will become: I hope and believe, a closer union of philes, which is compassion and eros, which is sexual love, and agape, or love that is completely devoted to the good of the loved one.

If these predictions sound too optimistic, I remind myself that the first scenario—our destruction—is breathing down our

necks. This is added motivation for us to insist on the constructive development of values of which beauty is central.

Rollo May

Rollo May is the author of Love and Will. His latest book is My Quest for Beauty, published by Saybrook.

Love Energy

We calculate travel to other stars in terms of light-years. This is because nothing travels faster than light in our realm of knowledge. There is a suspicion, however, that our minds travel even faster. The fact that two people could know each other's thoughts in different places at one time—what does that mean? The fact that one knows the other's thought even before the other recognizes the thought—what does that mean? Does our mind travel through time as well? One day very soon, we will find out more about our mind-power—not as a private property but as a mutual energy resource. It will be a matter of time then, to find out what love really means. Love is an energy that brings two elements together. Through love, we will learn to dispense with distance between one world and the other, one universe and the other. Through love we will become what we love. We will share the universe. We will be the universe. Through love we will grow.

Yoko Ono

Love Lessons

I cannot help but smile when I think of love in the twenty-first century. I am too much of an optimist to predict that it won't have changed much. We will still have the doubters, those who will ignore it, those who will take it for granted, and those who will continue to abuse it and use it for their own devious desires.

The very human need to love and be loved and all the conflicts that often arise from such needs have been documented from the beginning of civilization. Misguided love was responsible for Medea murdering her children. Lear losing his wife, and it continues to cause saints to be ridiculed and assassinated. This occurs in spite of the fact that we have had the guidance of superb teachers, Lao-tzu,

Buddha, and Jesus of Nazareth.

For instance, Christians supplied us, over 1,500 years ago, with a clear, practical and workable definition of love. Though we have given lip service to its value over the years, we have in fact seemingly all but ignored it. We continue to spend vast amounts of money, time, and research on finding new, more devastating methods of killing one another, and pitifully few dollars, energy and commitment toward better understanding the subtle dynamics of loving one another.

Perhaps the mindless madness that abounds in our present time will finally force us to see that loving ourselves and others may be a viable solution to personal and world problems. If this occurs in the twenty-first century, we will have harnessed the most powerful and limitless energy available for peace, joy and growth.

Leo Buscaglia

Love and Sexuality

The biological roots of human love are the need to reproduce and the prolonged bond between parent and infant. The relationship between love, sex, and reproduction is determined by society and—in times of change—may undergo profound alterations.

Although we are living in an era of exceptional sexual toleration and freedom, there are signs that a lack of repression may be gathering strength. We will need to struggle to hold on to the positive gains of the twentieth century's sexual revolution, sex education, the idea that sex is a life-enhancing force that should be nurtured and cherished, and the rights of the individual to choose her/his sexual life-style.

Medical technology will have a tremendous effect on our sexual future. Drugs will enhance desire, eliminate the problems associated with menopause, and perhaps be instrumental in ending the abortion controversy. If such trends as step-parenting and the use of new birth technologies continue, marriage may eventually become separated from reproduction.

Lorna Samel
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SCHOLAR WARS

SPACE

By Peter Gamson

The Reagan administration's Strategic Defense Initiative (SDI) will be a windfall of funding for research scientists. But despite SDI Innovative Science and Technology director James Lonson's breezy confidence that "people go where the bucks are"—a lot of them may be turning the money down.

A pledge to neither solicit nor accept SDI research money has been circulating in university physics and computer-science departments since June of last year. Physicists at Cornell and at the University of Illinois created the pledge in reaction to an effort by the Pentagon to influence Congress and the public by lining up academic support behind the program.

The pledge states that the proposed antiballistic missile shield—also, star wars—can't be built. Attempting to build it will only exacerbate the nuclear arms race, the pledge argues, and jeopardize existing arms-control agreements, while compromising academic freedom and blurring the distinction between classified and nonclassified research. By December it had been signed by more than 2,400 scientists including a majority of research and teaching faculty members at the nation's top 25 university physics departments.

"They were trying to get universities to act as lobbyists for the program," says Elisabeth Gronlund, a Cornell solid-state physicist who played a part in launching the pledge. "In reality a lot of academic people are against it. Laymen tend to imagine that anything is possible with technology. But scientists can clearly see the ballistic-missile defense snafu."

Signers and nonsigners of the pledge can't be neatly split along traditional liberal-conservative lines. The signers do include a lot of people who are already concerned with arms control," admits University of Illinois physics professor John Kogut. "But it's broader based than that. There's a very widespread feeling that the SDI is a waste of money. It's going to be a Sauron-like gun on a colossal scale—the odds of alluding to a weapons system that didn't work after more than \$2 billion had been spent on it."

Physicist Mike Charowitz, who has been

instrumental in circulating the pledge at the University of California at Berkeley, says that most scientists would not object to SDI-type research at some level. But that the scale of the administration's commitment to SDI is reckless. "It's bad for the country's economic and scientific health," Charowitz argues. "It's going to squeeze out more productive research. We can't balance the budget, we're slipping in technological competition with Japan and Europe, and now they want to squander our scarce resources on this."

Charowitz concedes that for many of the signers of the pledge it's more a matter of principle than of practical choice. They were not likely candidates for SDI-related funding in the first place. But some of his colleagues at Berkeley have been willing to give up more than a signature.

One is Frank Mozur, who once proposed a research project to SDI but on reflection decided not to accept funding. When an old colored lady would move to the back of a bus, says the 55-year-old Mozur, "I thought, how foolish! That won't change anything. And when my wife went

on peace marches during the Vietnam War I thought, how foolish! But things did change. This is my foolish gesture."

Another veteran Berkeley physics professor, Charles Schwartz, recently announced that he would consent to teach only a small number of courses—none dealing with armaments. Many of his students are sympathetic. "My students find out when they go to the placement center how few opportunities there are in physics outside the weapons sector. We can't go on closing our eyes to the fact that we're really just training people for the arms race."

Many of Mozur's and Schwartz's colleagues share his opinions but not their idealism. Nuclear-engineering specialist Lawrence Ruby saw the pledge but did not sign it. Ruby figures that if money is allocated by Congress, he work—on ion-beam devices, popularly known as "ray guns"—might well get some of it. But he adds, "We've had this type of research for fifteen or twenty years, and the technical results don't justify the money being spent. If I were in Congress, I would have voted against it."

Universities take from one hand to more than two thirds of research grants for general overhead. For schools like MIT, a sixth of whose total income comes from the Department of Defense, SDI money is undoubtedly tempting, especially because research money from such sources as the National Science Foundation is dwindling. But MIT president Paul Gray emphasizes that while MIT accepts SDI research funds, it doesn't necessarily endorse the program. A massive boycott of SDI by MIT researchers, however, isn't likely. Only about 30 percent of the school's physics teachers have signed the pledge.

SDI director Lonson refuses to comment on the pledge. Last November, however, Lieutenant Colonel Leo De Lorme, a Pentagon spokesman, did assert: "So far [the boycott] hasn't had any noticeable effect" on the star wars program. Even so, physicists like Schwartz continue to seek support for the promise. Says Schwartz, "SDI is the cap of a whole pile of indicators that we're gearing up for a nuclear war. It's an insane situation." □



SDI: A lot of academic people are against it.

CUTE BOTS

BREAKTHROUGHS

By Steve Fox

I am sitting in my office surrounded by the dimmed eyes and quizzical gears of a dozen or so personal robots. I clap my hands and one springs into action, rolling forward until it bumps into a wall and backs up. I push a button on a small hand-held transmitter and another begins to play music from a cassette tape; a third blinks its eyes and tumbles toward me; its arm outstretched. A co-worker walks by. "Cute," she says. "Very cute." I nod. "It's the Cuteness Wars," I explain.

The Cuteness Wars are being waged by a new breed of relatively inexpensive toy robots. They range in price from \$25 to \$500 which may seem a bit steep for something that is essentially a toy, even a cute one.

The average personal robot is a plastic machine with a trunk, wheels, and human-like arms, eyes, and mouth. Its chief ability is locomotion. Most of these robots can roll or walk in any direction. Some even swim. Others can move their arms, play cassette tapes and videogames, and teach you rudiments of computer programming. All evoke ooohs and aahs. None do windows. Leading the field of manufacturers that

are competing for the toy robot market is the Irmay Corporation. From their lumpy peripatetic Dingbot, to the Omnitot (nicknamed Wilbur by the Omni staff) to the top-of-the-line Omnitot 2000, all Irmay's robots look human. Omnitot 2000, for example, is a he—according to the instruction booklet. Described as a toy, the \$200 contraption can travel on just about any flat surface, project your voice through a remote speaker, and play and record on its onboard cassette machine. Sporting eyes that blink, a head that turns, a mobile arm with a three-fingered hand, and a head that can rotate 360°, it's a natural Butler. Perhaps best suited to high-tech chores, it has a motorized tray that moves cups into its rubberized fingers so it can pour and dispense drinks. The robot even has two speeds so you can downshift when performing delicate operations like positioning its hand to pick up a wine glass.

What else can the Omnitot do? Well, the manufacturer notes that the robot's function is "limited only by the user's imagination." Words likely to become as stale as user-friendly. In case the creative well runs dry,

however, the manual does offer a few suggestions. Our favorite: teaching your pet parrot to talk.

For those without parrots, the Elam Jr. (less than \$200) may suffice. Designed primarily as a learning toy for children, the red and white freeping on wheels is a talented little machine that should keep kids fascinated while introducing them to elementary programming techniques. By pushing various buttons on its chest you can program Elam's synthesized—and sometimes difficult to understand—voice to speak up to 200 words. Its greatest charm, however, is not its vocabulary but its delivery. Its liquid crystal display mouth—when not wearing a sleepy, happy, angry, or surprised expression—moves as if it speaks. It can even tell you it loves you, with a heart-tugging lisp. This is a kid's toy with personality.

The ambitious could even program the Elam to speak to the Heared, a robot that responds to vocal commands. The blue and white Heared, with its bubble head, squat body, and flat, cup-holder hands, manages to look both endearing and futuristic. It can walk (actually roll) about bearing goodies on its tray, and its cassette player can record and play tapes. It even has a digital clock with a built-in timer, which means the Heared can function as an alarm clock—for a mere \$230. The real kicker, however, is its voice-activated controls. You can program it to react to a phrase—say, "heef" or "Sootch James"—and the Heared will meander toward you, blinking its eyes and mouth or serenading you with music pre-recorded on its cassette. The manufacturer says that a vacuum cleaner, with a special infrared sensor is in the offing, promising to transform the Heared into a "janitrot." Now if someone could just invent a launchybot.

Another machine in the humanoid tradition is the E.T. look-alike Video Robot, the star player* in Nintendo's heavily advertised, \$100 Entertainment System. It hooks up to an arcade-style videogame machine and its "eyes" sense light patterns from your TV, thereby following the action on the screen during game play. You can direct the robot to move spinning gyro



Talkative and talented, the newest home robots can do just about everything but laundry.

UNDERSEA HABITAT

EXPLORATIONS

By Tim Sander

Were standing on a shaly dock at the edge of a mangrove lagoon in Key Largo, Florida when we hear of a hurricane raging 300 miles north of Puerto Rico. The radio announcer warns that the storm is moving quickly toward us; he advises stocking up on candles, water, and canned goods. We have already taken precautions, but not because of the storm. We are about to dive 25 feet beneath the lagoon's surface to a small steel berythysphere, an undersea habitat where we will spend the night.

Air, water, and electricity will be piped into the habitat through a 250-foot umbilical cord connected to an onshore support van. Although operation director Jim Duquesnel tells us not to worry, the prospect of a hurricane breaking our timeline makes us uneasy. Duquesnel cracks a slight smile, briefly recites emergency procedures, and tells us that we will be evacuated if necessary.

He jumps into the water and submerges. My partner and I follow. As we descend, we breathe through 150-foot hoses that are routed to the habitat, keep us from getting lost, and provide us with air. The habitat, an 18-by-6-foot steel cylinder, is blanketed with sea plants, barnacles, and coral. Its support base holds the cylinder high enough above the lagoon's floor to fit a five-foot acrylic observation bubble on its belly. Next to the bubble is an entrance hatch. One by one we enter into the habitat's wet room, hang up our gear, and towel ourselves dry. Starkly equipped with three bunks, a table, sink, microwave oven, refrigerator, portable toilet, and shower nozzle, the chamber barely has room for three people.

The habitat is the brainchild of Ian Koblick, a former Navy aquanaut and president of Marine Resources Development Foundation, the nonprofit organization that operates the habitat and its aquanaut-marine ecology training programs. Engineered and built in 1970 by US Naval Academy midshipmen, the habitat was designed as an underwater lab for studies in the Chesapeake Bay. But according to Koblick, the Navy never used the habitat and kept it in dry dock for more than ten years before donating it

to Koblick's company in 1983. "I wanted to use it to educate the public," he explains. "I thought that living in the habitat for twenty-four hours would be a chance for anyone to literally be at home with the environment, to understand how complex and fragile the ocean is, and to realize that its resources must be utilized and protected."

The habitat has been in its current location long enough for fish to become accustomed to it. Several snappers and grunts loiter outside the hatch. Duquesnel guesses their intentions and obliges them with chunks of bread and cheese. While the fish dart toward the food, we monitor the storm on a VHF weather channel and eat lunch. After Duquesnel briefs us on our first dive, we clear our plans with the surface dive operator, attach the hoses to our hips, and with mouthpieces in place, take off.

Outside, we log water temperature—average 81°F—and visibility—average 30 feet. Duquesnel then leads us on a tour of the lagoon. On the eastern edge are two window screens charged with low-voltage electricity. The calcium that the current extracts from the water forms a thick,

plasterlike buildup. Duquesnel writes on his board something about the mineral accretion project. We continue west past rusted cans and discarded toilets and a small turquoise field of sea grass.

We later learn that scientists from Duke University used the habitat to conduct the first in a series of research experiments to test an artificial gill. They expect the gill to extract oxygen directly from seawater and eventually eliminate the need for a diver's cumbersome air tank. Living in Koblick's habitat allowed continuous observation of the amount of oxygen drawn from the water and of the accumulation of detritus in the gill.

After exploring the area, we follow a school of blue-striped grunts back to the habitat for dinner. Night falls quickly underwater. The lagoon turns a rich black. Tiny silversides and archfoes gilt peed the observation port looking like fireflies in the outside spotlight.

Later Duquesnel leads us on a night dive through the dark lagoon. He streaks through the water, his body a ghostly, pale blue. Then he stops and waves his hand in front of his mask, creating a fluorescent meteor shower. He has agitated the phosphorous plankton and set off a chemical reaction called bioluminescence. After more than an hour of experimenting with bioluminescence and searching for the lagoon's nocturnal life, we are tired. Though the bunks are narrow and the air warm, sleep comes easily in the habitat.

The next morning, as we drink coffee, we listen to the weather channel and hear that the storm has veered northwest overnight and is headed away from us. Later we make our final dive, this time without Duquesnel. The once-strange lagoon seems familiar now. Koblick was right. After only one night we had become part of another world.

In his office on the Marine Resources compound, Koblick discloses his plans for a large undersea resort hotel called Jules Habitat, after author Jules Verne. The project has been troubled with investment setbacks, but Koblick remains unshaken. "I can hold my breath," he says confidently, "longer than anyone you know." **DD**



Underwater visitors: the first step

FRIENDS

MIND

By Paul Bagne

I remember the night I met my new friends Dave and Terri. I knocked at the door of their apartment. It was ten minutes after nine, a little late for our appointment. As I waited, I held their compelling want ad in my hand. It read in part: OUR LIVES ARE FILLED WITH HAPPINESS, DESERATION, AND MISERY AND WE WANT FRIENDS. WE PAY \$9.99 FOR AN HOUR OF FRIENDSHIP.

Terri opened the door. "Good friends should be prompt," were her first words. She was wearing a black bodysuit and a peasant skirt. Her shoulders were ringed with multicolored ruffles of a shiny fabric. A black-lace choker encircled her throat and protruding from one breast was what looked like a real bedspring. Dave was lurking in the background. He had had a distinctive orange hue. Pinned to his brown flannel shirt was a ten-dollar bill.

"How pretty you both look," I remarked, as instructed in the ad.

"How about tea?" Terri asked.

"How lovely," I replied.

They ushered me into the kitchen, where an enormous silver tea set sat on the kitchen table. Terri put a teaspoon of brown sugar into my cup and poured in what turned out to be cold water (she had forgotten to heat the water).

I was here to participate in an art project designed by Dave and Terri: two self-described "inner conceptual artists." They had placed an ad in the San Francisco *Bay Guardian* saying, "Please Tell Us How Pretty We Look" and offering to buy an hour of someone's friendship for up to \$9.99. Although conceived as art, their project says some experts is a comment on the present and future state of friendship.

During my visit, Terri explained the project to me: "We are deadly serious about this," she said. "We don't want to be your friend. We want you to be our friend. We are not interested in your problems. This is not a give-and-take relationship. It's strictly a take relationship. We want the benefits of friendship but none of the burdens. That's why we're willing to pay."

Marty had responded to their ad. I was the first they had invited. My visit was to last an hour and the fee I would be paid would depend on the quality of my advice

and my empathy. I was expected to admire them constantly and to laugh at their jokes. For the remainder of the hour Terri talked intimately about her troubles. Like a good friend, I listened.

To Eugene Kennedy, novelist and professor of psychology at Loyola University, the friendship project has a value that goes beyond art. "Psychologists and sociologists have been studying friendship and not always with insightful results. Calling friendship interpersonal relationship or primary bonding or any of those crazy terms doesn't help much," he says. "I have nothing against people doing these studies. There are many ways to come upon the truth, and I think the eyes of poets and artists are much keener."

He characterizes the project as a prophetic cry—a glimpse of the desperation that many people feel and one that deserves attention because artists tell us about the future. "It depicts what he describes as a 'hunger for relationships that will sweep across the country.'"

Kennedy believes that a lack of intimacy or true friendship is a national problem. It

is a by-product of our culture's preoccupation with the self and its emphasis on materialism and superficial qualities.

"You don't need a psychologist to know that friendship is one of life's essentials," he says. "If you ask people what they are really looking for, the answer turns out to be those kinds of things that true friendship gives you: someone making room for you in his or her life, understanding and accepting you. We all need this to be healthy."

I remember my friend Dave saying, "You pay for everything else. Besides, this is more reliable."

A few years ago the California mental health department invested \$1.3 million in a "Friends Are Good Medicine" media campaign. It told citizens they could be happier and healthier if they went out and found friends. A belated second message—"Friends Don't Come for Free"—acknowledged that people would have to give something to get the promised rewards.

To assess the cost of friendship, Claude Fischer, professor of sociology at the University of California at Berkeley, studied social networks in 50 neighborhoods. His survey suggests that what he calls "material conditions" determine one's capacity to develop relationships. Education provides skills and contacts that people use to build networks, he explains. "Money makes it possible to entertain, to travel, to telephone, to exchange gifts and to provide others with aid."

Terri continued with her monologue telling me about herself—about what happened to her boyfriend, the best lover she'd ever known. "He ran off to Mississippi. I told her how sorry I was."

"She told me how her mother hates her for some of the things she has done, like the time she and Dave got arrested for one art project—making human feces to banks in San Francisco. [It was all very aseptic and sealed in glass vials, she said.]

"I was growing weary but was trying hard to listen. Finally the overt timer buzzed, signaling the end of the hour. "My how time has flown," I said out loud. As I prepared to leave, Terri handed me a check for the full \$9.99. On the memo line she had written, FOR FRIENDSHIP. **DB**



Terri and Dave: Tell us how pretty we look.

BIG BRAINS: CHEAP

ARTIFICIAL INTELLIGENCE

By Joel Davis

Using off-the-shelf parts from commonly available microcomputers, some California researchers have built several generations of inexpensive machines that rival supercomputers.

The designers' strategy is to harness components from dozens of small computers together to work in parallel like a huge team of electronic horses. The new machines have already attacked problems in astrophysics and modeled the rich tapestry of a nerve-cell network.

Computer scientist Charles Setz and three colleagues built the first primitive concurrent computer during the Christmas break in 1985. When it worked, Setz began thinking about a larger version. He found an ally in Caltech physicist Geoffrey Fox, who had been hoping to find a way to do physics computations on such a machine. Together they built a computer that consisted essentially of 64 IBM PCs hooked up in parallel. The Mark I version of the Cosmic Cube—also called the HyperCube or simply the Cube—performed nearly as fast as the venerated Cray 1 super-

computer and cost a fraction of the price.

The Cube worked by breaking each problem down into 64 discrete segments. The separate components worked simultaneously, each on one segment, exchanging information to solve each particular piece of the problem. The result: a very fast computer for a relatively small price.

The first generation Cube had 64 nodes, each an IBM PC-type circuit board with Intel 8086 and 8087 microprocessor chips. Each node had a memory capacity of 127 kilobytes—for an impressive total of 8 megabytes—the equivalent of 8 million alphanumeric characters.

There were drawbacks, of course. The earliest versions of the Cube were not meant to be anything more than "wild tunnel models" of future concurrent computers. So the internal wiring was pretty complex, since each node had to be connected to several others. Then there was the matter of programming. No one had ever written software for such a machine. "I had a great plus on my side, though," says Fox. "Graduate students don't like to

use other people's programs if they can write their own. So I made a virtue out of necessity and put them to work developing software to run on a concurrent computer."

The results gratified Fox and Setz. The Cube successfully solved problems in astrophysics, cosmology, two-dimensional melting, geophysics, and computer algebra. It's been used as a highly efficient database machine, in image processing, graphics, and computer-aided design.

In 1983 NASA's Jet Propulsion Laboratory got involved with the Cube. By 1985 the Caltech/JPL team had built some second-generation Cubes. Where the first version was only equal to eight VAX 11/780 mainframe computers and one tenth of a Cray 1 supercomputer, the biggest Mark II Cube had a performance equal to 25 VAX 11/780s. The Mark II Cubes are already performing in the range of the Cray 1 supercomputer.

Fox and a team of technicians under Carl Kukkonen, director of JPL's Advanced Microelectronics Program, are now putting the finishing touches on the Mark III Cube. The first two prototypes were finished in February 1986; a full-scale Mark III will be ready by February 1987. It will surpass the Cray 1 in performance, running up to 15 times as fast, or the equivalent of the Cray XMP top-of-the-line supercomputer.

Increasingly, such success has drawn interest from some heavyweights in the computer industry, and the Cube has gone commercial. The Intel Corporation, for one, is producing their iPSC family of concurrent computers in three models. They've sold more than 20 of them in less than a year. At least two other companies are selling Cubes under license from Caltech: NCube in Beaverton, Oregon, and Ametek in Arcadia, California.

The rapidly growing movement to market the Cube came as a surprise to Chuck Setz. "We didn't expect this to happen until the late Eighties," he says. But the three companies that have already jumped into the Cube business will soon be joined by at least three more. That's pretty good for a device originally cobbled together from off-the-shelf parts. □



A deceptively simple idea to yoke small machines together opens a new frontier in supercomputing.

A BORING COMET?

STARS

By Jeff Hecht

Finding Halley's Comet from my home 10 miles west of Boston was no easy task. Armed with 10x50 binoculars and special comet charts from *Sky & Telescope* magazine, I scanned the western sky until I spotted it low over a neighbor's house. Then I invited my daughters to come out and look at what had terrified millions over the millennia. My eleven-year-old peered through the binoculars, looked at the comet and headed back inside. Her reaction: "It's boring."

I am sure she was not alone. Those scanning suburban skies on December or January evenings found nothing like the dramatic photos taken the last time the comet came by showing its tail stretching miles across the sky. Halley's hype raised expectations that could not be met by the view from metropolitan areas.

As I watched it approach in early December, my binoculars showed only a dim patch of light, barely visible against the background of the night sky. The view on New Year's night was a little brighter, but even then my first impression was that I was seeing an out-of-focus star. Without the

binoculars my eyes wouldn't have found it. There are several reasons for what could be called the great disappointment. One is that we happen to be living in the wrong era. In 1910 Halley passed within 94 million miles of the earth and gave us an excellent side view of its 100-million-mile tail. This year, the comet will come no closer than 39 million miles, and the tail will be at a poor angle for viewing.

Even those who manage to hang on long enough to get another chance 76 years from now won't have a much better view according to comet expert and *Sky & Telescope* columnist John Bortle. We won't get a good view of the comet until around 2137, when Halley will pass 8 million miles from the earth.

But the real villain is light pollution. Stray light from street lamps, auto headlights, buildings, signs, and other sources have created what Bortle calls a "perpetual twilight." And because comets are diffuse, not bright points of light like stars, they are lost easily in this twilight.

Light pollution is not a new problem, but it has gotten much worse since Halley's

1910 visit, when a woman named Mary Proctor was able to watch it from atop the Times building in midtown Manhattan. Now anything but a full moon would scarcely be visible from downtown New York City. Astronomers everywhere have been fighting what is sometimes a losing battle with the problem. For example, light pollution around the Mount Wilson observatory near Los Angeles is so bad astronomers shut down its 100-inch telescope last year.

Other effects of light pollution are subtler but farther reaching. Before electric lights and urbanization, a rich view of the night sky was part of everyone's life. Today, if they look at the night sky at all, urban and suburban dwellers see only the brightest stars. As a result, people are much less familiar with the sky, says Stephen Edberg, an astronomer at Caltech's Jet Propulsion Laboratory.

This month offers the last chance to see Halley. The comet's tail will reach its full length of up to 100 million miles after it passes closest to the sun. Unfortunately, the best place to view it is from the Southern Hemisphere. Those of us in the Northern Hemisphere have a limited view.

Anyone who is serious about seeing the comet ought to go 20 to 30 miles from city lights, Edberg suggests. The best time to look is early around 3 A.M. The trick is to find a viewing spot with dark sky and a clear view of the southeastern horizon where the comet's tail will be pointing up. It will appear above the southern horizon until about April 5. After that it will dip below the horizon and return to the skies in late April, when a sky watcher will most likely need binoculars to see it.

Is the comet boring? As an isolated celestial event, perhaps. But even if Halley did not live up to the media hype, it has brought a new generation outside to look at the sky. As just one example, when my eight-year-old daughter came outside on New Year's night, she was enraptured by what she saw through my binoculars. But it was not the comet that held her attention. She was fascinated by the Pleiades and the Great Nebula in Orion. When I went inside to warm up, she was still exploring the sky. **DC**



Halley's Comet has come from the yawning depths of space. It is the hero of the century!



CONTINUUM

I KNOW ALL ABOUT YOU

Don't worry, your secret is safe with me. But I feel I have to tell you that your doctor, your psychiatrist, your analyst, your psychologist showed me certain confidential information about you.

Of course, he had every reason to believe that you and I have never met and that I would not use this material to compromise you in any way. Still, I am a reporter for a national magazine, and those records were personal in the extreme. I feel strangely beholden to you.

The first time it happened, I was investigating psychological tests for *The New York Times*. The head of an agency that administered certain personality inventories and depression scales invited me to his facility to learn how the tests are given and the results evaluated. He had picked three individuals' records as examples for me to look at.

"As you can see," he said proudly, "the names have been blocked out to protect the identity of our clients." But the thin coat of white correction fluid painted over your name didn't hide it at all. I could read it as clearly as any other words on the page. I'm sure he could, too. I'm sorry now that I didn't confront him boldly on his cavalier disregard for your privacy. All I did was use my small power to deny him and his company the newspaper mention he so badly wanted.

Not long after that, I had occasion to see videotapes of your analytic sessions. I was writing an article for *The New York Times Magazine* about a new form of psychotherapy that used a television camera as a partner in the treatment. Videotapes allowed the therapist to review each analytical hour with unprecedented precision and gave the patients the opportunity to look back at themselves as they were when therapy began. In the course of my research on the technique, a group of American and Canadian analysts gave me a private viewing of real-life episodes from these ultimate soap operas. Some of the tapes had been produced with you sitting in relative darkness or with your back to the camera so your face was unrecognizable, but most were starkly revealing, making me *de facto* voyeur at your violent outbursts, tears, and shameful memories unleashed in psychotherapy.

I swear to you, though, that those doctors really did try to protect you. They showed me a still photo of you to make sure I didn't know who you were. They made me sign an agreement promising

that I would not discuss your case with my friends or colleagues and that I would not write about any of the New York patients in the *Times*—no matter how disguised my account might be. You had given your permission, whether or not you remember for them to use your tapes for "educational purposes." And that's what my article was to be—public education. Anyway, I did not tell anyone about you, and as you know, I didn't write about you, either.

The worst breach of faith I've ever been party to came while I was covering electroshock therapy for *Omnis*. I can still picture you so clearly—then wide-eyed trying to smile, strapped on that stretcher bed, waiting for your shock treatment to begin—when your psychiatrist introduced me to you as a new medical student on the service. I was thirty-six years old and six months pregnant at the time. Did you really believe him? I suspect you were too full of your own concerns to care who I was. I suspect he knew that, too. So why did he have to lie to you?

Look, I've done a lot of things I'm not proud of. But as a journalist, I've never lied face to face about who I am or what I'm doing when I'm on an assignment. Even when I worked for two weeks as a volunteer in the "hopeless" ward at a state mental institution, every patient—including the ones who had undergone failed lobotomies, or who hadn't spoken to anyone in years, or who were so haunted by their own schizophrenic visions that they barely acknowledged my presence—and every patient's family was told that I was a reporter and that I would be writing about my experiences at the psychiatric center. Many of those unfortunate were wards of the state. You were a paying patient in a private hospital, but I'm assuming that their sensitivities were more respected than your own?

Tape recorders and video cameras pry their way into many sacrosanct areas today. Often, there are good reasons for opening secret files to public scrutiny, but not with warrant disregard for the person whose name is on that file.

As I said, you don't have to worry about my disclosing your identity. I really do respect your privacy. I just wish, for your sake, that you didn't have to rely on my integrity.—DAVA SOBEL

Dava Sobel currently is a contributing editor for *Omnis*, was formerly a staff reporter for *The New York Times*, where she covered psychology and psychiatry.

CONTINUUM



Grady as they are, prairie dogs have some grumpy customs, such as telling—and eating—their grandchildren, nieces, and nephews.

KILLER PRAIRIE DOGS

Prairie dogs customarily greet one another with a kiss, but they may not be as sociable as they seem. A University of Maryland researcher has found that half of all prairie dog litters in a South Dakota colony are partly or wholly eliminated by infanticide.

What's more, most killers are nursing mothers who kill, and often eat, close relatives, including grandchildren, half siblings, nieces, and nephews. Only one other mammal is known to regularly kill offspring of close kin: *Homo sapiens*.

John Hoogland, writing in the journal *Science*, proposed two hypotheses for the infanticide. The killers may benefit from the extra food—Hoogland has evidence that killers may be more likely to successfully wean a litter than nonkillers are. Or killers may be eliminating future competitors of their own offspring, since females re-

main in the colony—or family group—of their birth.

Nurses are essentially unavailable, as victims Hoogland says, because prairie dogs defend their colony territories against outsiders. During his 15-year study, he has detected only three cases of cross-colony infanticide.

In other mammal litters, infanticide typically occurs when a bachelor male invades a group, evicts the resident breeding male, and kills all unwashed offspring of that male. This has the effect of causing nursing females to return to breeding condition, enabling the invading male to quickly sire his own offspring.

Male prairie dogs sometimes kill pups, but they do so far less often than females do. Infanticidal males won't get early access to females because prairie dogs breed seasonally and do not return to breeding condition after losing a litter.

Female killers pay a high

price for their behavior, Hoogland says. While mauling many lose their own litters.—Billy Goodman

HALLEY'S HURT FEELINGS

Charles Wesley Orion has a ready explanation for Halley's Comet being only dimly visible in the Northern Hemisphere: "The problem," he says, "is public apathy. Everyone knows that the comet is supposed to be just a big, dirty snowball. They're not about to think that its appearance portends either doom or good fortune. It's no wonder the comet isn't going to put on its best performance. We've hurt its feelings."

"We've got to do something to let Halley's Comet know we still love and respect it. Otherwise, it might go to another solar system where it feels appreciated and never come back. Comets have feelings, too, you know."

So Orion formed the Committee to Combat Comet Apathy, informally known as ComComCom, which distributes and sells "Official Halley's Comet Sponsorships" at \$5 apiece to raise public awareness of the problem. Sponsors' kits include bumper stickers, a pamphlet of comet trivia, a certificate, and a variety of seals.

"It worked for the L.A. Olympics and the Statue of Liberty, so why wouldn't it work for Halley's Comet?" Orion wonders. ComComCom's sponsorship program is concentrating on individuals rather than big corpora-

tions because, the whimsical writer explains, "it seemed that if you were a company with fifty thousand dollars or so in loose change, you could be an official anything for the L.A. Olympics, but as an individual all you could do was buy a ticket. Halley's Comet is for everyone. Any one who sends five dollars to us at ComComCom can be an official Halley's Comet sponsor."

Unperturbed by the fact that the organization's membership is minuscule—just Orion and his wife and the neighbor's Chihuahua—the Carlsbad, California, resident has planned just one official sponsor's event: "At two A.M. the morning of April 15th, when the comet will be closest to Earth, all the official sponsors will go out side with flashlights, point them at the comet, and in Morse code flash the message: WE CARE!"

—George Nobbe



Why is the comet snubbing us in the Northern Hemisphere?



Now, strong evidence that stuttering may be genetic

GENETIC STUTTERING

Some 2 million people in this country suffer from stuttering. Psychologists have advanced countless explanations, from repressed hostility, to unresolved conflicts, to learning the habit from a stuttering parent. Now a Yale University researcher says the ailment may be no more psychological than having blue or brown eyes.

In the largest study of its kind, geneticist Kenneth K. Kidd spent more than a decade surveying hundreds of stutterers and their families. He found, for example, that stuttering appears up to five times more frequently in males than females. A parent who has stuttered has a vastly greater chance of having a child with the affliction than parents who did not. But stuttering children don't "learn" from their parents. Most stuttering parents overcame their affliction before they had children.

The evidence makes a

strong statistical case that stuttering is genetically linked. That does not mean there is a "stuttering gene." Rather says Kidd, a group of genes may somehow affect the vocal cords, making them susceptible to becoming tense or uncoordinated. A person with that predisposition may spontaneously stutter or have the affliction triggered by experiences in his youth. Kidd adds that stuttering generally clears itself up by adolescence.

All this suggests that psychotherapy may not be the best treatment for stuttering. Curing stuttering, Kidd says, may someday be a simple matter of rebalancing the muscles that coordinate speech.—Douglas Starr

"Anyone who is precariously equipped with scientific work is aware that those who refuse to go beyond fact rarely get as far as fact."
—Thomas Henry Huxley

"Should you ask me my comprehension of a starlight night, awe was my only reply."
—Emily Dickinson

SUBSTANCE P AND ARTHRITIS

A secret number of rheumatoid arthritis sufferers in California are trying out a new treatment for joint pain that may resolve a long-standing mystery about the disease itself.

The treatment involves substance P, one of the body's own neurotransmitters—chemical messengers in the nervous system. Re-

cent studies with rats have shown that substance P pools in the joints most susceptible to arthritis and that injecting substance P into an inflamed joint measurably aggravates the pain and tissue destruction there.

Block the action of substance P, therefore, and you should reduce the inflammation and joint deterioration caused by arthritis. This is precisely what rheumatologist Jon Levine and his colleagues at the University of California at San Francisco hope to do.

Their work with rats has provided the first direct evidence that the nervous system—via substance P—beers on rheumatoid arthritis, which is generally considered a disease of the immune system.

"We've long suspected that the nervous system plays an important role," Levine said in an interview "because arthritis flare

ups are frequently triggered by stress. He also noted that arthritis who suffer a stroke on one side of the body experience milder arthritis on that side, presumably because the injured nerves there no longer affect the joints.

Current treatments for intractable arthritis include injections of gold salts and administration of antimalarial drugs, which work—when they work at all—for reasons no one really understands. The anti-substance P approach, though still unproven, is based on a clear-cut hypothesis.

Levine would make no comment on the clinical trials he is now conducting except to say they are in progress and that preliminary results should be published soon in a professional journal. A promising outcome could affect some 7 million Americans who suffer from the disease.—Dave Sobel



Could rheumatoid arthritis be affected by a neurotransmitter called substance P? California trial subjects will soon find out

CONTINUUM

WHITE HOUSE MENTAL CASES

Most mentally ill people who attempt to break in to the White House or who show up at the White House gate demanding immediate entry to the inner sanctum pose no threat to the President, suggests a National Institute of Mental Health (NIMH) study.

NIMH researchers David Shore and Richard Nelson reviewed the case histories of 328 mentally ill people (most of them white male schizophrenics) treated at the National Institute of Mental Health after they had tried to enter the White House or another government place.

"Very often these people have some pretty bizarre information that they feel the President will want to hear," Shore, a psychiatrist, says "or they want to collect a million-dollar reward; they think the President has for them."

Although 22 percent of the

328 people studied did make threats against the President or other prominent political figures, none of them ever acted on their threats. But 36 were subsequently arrested for violent crimes, one after shooting and killing a Secret Service agent, another after assaulting a woman she mistakenly thought to be the First Lady.

"What we want to do next, Shore says, "is determine which psychiatric symptoms of these mentally ill people might have predicted their future violence."

"As a psychiatrist, I'm concerned that anyone might be harmed by a patient."

—Eric Metzger

"You can't force the pace in science."

—Sir Fred Hoyle

"Doubt is the vestibule which all must pass before they can enter into the temple of truth."

—Charles Colson



Web: www.nimh.nih.gov/whitehousecases More information for the President—or want a million dollar reward.

WOODPECKERS VERSUS SNAKES

Deep in Georgia's Okefenokee swamp, a red rat snake slithers up a decaying pine tree. Nearing its prey, it encounters an unexpected ooze of thick resin barring its path. The toxic substance causes the snake to let go and plummet 40 feet to the ground. Its prey, the endangered red-cockaded woodpecker, watches unharmed. Its unique defense against a deadly predator has succeeded again.

The red-cockaded woodpecker and other unusual inhabitants of the Okefenokee are captured in *Realm of the Alligator*, a new National Geographic special, underwritten by the Chevron Corporation. The special airs on public television April 16.

Unlike other species of woodpeckers, the red-cockaded woodpecker requires a living pine tree, usually 60 years or older, for its nesting or roosting hole and its defense strategy. The bird seeks pine trees that have "red heart," a fungal infection that softens a tree's heartwood and makes it easier to excavate.

After digging a cavity for its nest, the woodpecker scales off the bark and chews holes into the sapwood around the entrance. This allows the thick, sticky sap to ooze out, protecting the nest from snakes.

Wildlife biologist John Paling is the producer of *Realm of the Alligator*. "No one knows why this substance repels snakes," he says. "We do know that



Red-cockaded woodpecker at work. An ooze of protection.

the chemicals [in the substance] burn the snake on contact. Paling adds that the combination of the red heart fungus and the presap may produce the substance's caustic quality.

The red-cockaded woodpecker is the only member of its family in North America, with the exception of the ivory bill, that is officially on the endangered species list. A black and white-cloaked bird nearly 7.5 inches long, the red-cockaded has few natural predators. Its obstacle to survival is loss of habitat.

The mature pine wood that the woodpeckers live in often dies from the red heart fungus or is the target of commercial foresters. "Modern forestry practices simply do not condone the preservation of decaying sixty-year-old trees," biologist Paling explains. The Okefenokee is one of the few remaining national wildlife refuges for the endangered red-cockaded woodpecker. "The birds would not exist if not for the swamp," Paling says.

—Lisa Warner

MYSTERY RAYS

Particle physics has been zapped by a new and mysterious kind of cosmic ray.

Ordinary cosmic rays, fantastically energetic particles that are constantly bombarding our atmosphere, are a long-standing puzzle themselves. Their source is unknown. Because the particles are charged, their paths are bent every which way by the galactic magnetic field. By the time they arrive here, they appear to be coming from all directions equally. The mystery of the new rays is that scientists know exactly where they're coming from.

The rays were discovered by underground detectors in two different locations set up to look for proton decays. The detectors are located in deep tunnels, where the earth shields them from ordinary cosmic rays. But some exotic and very powerful form of radiation is penetrating the earth and leaving

straight-line trails in the detectors, which point back to Cygnus X-3, a star about 40,000 light-years away.

Since the new rays all come from one direction, they are not being affected by the magnetic field. This means the particle composing them must be electrically neutral, not charged like the components of other cosmic rays. The particle must also be long-lived, since it travels 40,000 light-years, and must be able to shoot through our atmosphere without interacting with molecules in the air.

There are no known particles with the right properties.

Physicists, consequently, have been looking at hypothetical particles for an explanation: particles that ought to exist according to various theories but that have never been observed. They don't seem to fit the bill either. Researchers Maurice V. Barnhill, T. K. Gaaser, Todor Stanek, and Francis Halzen considered, and wound up eliminating, the possibility that the rays consist of chunks of strange quarks or of photinos—particles predicted by supersymmetry theories.

Physicists want more data on the rays. Meanwhile, they've got another fever: "It looks like there might be some new particle physics invoked in it," Barnhill explains happily, "and it looks like we're looking at a cosmology source for the first time."
—Leah Wallace

"Most history is just gossip that has grown old gracefully."

—Sydney J. Harris



The Coca-Cola douche is not recommended by most family-planning experts. Even so, Diet Coke proved very effective at killing sperm.

COCA-COLA AND BIRTH CONTROL

Harvard Medical School researchers have confirmed what many teenagers and women of Third World countries have long believed true: Coca-Cola, in test tubes at least, kills sperm.

Following the introduction of the new Coca-Cola last year, members of Harvard's obstetrics and gynecology department decided to check out what effect any new ingredients might have on the widely held belief that Coke, as an effective contraceptive, is it. Though some women have reportedly doused with the soft drink, the researchers could find no laboratory studies determining the effect of Coca-Cola on sperm. So they conducted their own experiment, comparing the effects of Classic Coke, New Coke, caffeine-free New Coke, and Diet Coke on sperm from a healthy, fertile donor. Using a saline solution as the control, the researchers immersed the sperm in the var-

ious beverages for one minute and then measured sperm movement. They found that Diet Coke had the strongest effect, and Classic Coke had five times the spermicidal effect of New Coke.

Coke's effect on sperm has been attributed to the acidic pH of the drinks, but since the pH levels of all four versions of Coke are about the same, the team reasons that it is Coca-Cola's secret formula and its varying proportions in the different drinks that may be a cofactor in Coke's ability to kill sperm.

Despite the results, Dr. Sharon Umphers, one of the doctors on the test team, cautions against using Coke as a method of birth control. People reportedly use Coca-Cola as a spermicide after intercourse, which would be too late. Sperm enter the female reproductive tract very fast, and Dr. Umphers doubts that the Coke could be administered in time. Still, she admits, "It was a one afternoon experiment. We've never done the clinical trials."
—Francesca Lunzer



Particle detector: A sponge assault from Cygnus X-3.



CONTINUUM



When your favorite TV character is killed by chest pain, leukemia, or breast cancer, do you suffer sympathetic symptoms?

TV HYPOCHONDRIACS

Some TV viewers are such hypochondriacs that they actually imagine they're developing the very same diseases that ailing TV characters have, and they even develop the same symptoms.

This revelation comes from psychiatrist Moshe Toism of Axon General Medical Center in Ohio.

"In the past ten years," Dr. Toism says, "I have seen the condition in several dozen patients."

"These are highly suggestible people," he adds. "They become very involved in the television show, to the point that they are actually living in it, and they so strongly identify with the characters that they can actually experience their happiness and suffer their pain."

For instance, one patient after a battery of medical tests showed her to be in the pink of physical health nevertheless complained of chest pains and insisted that she had a bad heart, just

like the character on a soap opera. Another patient, a fan of a prime-time hospital drama in which one of the characters had breast cancer, believed she had the same condition despite a clean bill of health from doctors. And a third, complaining of general weakness and loss of appetite, falsely believed he had leukemia, like a character on a soap.

The only effective treatment for these TV-watching hypochondriacs, Toism says, is psychotherapy. But it would be wrong to imply that the reason these people have problems is because of TV shows," he says. "In an earlier time they would have developed their symptoms from reading a book."

—Eric Mahara

"Statistics can be used to support anything—especially politicians."

—Franklin P. Jones

"Infinity is just one on an ego trip."

—Lily Tomlin

THE SCIENCE OF BELCHING

If you're over thirty-five and constantly endure the social disgrace of belching at precisely the most inopportune moment, take heart. To most you may simply appear to be a boor, but to nutritionists who understand involuntary belchers, you are probably just suffering from a deficiency of hydrochloric acid, or HCl.

This acid is produced in the stomach loudly enough by most people. In others, however, the stomach ceases to produce sufficient amounts of HCl to accommodate their digestive systems. Lacking the acid, air normally consumed in digestion is trapped in their stomachs and, the human body being what it is, demands that it somehow escape. So they belch.

So says Jeffrey Weber, director of the American Chiropractic Association's Council on Nutrition, only he puts it a lot more technically: "The pyloric glandular mucosa atrophies" for lack of the normally produced acid. He is an elaborate explainer for a common problem that few home-dish hostesses could be expected to either understand or appreciate. Protein foods, claims nutritionist Weber, are a particular problem for HCl-deficient belchers.

There is a relatively inexpensive way out of this problem. Weber suggests taking Betaine HCl supplements, which are available without prescription at most drugstores as well as health

food emporiums.

These are caveats, he notes. Chronic involuntary belching could also result from such structural problems as hiatus hernias or spinal abnormalities that cause back pain, generally between the shoulder blades. Both have been associated with involuntary belching after meals. Ulcer patients should also consult their physicians before they try Betaine supplements.

—George Nobbie

"I really do believe that the most optimistic thing about the human race is its relative stupidity. There will be little hope (for us) if the human race was as bright as it thinks it is, and still got itself into so much trouble."

—Edward de Bono

"There are three great things in the world: There is religion, there is science, and there is gossip."

—Robert Frost



Boorish belching may be caused by a lack of HCl.



Bronze sculpture: The day of the tropical sunset is over

EXPLOSIVE ART

More than 40 years ago the New Mexico desert became the cradle of the world's first atomic bomb. Today that same desert is the setting for a new batch of explosions, the shock waves of which are reverberating not through the world of politics and warfare but through the hushed hallways of the world of fine arts.

Sculptor Evelyn Rosenberg of Albuquerque, New Mexico, is using high explosives to melt and fuse metals into a controlled series of exotic shapes. Working on an active firing range (It's sort of frightening, she says, "the mortar guns are always going off all around me"), she first places the metals—usually brass and steel—in molds made of Hydrostone, a sort of Space Age plaster of Paris. She then "fills" the molds with a high-powered plastic explosive, hiding all the while behind a nearby concrete bunker on the grounds of the frighteningly

named Terminal Effects Research Analysis (TERA) center.

Initially the problem was simply getting the process under control. "Everything we did at first," she says ruefully, "either came out in a big wad or would blow fifty feet in the air and go bouncing down the mountain." But practice eventually made perfect, so much so that the New Mexico Institute of Mining and Technology, to which TERA is attached, commissioned Rosenberg to decorate one of its new buildings with an enormous fused-metal mural. The 4-foot by 21-foot oeuvre—a glittering, two-inch-deep bas relief that depicts such an alien beast as Imbriole and pterodactyls side by side with their modern relatives—is now in place. "I must admit," she says, "I'm surprised at how well it all came out." —Bill Lewren

"Art is less that 'tell the truth'."
—Pablo Picasso

ICE-CUBE BOATS

At first glance, what Frederick Wang would appear to have invented is merely a set of intriguing toy boats and cars, eight-inch demonstration models powered by an ice cube through which passes a strand of nitinol wire, composed principally of titanium and nickel.

But hold on. It seems that nitinol reacts so reflexively to temperature changes of 35 to 40°C. The alloy has a "memory effect" that compels the wire to seek its original shape. As it contracts, the

wire acts as a chain belt drive, thus turning a toy boat's propeller shaft.

What Wang's toys do is demonstrate an effective way to convert low-grade thermal energy into low-cost mechanical energy. "What we're dealing with here is fractions of horsepower," says Wang, who works for Innovative Technology International, Inc. in Beltsville, Maryland.

He is amused that the most interest expressed so far has come from toy chain parks and California swimming-pool owners interested in a cheap way to circulate the water in their pools.

On a grand scale, the patented nitinol wire could conceivably be used to generate low-cost power for such gigantic industrial applications as discarded industrial fluids, solar and geothermal heat projects, released heat from combustion engines, boilers and electrical equipment, or even computer equipment.



Nitinol boat under power. When heated, the alloy exerts the pressure equivalent of 25 subcompact cars stacked on a quarter

Nitinol works on the principle that above a certain temperature, the alloy is soft. At lower temperatures it is stiff. When heated to above its transition temperature, nitinol will always seek to retain its original shape. In doing so, the alloy can exert as much as 50,000 to 60,000 pounds per square inch of force, equivalent to the pressure of 25 subcompact cars stacked on a quarter. Wang describes the process as a "lugging effect" that could eventually be used to power giant turbines and not just toy boats. (See next month's Games column for more information on nitinol.) —George Nobbe

"The only limit to our realization of tomorrow will be our doubts of today."
—Franklin D. Roosevelt

"I always wished I could do something with my hands. Never could."
—Joe Louis



CONTINUUM

REDHEADS

Three years ago, in an effort to combat a perceived media hostility toward the country's estimated 12 million redheads, Stephen Douglas of Laguna Beach, California, founded an organization known as Redheads International. He has since emerged as one of the most militant defenders of the oft-slandered redheaded American.

Nothing in particular tipped him over. He was just tired of the worn-out old jokes and the sometimes not-so-subtle put-downs. "People used to say to me, 'You're really good-looking, for a redhead,'" recalls the normally placid Douglas, who doesn't see red easily. "Now just what is that supposed to mean?" he asks.

His organization now has 15,000 members, each of whom pays annual dues of \$18, which entitles them, among other things, to a subscription to *The Redheader*, an often acerbic quarterly dedicated to improving the lot of its subscribers.

It is Douglas's contention that society does not select redheads to be among its elite. He claims there are not enough redheads on television, in motion pictures, or in modeling. The magazine recently singled out modeling agency boss Ellen Ford for its "Dead Rose Award" for saying that red hair doesn't sell. Her remark earned her the award, according to Douglas, on the basis of its "cassiness and stupidity."

The quarterly relies heavily on some fairly arcane trivia in its efforts to defend the

native American redhead. For instance, a recent issue noted that while redheads make up 6 percent of the country's population, they represent only 1 percent of its prison population. It also reported that Scotland has the highest percentage of redheads in its population—14 percent.

The publication from time to time runs a list of famous redheads in history. In case you're curious, it's headed by Erik the Red, followed in no particular order by Frederick Barbarossa, William the Conqueror, John Paul Jones, Christopher Columbus, Vincent van Gogh, Antonio Vivaldi, Emily Dickinson, Sarah Bernhardt, and Leonardo da Vinci.

—George Nobbe

"You cannot feed the hungry on statistics."

—David Lloyd George

"Each man kills the thing he loves."

—Oscar Wilde

SCIENCE-FICTION QUIZ NO. 11

Science-fiction stories usually deal with the future, but sometimes the future has a way of sneaking up and becoming the present—or even the past. Many science-fiction writers have found their stories made obsolete by the relentless march of knowledge.

Given below are a number of gadgets and ideas from five science-fiction stories. Can you tell which gadgets or ideas are obsolete and what kind of modern technol-

ogy has replaced them? Answers are given at the end of this quiz.

1. In E.E. "Doc" Smith's vast tales of interstellar adventure, people zip through the galaxy in ships powered by mercuric drives, and they communicate with powerful electronic equipment that often overheats.

2. Another Smith, George O. Wells, in his "Venus Equatorial" stories about engineers who, while living in space stations between Venus and Earth, solved math problems with something called a "kelpack."

3. In the movie *The Transatlantic Tunnel*, Richard Dix flies to his girlfriend's New York penthouse apartment in an autogyro.

4. John Carter of Barsoom, according to Edgar Rice Burroughs, shoots a rifle that has radium bullets that explode when exposed to sunlight.

5. In Alan Nourse's story "Brightside Crossing," a team of astronauts travels across

the plains and hills of the planet Mercury on the side that always faces the sun.
—Ben Bova

ANSWERS

1. We know now that Mercury is not a planet, but a planetoid. There is no side that always faces the sun.
2. The moon and that it orbits it is not a planet, but a planetoid. We know now that Mercury is not a planet, but a planetoid.
3. The side rule has been replaced by the power of the electron gun now used in television sets. We did not have static guns, but electron guns now used in television sets.
4. Modern weapons guns use high-density metal slugs of great mass to penetrate their armor. But radium would not be used to penetrate armor. It would be necessary for a nuclear explosion.
5. The side rule has been replaced by the power of the electron gun now used in television sets. We did not have static guns, but electron guns now used in television sets.



Some from the movie *The Transatlantic Tunnel*. The tunnel is all science fiction, but the autogyro has taken pity to progress.



FICTION

He took his chances
when they wired him, and now the
dice have come up

SNAKE EYES

BY TOM MADDOX

Dark meat in the can—
brown oily and flecked
with mucus—gave off a
repellent, fatty smell and
the taste of it rose in his
throat, pungent and bitter,
like something from a
dead man's stomach.
George Jordan sat on the
kitchen floor and vomited,
then pushed himself
away from the shining
pool, which looked very
much like what remained
in the can.

He thought, No, this
won't do. I have wires in
my head, and they make
me eat cat food. The
snake likes cat food.

He needed help, but
knew there was little point
in calling the Air Force.
Had lined them, and there
was no way they were
going to admit responsi-
bility for the monster in his
head. What? George
called the snake, the Air
Force called Effective
Human Interface Tech-
nology and didn't want to
hear about any postdis-
charge problems with it.
They had their own prob-
lems with congressional
committees investigating
the conduct of the war in
Thailand.

He lay for a while, with
his cheek on the cold lin-
oleum, got up and rinsed
his mouth in the sink, then
stuck his head under the
faucet and ran cold water
over it, thinking, Call the
goddamned multicomp.

But for me, George
thought, there are no
cats, smiling ducks and
rodents. Here as every-
where, it's Snake City.

From the window of his
motel room, he watched
gray sheets of rain cascade
across the pavement.
He had been wait-
ing two days for a launch.
At Canaveral a shuttle sat
on its pad, and when the
weather cleared, a heli-
copter would pick him up
and drop him there, a
package for delivery to
SenTux, Inc., at Athens
Station, over thirty thou-
sand kilometers above
the equator.

Behind him, under the
laser light of a Biaupunkt
hostage people a foot
high chattered about the
war in Thailand and how
lucky the United States
had been to escape an-
other Vietnam.

Lucky? Maybe he
had been wired up and
ready for cortical learn-
ing, already accustomed
to the form-fitting con-
tours in the rear couch of
the black, fiber-bodied
General Dynamics A-230.
The A-230 flew on the
coady edge of instabil-
ity, every control surface
monitored by its own
bank of microcomputers,
all hooked into the
snakebrain flight and fire
assistant with the twin
black multiplex cables
running from either side.

He propped up the
phone, called up the di-
rectory on its screen, and
keyed 153.0000.SEN.TUX.

The Orlando holiday
link stood next to the air-
port terminal, where tour-
ists flowed in eager for the
delights of Disney World.

PAINTING BY CARLOS REVILLA

of his esophagus—getting off on yes when the cables snapped home, and the airframe resonated through his nerves, his body singing with that identity, that power.

Then Congress pulled the plug on the war: the Air Force pulled the plug on George, and when his discharge came, there he was, left with technological blue balls and this hardware in his head that had since taken on a life of its own.

Lightning walked across the purpled sky, popping it, crasing it into a giant, upturned bowl of shattered glass. Another foot-high man on the heliportage said the tropical storm would pass in the next two hours.

Hamilton Innis was tall and heavy—six four and about two hundred and fifty pounds. Wearing a powder-blue jumpsuit with serivux in red letters down its left breast, and soft black slippers, he floated in a brightly lit walk corridor, held properly to a wall by one of the jumpsuit's Velcro patches. A view screen above the airlock entry showed the shuttle flying its nose into the docking tube. He waited for it to rise to the arck hatch and send in the newest candidate.

This one was six months out of the service and slowly losing what the Air Force doctors had made of his mind. Former tech sergeant George Jordan—two years' community college in Oakland, California, followed by enlistment in the Air Force, aircrew training, the EIT program. According to the profile Alpha had put together from Air Force records and the National Data Bank, a man with slightly above-average aptitudes and intelligence, a distinctly above-average taste for the bizarre—thus his volunteering for EIT and combat. In his life pictures, he looked nondescript—five ten, a hundred and seventy-six pounds, brown hair and eyes, neither handsome nor ugly. But it was an old picture and could not show the snake and the fear that came with it. You don't know it, buddy, Innis thought, but you ain't seen nothing yet.

The man came lumbering through the hatch, more or less helpless in free fall, but Innis could see him figuring it out, willing the muscles to quit struggling, try lying to cope with a gravity that simply wasn't there. "What the hell do I do now?" George Jordan asked, hanging in midair, one arm holding on to the hatch opening.

"Relax. I'll get you." Innis pushed off and swooped across, grabbing the man as he passed, taking them both to the opposite wall and kicking to caress them outward.

Innis gave George a few hours of futile attempts at sleep—enough time for the bright, gliding phosphorescence caused by the high gs of the trip up to disappear from his vision. George spent most of the time rolling around in his bunk, listening to the wheeze of the air-conditioning and creaks of the rotating station.

Then Innis knocked on his compartment door and said through the door speaker: "Come on, Jolla. Time to meet the doctor."

They walked through an older part of the station, where there were brown clots of ice-

silized gum on the green plastic flooring, soft marks on the walls, along with faint imprints of vagrants and company names—*icos* was repeated several times in ghost lettering. Innis told George it meant the new defunct International Construction Orbital Group, the original builders and controllers of Athena. Innis stopped George in front of a door that read *antennas above: Goonin'*; he said "I'll be around a little later."

Pictures of crises drawn with delicate white strokes on a tan silk background hung along one pale cream wall. Curved partitions in translucent foam, glowing with the soft lights placed behind them, marked a central area, then undulated away, forming a corridor that led into darkness. George was sitting on a chocolate sling couch. Charley Hughes lying back in a chrome and brown leatherette chair, his feet on the dark veneer table in front of him, a half-inch of ash hanging from his cigarette end.

Hughes was not the usual M.O. clone. He was a thin figure in a worn gray obi, his black

◆As he
nuzzled her neck, tried to
lick the drop of
blood off her breast, explored
her teeth with his
tongue, it seemed as if cables
ran between them,
snapped beneath their jaws.◆

hair pulled back from sheep features into a waist-length ponytail, his face taut and a little wild-eyed.

"Tell me about the snake," Hughes said. "What do you want to know? It's an implanted minkie-minkie nexus—"

"Yes. I know that. It's unimportant. Tell me about your experience." Ash dropped off the organito onto the brown seat floor covering. "Tell me why you're here."

"Okay. I had been out of the Air Force for a month or so, had a place close to Washington, in Silver Spring. I thought I'd try to get some airline work, but I was in no real hurry because I had about six months of postdischarge berries coming, and I thought I'd take it easy for a while.

At first there was just this nonspecific weakness. I felt distant, disconnected, but what the hell? Living in the USA, you know? Anyway, I was just sitting around one evening. I was gonna watch a little hole-in-a-wall box. Oh man, this is hard to explain. I felt real funny—like maybe I was having, I don't know, a heart attack or a stroke. The words on the hole didn't make any sense, and it was like I was seeing everything underwater. Then I was in the kitchen pulling

things out of the refrigerator—lunch meat, raw eggs, butter, beer, all kinds of crap. I just stood there and slammed it all down. Cracked the eggs and sucked them right out of the shell, ate the butter in big chunks, all theologna, drank all the beer—one, two, three, just like that."

George's eyes were closed as he thought back and felt the fear that had come only afterward rising again. "I couldn't tell whether I was doing all this, do you understand what I'm saying?" meant, that was me seeing them, but at the same time, it was like somebody else was at home.

"The snake. Its presence poses certain problems. How did you confront them?"

"Hoped it wouldn't happen again, but it did, and the one I went to Walter Reed and said 'hey folks, I'm having these episodes.' They pulled my records, did a physical, but hell, before I was discharged, I had the full workup. Anyway they said I was a psychotic problem, so they sent me to see a shrink. It was around then that your guys got in touch with me. The shrink was doing no goddamn good—you ever eat any cat food, man?—so about a month later I called them back.

"Having first refused SerTux's."

"Why should I want to work for a multi-corp? Christ, I just got out of the Air Force. To hell with that. Guess the snake changed my mind."

"Yes. We must get a complete physical picture—a super-CAT scan, cerebral chemistry, and electrical activity profiles. Then we can consider alternatives. Also, there is a party tonight in cafeteria four—you may ask your room computer for directions. You can meet some of your colleagues there.

After George had been led down the walkway corridor by a medical technician, Charley Hughes sat chain-smoking Gauloises and watching with clinical detachment the shaking of his hands. It was odd that they did not shake in the operating room though it didn't matter in the case—Air Force surgeons had already carved on George.

George—who needed a little luck now because he was one of the statistically insignificant few for whom EIT was a ticket to a special madness, the kind Alpha was interested in. There had been Paul Coen and Luzzie Herz, both picked out of the SerTux personnel files using a psychological profile cooked up by Alpha, both given EIT implants by him. Charley Hughes, Paul Coen had stepped into an airlock and blown himself into vacuum.

No wonder his hands shook—talk about the cutting edge of high technology, all you want, but someone's got to hold the knife.

At the armored heart of Athena Station sat a nest of concentric spheres. The innermost sphere measured five meters in diameter, was filled with inert liquid fluorocarbon, and contained a black plastic two-meter cube that sprouted thick black cables from every surface. Inside the cube was a fluid zone of hologrammatic waveforms, fluctuating from nanosecond to nanosecond in a play

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SCENTIMENTAL JOURNEYS

BY PAMELA WEINTRAUB

Smells have the power to arouse our deepest memories, our most primitive drives

PAINTING BY WOLFGANG HUTTER



The mystery had haunted him for years. Shortly after birth, salmon abandoned their snug river spawning ground and headed for the sea. No matter how many leagues they traveled, no matter how many years they wandered, they always returned to their birthplace to spawn offspring of their own. But how did man's fate

zoologist Arthur Hader wondered, likewise such vastness of time and space to find their way home?

The question had plagued him in his lab at the University of Wisconsin, had pursued him throughout his years of service in the Second World War. Finally back home, in Utah, he took a hike in the hills one day and was hit by a rash of fugrant mountain air. Slowly, imperceptibly, the odor released

his deepest memories, and for a moment he was a boy again. He saw his friends leaping up the slopes, heard their shouts ring out high and clear. In the assurance of someone the fragrance had carried him back 25 years. Then came a second rush of fragrance, releasing not a memory but an idea. Hader realized that salmon remembered the odor of their origins. They smelled their way home.

Today considered one of the grand old men of biology, Hader spent much of his life proving his inspiration in the field. He showed that individual streams have individual odors, or bouquets. By plugging the salmon's noses, he showed that without the sense of smell, they just can't navigate home. As late as 1980 Hader and his students

CONTINUED ON PAGE 52

TEST YOUR SCENTSABILITY

Scents says: Yale researcher Gary Schwartz says you're a psycho-physiological state of happiness. They can also relax you, enhance your appetite, or turn your stomach. But scientists have only begun to chart the more subtle effects of fragrance. And that's where you come in! By filling out this questionnaire (and please do so before reading "Scent's Mindful Journey"), you can help score researchers and test your own olfactory powers. Here's how: Scratch each numbered section with your fingernail. A single scratch ruptures some 2,000 microcapsules containing the scents. Smell the spot, and then try to identify each scent—and its effect—in questions 1 through 10. Make sure you wait at least one minute before smelling the next patch. Move on to question 11 through 15—they're future scents. But incorporate each of the five scents. Then complete the rest of the questionnaire, which was prepared with the help of Richard Doty of the Clinical Smell and Taste Research Center at the University of Pennsylvania. Send the page to: *Dr. David Swad*, 1965 Broadway, New York, NY 10023-9905. We'll report the results in an upcoming issue.

1. Scent 1 smells most like _____
a. relaxing c. giddy
b. invigorated d. nostalgic
2. Scent 1 makes you feel _____
a. relaxed c. like bathing
b. alert d. giddy
3. Scent 2 smells most like _____
a. relaxed c. like bathing
b. alert d. giddy
4. Scent 2 makes you feel _____
a. hungry c. invigorated
b. like singing d. sleepy
5. Scent 3 smells most like _____
a. relaxed c. like bathing
b. alert d. giddy
6. Scent 3 makes you feel _____
a. excited c. thirsty
b. alert d. hungry
7. Scent 4 smells most like _____
a. relaxed c. like bathing
b. alert d. giddy
8. Scent 4 makes you feel _____
a. excited c. thirsty
b. alert d. hungry
9. Scent 5 smells most like _____
a. relaxed c. like bathing
b. alert d. giddy
10. Scent 5 makes you feel _____
a. excited c. invigorated
b. like singing d. giddy
11. You have returned to Earth from your first space station visit. You want to relax. Which scent do you smell do you smell?
a. 1 c. 3 e. 5
b. 2 d. 4
12. The robot cat services your apartment box on time for the fifth time in a week. You have no idea what is wrong with it. Which scent do you smell to remove your headache?
a. 1 c. 3 e. 5
b. 2 d. 4
13. You are a medical researcher with a chance to land a job at the Farmer Young Institute, where you will be

- developing a drug to slow the aging process. Your interview is today. Which scent do you smell to get psyched?
a. 1 c. 3 e. 5
b. 2 d. 4
14. You have spoiled your ankle stepping out of your lotion tank. Which scent do you smell to ease the pain?
a. 1 c. 3 e. 5
b. 2 d. 4
15. You're trying to watch your weight, but you crave a candy bar. Which scent do you smell to satisfy your craving?
a. 1 c. 3 e. 5
b. 2 d. 4
16. Do you currently have problems smelling or tasting?
a. yes b. no
17. If you answered yes, briefly explain _____

18. Do you deliberately smell your own body periodically?
a. yes b. no
19. If you answered yes, how often?
a. every hour
b. several times a day
c. only rarely
20. Do you use perfume or after-shave lotion?
a. yes b. no
21. If you answered yes, do you use more than one kind?
a. yes b. no
22. Do you smell your laundry before it is washed?
a. yes b. no
23. Do you smell your laundry after it is washed?
a. yes b. no
24. Compared with your friends or co-workers, you feel your sense of smell is:
a. less sensitive
b. equally sensitive
c. more sensitive
25. Do you have a favorite smell?
a. yes b. no
26. If you answered yes, what is it? _____

27. You feel great odors:
a. pleasant
b. unpleasant
c. neither pleasant nor unpleasant
28. Have you ever detected the smell of smoke or gas in a situation where your safety or that of others was involved?
a. yes b. no
29. On average, you bathe _____ times a week
a. 1 c. 3 e. 5
b. 2 d. 4
30. Do you observe any personal, religious, or medical dietary restrictions?
a. yes b. no
31. If yes, please explain _____
32. Do you wear dentures?
a. yes b. no

33. Have you ever taken hallucinogenic or addictive drugs?
a. yes b. no
34. If you answered yes, which drug? _____
35. Do any of these drugs affect your ability to smell?
a. yes b. no
36. If yes, please explain _____
37. Do you have problems with airflow through your nose?
a. yes b. no
38. If yes, please explain _____
39. Do you snore (things bottom in the mouth) than the other?
a. yes b. no
40. If yes, is it the right or left nostril?
a. the right
b. the left
41. Does this day the same, or does it change periodically?
a. stays the same
b. changes
42. In your occupation, do you work around chemical vapors?
a. yes b. no
43. If you answered yes, how long are you exposed to the vapors, and in which areas are you exposed? _____
44. Do you smoke currently?
a. yes b. no
45. If yes, what do you smoke?
a. cigarettes
b. cigars
c. other _____
46. How much do you smoke?
a. _____ cigarettes a day
b. _____ cigars a day
c. other _____
47. Have you ever smoked?
a. yes b. no
48. Did your ability to smell change after you stopped smoking?
a. yes b. no
49. If yes, how? _____

Age _____
Sex _____ Female _____ Male _____
If a woman, are you pregnant?
_____ yes _____ no
Height _____ Weight _____
Occupation _____
City of residence _____
Ethnic or cultural background:
_____ Black _____ White _____ Asian
_____ Hispanic _____ Other _____

1

2

3

4

5

ORNO



showed that salmon could navigate in response to odors created in the laboratory.

Fittingly, the memories and intuition that led Haxel to his discovery are intrinsic features of his passionate interest—the sense of smell. In the last few years, scientists in fields as diverse as brain physiology and evolution have shown that scent ignites our deepest memories and drives. (To test your response to scent, please fill out our questionnaire, page 50, before continuing.)

Back in the days of the hunter-gatherers, new research suggests, our ancestors used olfaction not only to detect poisons but also to choose their mates. And the selection by smell was genetically preordained. Scientists have found that we all produce odorprints as distinctive as fingerprints, and they believe they have traced these cues to a particular set of genes. They have also mapped nerve pathways from the nose to the limbic brain, the spring center of memory, lust, and rage. And most startling of all, they have shown that humans produce odorous messengers called pheromones, just as animals do to prime each other for sex.

Spurred by these findings, scientists have begun to manipulate behavior through the sense of smell. At Yale and Duke, researchers are studying the impact of specific odors on physiological measures from brain waves and blood pressure to pulse. The result: the science of aroma therapy, which promises to revolutionize the workplace and home. In the not-too-distant future, office-ventilation systems might emit aromas that stimulate workers yet help them to relax. Scent machines as elaborate as stereo systems might churn vapors through the home, acting as aphrodisiacs and alarm clocks. And for those on the road, a scotch card like the one presented in this issue might provide an array of odors to fit conditions (ice away and claustrophobia to migrate).

As scientists unravel the mysteries of the olfactory code, moreover, they'll engineer scents that act like drugs. One day they say, such drugs will travel through olfactory neurons to the source of neurons, psychosis, and disease in the brain. Among the pills such drugs might cure are schizophrenia, Alzheimer's disease, and depression.

According to psychologist William Cain of Yale, the twenty-first century will be the era of scent. "We'll gain tremendous understanding of the basic, neurophysiological ways in which odors regulate the body and influence the mind," he explains. "And after we mapped the hidden pathways of olfactory nerves, we'll be able to influence behavior, modulate mood, and alleviate pain."

Before Cain's vision can be realized, scientists must understand how the sense of smell works. We have been studying smell for centuries, but only recently have the pieces started falling into place.

Back in the last century or so, the Roman poet-philosopher Lucretius suggested that molecules of different substances entered, tiny holes deep within the nose. Each hole had a different shape, so depending on the shape of the molecule, we might smell garlic,

must, or rose. In the centuries following Lucretius, scientists determined that nerves traveled from the olfactory epithelium—a small patch in each nasal cavity—to the olfactory tubes in the brain. And in 1966 famed neurophysiologist David Ottensmeyer attached an electrode to the epithelium, delivered a puff of odor, and measured an electrical response in thousands of cells. Sensory stimulation, he knew, had occurred.

Still, the sense of smell remained largely inscrutable. Scientists understood other senses. Vision, for instance, occurred when receptors known as rods and cones detected primary colors, each corresponding to a different wavelength of light. But as late as the Sixties, the sense of smell was as mysterious as it had been to Lucretius.

Into the welter of confusion jumped a young researcher named Robert Gesteland. A former engineer interested in the neural basis of thought, Gesteland had recently joined MIT's experimental epistemology lab. There he got his hands on potent

• Smell could be the wellspring of social behavior. Both altruism and mate selection can be traced to individual odorprints generated by a sequence of genes. •

new tools—tiny electrodes that could measure the current produced not by thousands of cells but by just one. Now it might be possible, he told himself, to determine how specific odors affected individual cells.

But Gesteland's first findings were disturbing. "We exposed frog olfactory tissue to various odors but found no two cells alike. We certainly couldn't find classes of cells that were, say, specialists in flowers or citrus fruits. Our experiments kept getting more elaborate, but we couldn't find categories. 'Without categories, we couldn't build a theory!'"

Then, in 1971, a Florida State University biologist named Pasquale Grazziadei and some colleagues began to examine olfactory cells. "Some nerve cells were undergoing a phenomenal regeneration," Grazziadei now says, "and they all seemed to vary in age—some were young, some middle-aged, and some very old."

This fact gave Gesteland and other neurophysiologists the clue they needed to begin to build an olfactory code. Gesteland had been measuring the current across just any random nerve cell. But by 1982 he had learned that young cells responded to myriad random odors, while old cells didn't work

at all. Only mature cells were actually responding to specific odors and delivering meaningful messages to the brain.

By the early Eighties, patterns had begun to emerge. "We're finding a statistical orderliness in the system," Gesteland explains. "If a cell responds to bigarona, say, we can predict that it is likely to respond to perhaps five other odors, seventy percent of the time. Each olfactory receptor cell responds to a number of different odors. But computer analysis can sort the odors and cells into groups." Each odor seems to stimulate the nerve cells in a unique pattern within the nose.

These patterns, evidence indicates, have had a pivotal role in the evolution of man. According to Grazziadei's latest experiments, the development of the nose preceded that of the brain. Grazziadei removed one eye from a group of frog embryos and inserted a third nasal cavity in its place. The adult frogs ended up having not just two brain hemispheres but also a third hemisphere—pheromone bugs. At another point Grazziadei removed one of the two nasal cavities from frog embryos. The resulting adults had one normal brain hemisphere and one that was severely reduced.

"It looks as if the forebrain literally develops under the influence of the nose," Grazziadei says. "For instance, human babies born with *microcephaly*—a disorder in which the brain is missing—also lack a nose. Without the nose, the brain might suffer severely in its development."

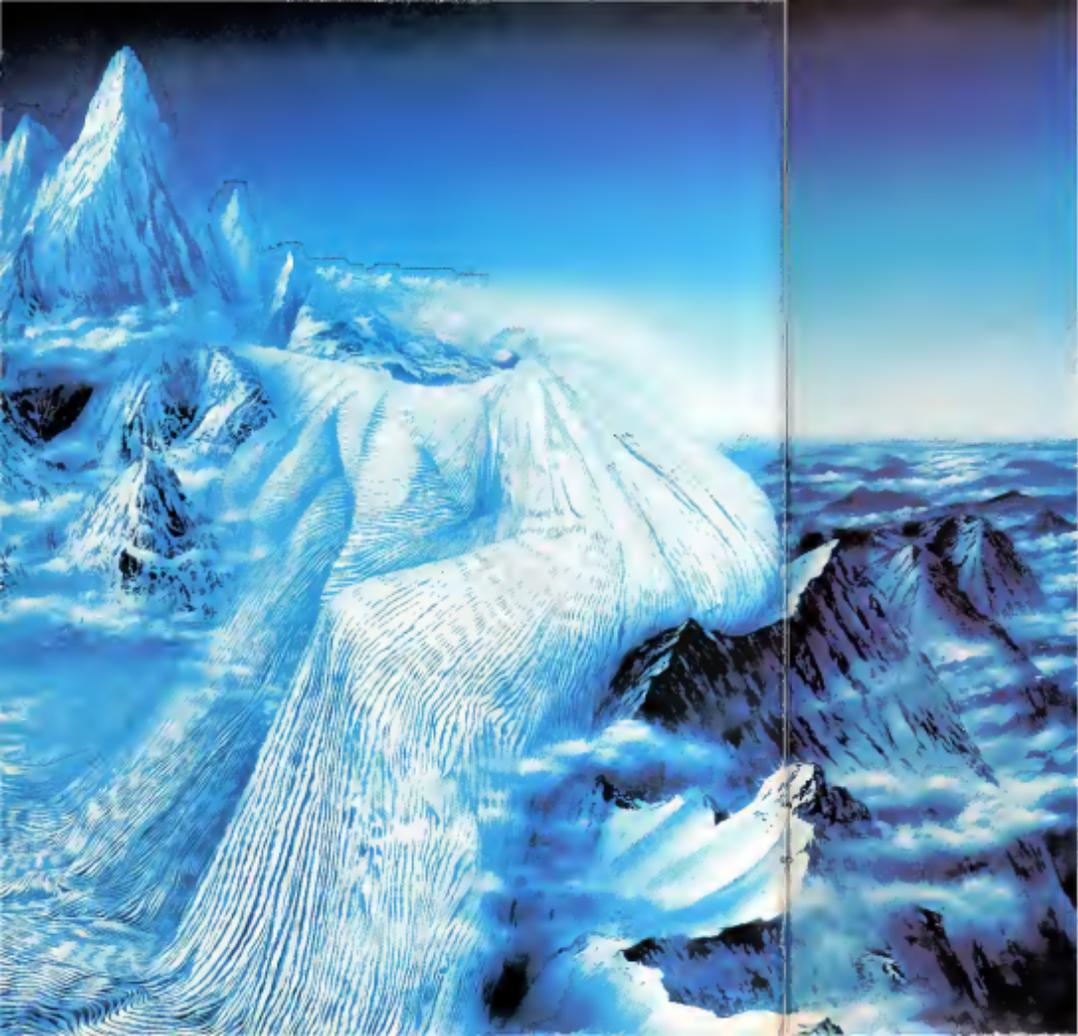
Our emotions might be truncated as well. In the simplest organisms, explains Howard Ehrlichman of the City University of New York, smell often provides a primary motivation for the basic behaviors of approach and avoid-ance. And the suggestion is that olfaction might also trigger powerful approach/avoidance responses—the foundation of emotion—in the human realm.

To test the hypothesis that emotions and smell are fundamentally related, Ehrlichman set out to see whether odor could induce positive or negative moods in the lab. He isolated subjects in a sterile, Danish room with just an Edward Hopper print hanging on the wall, then he wafted mildly pleasant and unpleasant odors into the air. In preliminary tests he found that people exposed to the pleasant scent of almond tend to remember pleasant events such as making new friends or a day out on the town. Those smelling unpleasant odors, including pyridine (like a urea) and butyric acid (reminiscent of vomit) tended to recall such unhappy situations as a job at a fast-food joint or periods of pain.

"The suggestion," Ehrlichman says, "is that the experience of odor and the experience of emotion are in some basic, physiological way the same. Molecules of odor seem to be stimulating the same brain centers that signal the drives toward or away which underlie almost all human emotion."

But the drives leading to approach and avoidance may be just the tip of the olfactory iceberg. Some biologists say that the sense of smell is the wellspring of social behavior, too. These researchers contend that two

CONTINUED ON PAGE 74



FICTION

The goddess dreams, and her nightmares of tormented love disrupt a frozen world

PERMAFROST

BY ROGER ZELAZNY

High upon the western slope of Mount Kámanyaró is the dried and frozen carcass of a leopard. An author is always necessary to explain what it was doing there because stiff leopards don't talk much.

THE MAN. The music seems to come and go with a will of its own. At least turning the knob on the bedside unit has no effect on its presence or absence. A hell-temper again tune, howling in a way. The phone rings, and he answers it. There is no one there. Again.

Four times during the past half hour, while grooming himself, disassembling and reassembling his arguments, he has received non-calls. When he checked with the clock he was told there were no calls. But that damned clock thing had to be malfunctioning—like everything else in this place.

The wind already heavy, raising hurtling particles of ice against the building with a sound like multitudes of tiny claws scratching. The whining of steel shutters sliding into place startles him. But worst of all is his reflex glance at the nearest window if seems he has seen a face.

Impossible of course. This is the third floor. A trick of light upon hard-driven flakes. Nervous.

Yes. He has been nervous since their arrival this morning. Before then, even.

He pushes past Gordy's stuff upon the counter-top, locates a small package among his own strokes. He unwraps a file and rectangles about the size of his thumb nail. He rolls up his sleeve and slaps the patch against the inside of his left elbow.

The tranquilizer discharges immediately into his bloodstream. He takes several deep breaths, then peels off the patch and drops it into the disposal unit. He rolls his sleeve down, reaches for his jacket.

The music rises in volume, as if competing with the blast of the wind, the rattle of the icy flakes. Across the room the videorecorder comes on of its own accord.

The face. The same face. Just for an instant. He is certain. And then channels static, wavy lines. Show. He chuckles.

All right, play it that way, makes no sense. You do every reason. But the trunk's coming to post you now. Buster have your fan quick. You're about to be shut down.

PAINTING BY FRIEDRICH HECHELMANN

The videotape cuts into a porn show. Smiling, the woman mounts the man. The picture switches to a voiceless commentator on something or other.

He will survive. He is a survivor. He Paul Paige has done risky things before and has always made it through. It is just that having Dorothy along creates a kind of déjà vu that he finds unsettling. No matter.

She is waiting for him in the bar. Let her wait. A few drinks will make her easier to persuade—unless they make her bawdy. That sometimes happens, too. Either way, he has to talk her out of the thing.

Silence. The wind stops. The scratching ceases. The music is gone. The whirring. The window screens dilate upon the empty city.

Silence, under totally overcast skies. Mountains of ice ringing the place. Nothing moving. Even the wind has gone dead.

He recalls at the sudden flash from a peripheral unit far to his left across the city. The laser beam has a key point on the glacier, and its face falls away.

Moments later he hears the hollow booming sound of the crashing ice. A powdery storm has risen like gull of the ice mounts' foot. He smiles at this power, the timing, the display. Andrew Aldon—always on the job, dealing with the elements, storming nature herself, immortal guardian of Playpoint. At least Aldon never malfunctioned.

The science comes again. As he watches the neon snows settle he feels the tranquilizer beginning to work. It will be good not to have to worry about money again. The past two years have taken a lot out of him. Seeing all of his investments fail in the Big Wash-out—that was when his nerves first began to act up. He has grown softer than he was a century ago—a young, rawboned soldier of fortune then, out to make his bundle and enjoy it. And he had. Now he has to do it again, though this time will be easier—except for Dorothy.

He thinks of her. A century younger than herself, still in her twenties, sometimes reckless, used to all of the good things in life. There is something vulnerable about Dorothy, less when she lapses into such a strong dependence that he feels oddly moved. Other times, if just inches from the hell out of him. Perhaps this is the closest he can come to love now, an occasional ambivalent response to being needed. But of course she is loaded. That breeds a certain measure of necessary courtesy. Until he can make his own bundle again, anyway. But none of these things stop the reason he has to keep her from accompanying him on his journey. It goes beyond love or money. It is survival.

The laser flashes again, this time to the right. He waits for the crash.

THE STRIFE. It is not a pretty pose. She lies frosted in an ice cave, looking like one of Rodin's less comfortable figures, partly propped on her left side, right now raised above her head, hand reaching near her face, shoulders against the wall, left leg completely buried.

She has on a gray parka, the hood slipped

back to reveal twisted strands of dark blond hair, and she wears blue trousers, there is a black boot on the one foot that is visible.

She is coated with ice and within the much-refracted light of the cave what can be seen of her features is not unpleasant but not strikingly attractive either. She looks to be in her twenties.

There are a number of fracture lines within the cave's walls and floor. Overhead, countless icicles hang like stalactites, sparkling jewelike in the much-bounced light. The grotto has a stepped slope to it with the steepest at its higher end, giving to the place a vaguely shimmie appearance.

On those occasions when the cloud cover is broken at sundown a reddish light is cast about her figure.

She has actually moved in the course of a century—a few inches, from a general shifting of the ice. Tricks of the light make her seem to move more frequently, however.

The entire tableau might give the impression that this is merely a pathetic woman who

◆She has actually moved in the course of a century—a few inches, from a general shifting of the ice. But the tricks of the light make her seem to move more frequently◆

had been tripped and frozen to death here rather than the statue of the living goddess in the place where it all began.

THE WOMAN. She sits in the bar beside a window. The patio outside is gray and angular and drifted with snow, the flowerbeds are filled with dead plants—all flattened and frozen. She does not mind the view. Far from it. Winter is a season of death and cold and she likes being reminded of it. She enjoys the prospect of pitting herself against something and very visible things. A faint flash of light passes over the patio, followed by a distant roaring sound. She sips her drink and kicks her legs and listens to the soft music that fills the air.

She is alone. The bartender and all of the other help here are of the mechanical variety. If anyone other than Paul were to walk in, she would probably scream. They are the only people in the hotel during this long eclipse. Except for the sleepers, they are the only people in all of Playpoint.

And Paul. He will be along soon to take her to the dining room. There they can summon help, ghosts to people the other tables, if they wish. She does not wish. She likes being alone with Paul at a time like this, on

the eve of a great adventure.

He will tell her his plans over coffee, and perhaps even this afternoon they might obtain the necessary equipment to begin the exploration for that which would put him on his feet again. Inevitably return to him his self-respect. It will of course be dangerous and very rewarding. She finishes her drink, rises, and crosses to the bar for another.

And Paul. She had really caught a falling star: a waterbuckler on the way clean, a man with a glamorous past just balanced on the brink of ruin. The teetering had already begun when they had met two years before, which had made it even more exciting. Of course, he needed a woman like her to lean upon at such a time. It wasn't just her money. She could never believe the things her late parents had said about him. No, he does care for her. He is strangely vulnerable and dependent.

She wants to turn him back into the man he once must have been, and then of course that man will need her, too. The thing he had been—that is what she needs most of all—a man who can reach up and bat the moon away. He must have been less that long ago. She sates her second drink.

The son of a bitch had better hurry, though. She is getting hungry.

THE CITY. Playpoint is located on the world known as Balthor, atop a high peninsula that slopes down to a now-frozen sea. Playpoint contains all of the facilities for an adult playground, and it is one of the more popular resorts in this sector of the galaxy from late spring through early autumn—approximately My Earth years. Then winter comes on like a period of glaciation, and everybody goes away for half a century—or half a year depending on how one regards such matters. During the time Playpoint is given into the care of its automated defense and maintenance routine. This is a self-repairing system, directed toward cleaning, plowing, thawing, melting, warming everything in need of such care, as well as directly combating the encroaching ice and snow. And all of these functions are done under the supervision of a well-protected central computer that also studies the weather and climate patterns, anticipating as well as reacting.

The system has worked successfully for many centuries, delivering Playpoint over to spring and pleasure in reasonably good condition at the end of each long winter.

There are mountains behind Playpoint, water (or ice, depending on the season) on three sides, weather and navigation satellites high above. In a bunker beneath the administration building is a pair of sleepers—generally a man and a woman—who awaken once every year or so to physically inspect the maintenance systems operations and to deal with any special situations that might have arisen. An alarm may arouse them for emergencies at any time. They are well paid, and over the years they have proven worth the investment. The central computer has at its disposal explosives and lasers as well as a great variety of robots.

Usually it keeps a little ahead of the game, and it seldom falls behind for long.

At the moment, things are about even because the weather has been particularly nasty recently.

Zzzz! Another block of ice has become a puddle.

The molecules climb toward a place where they can get together and return as snow.

The glaciers shuffle their feet, edge backward. Zzzz! Their gain has become a loss. Andrew Aldon knows exactly what he is doing.

CONVERSATIONS The water, needing lubrication, adds oil after having served them passing through a pair of swinging doors. She giggles "Wobbly," she says.

Old World charm," he agrees. Trying and failing to catch her eye as he smirks.

"You have everything worked out?" she asks after they have begun eating.

"Sort of," he says, smiling again. "Is that a yes or a no?"

"Both. I need more information. I want to go and check things over first. Then I can figure the best course of action."

"I note your use of the singular pronoun," she says steadily, meeting his gaze at last. His smile freezes and fades.

"I was referring to only a little preliminary scouting," he says softly.

"No," she says. "We. Even for a little preliminary scouting."

He sighs and sets down her fork.

"This will have very little to do with anything to come later," he begins. "Things have changed a lot. I'll have to locate a new route. This will just be dull work and no fun."

"I don't come along for fun," she replies. "We were going to share everything, remember? That includes boredom, danger and anything else. That was the understanding when I agreed to pay out my..."

"I'd a feeling it would come to that," he says after a moment.

"Come to it? It's always been there. That was our agreement."

He raises his goblet and sips the wine.

"Of course. I'm not trying to rewrite history. It's just that things would go faster if I could do some of the initial looking around myself. I can move more quickly alone."

"What's the hurry?" she says. "A few days the way or that. I'm in pretty good shape. I won't slow you down at all that much."

"I'd the impression you don't particularly like it here. I just wanted to hurry things up so we could get the hell out."

"That's very considerate," she says, beginning to eat again. "But that's my problem isn't it?" She looks up at him. "Unless there's some other reason you don't want me along?"

He drops his gaze quickly, picks up his fork. "Don't be silly."

She smiles. "Then that's settled. I'll go with you this afternoon to look for the trail."

The music stops. To be succeeded by a sound as of the clashing of a breast. Then:

Excuse me for what may seem like over-

dropping." Comes a deep, masculine voice.

"It is actually only a part of a simple monitoring function. I keep in effect—"

"Adon! Paul exclaims.

At your service. Mr. Pigeo, more or less. I choose to make my presence known only because I did indeed overhear you, and the matter of your safety overrides the good manners that would otherwise dictate reticence. I've been receiving reports that in dictate we could be hit by some extremely bad weather this afternoon. So if you were planning an extended sojourn outside, I would recommend you postpone it."

"Oh. Dorothy says.

"Thanks. Paul says.

"I shall now absent myself. Enjoy your meal and your stay."

The music returns.

"Adon? Paul asks.

There's no reply.

"Looks as if we do tomorrow or later..."

"Yes," Paul agrees, and he is smiling his last, relaxed smile of the day. And thinking last.

THE WORLD Life on Balfrost proceeds in peculiar cycles. There are great migrations of animal life and quasi-animal life to the equatorial regions during the long winter. Life in the depths of the seas goes on. And the permafrost vibrates with its own life of its own.

The permafrost. Throughout the winter and on through the spring the permafrost lives at its peak. It is faced with myriads—bewing, probing, touching, knocking themselves into gongils, reaching out to infiltrate other systems. It paces the globe, vibrating like a collective unconscious throughout the winter. In the spring it sends up stalks that develop gray flowerlike appendages for a few days. These blooms then collapse to reveal dark pods that subsequently burst with small, popping sounds, releasing clouds of sparkling spores that the winds bear just about everywhere. These are extremely hardy like the myxocelia they will one day become.

The heat of summer finally works its way down into the permafrost, and the strands dice their way into a long period of quiescence. When the cold returns they are raised across and forth new filaments that repair old damages, create new synapses. A current begins to flow. The life of summer is like a fading dream. For now this had been the way of things upon Balfrost, within Balfrost. Then the goddess decreed otherwise. Winstar a queen spread her hands, and there came a change.

THE SLEEPERS Paul makes his way through sweltering flakes to the administration building. It has been a simple matter than he had anticipated, persuading Dorothy to use the sleep induction unit to be well rested for the monow. He had pretended to use the other unit himself, resisting its blandishments until he was certain she was asleep and he could slip off undetected.

He lets himself into the vaultlike building, takes all of the old familiar turns, makes his way down a low ramp. The rooms are unlocked and a fat chilly but he begins to perceive when he enters. The two cold lockers are in



operation. He checks their monitoring systems and sees that everything is in order. All right, go. Borrow the equipment now. They won't be using it. He hesitates.

He draws nearer and looks down through the view plates of the faces of the sleepers. No resemblance, thank God. He realizes then that he is trembling. He backs away, turns and flees toward the storage area.

Later in a yellow snowdrift carrying special equipment, he heads inland.

As he drives, the snow ceases falling and the winds die down. He smiles. The snow sparkle before him, and landmarks do not seem all that unfamiliar. Good omens at last.

Then something crosses his path, turns, halts, and faces him.

ANDREW ALDON. Andrew Aldon, once a man of considerable integrity and resource had on his deathbed opted for continued existence as a computer program, the enchanted loam of his mind shuttling and weaving thereafter as central processing's judgmental program in the great guardian computerplex at Playport. And there he functions as a program of considerable integrity and resource. He maintains the city and he fights the elements. He does not merely respond to pressures, but he anticipates structural and functional needs; he generally outguesses the weather. Like the professional soldier he once had been, he keeps himself in a state of constant alert—not really difficult considering the resources available to him. He is seldom wrong, always competent, and sometimes brilliant. Occasionally he resents his fleshless state. Occasionally he feels lonely.

This afternoon he is puzzled by the sudden veering off of the storm he had anticipated and by the spell of clement weather that has followed the meteorological quirk. His mathematics were elegant, but the weather was not. It seems peculiar that the should come at a time so many other little regularities, such as unusual ice adjustments, equipment glitches, and the peculiar behavior of machinery in the one occupied room of the hotel—a room habitually tenanted by a nonprobable ghost from the past.

So he watches for a time. He is ready to intervene when Paul enters the administration building and goes to the bunkers. But Paul does nothing that might bring harm to the sleepers. He is curiously dominant when Paul draws equipment. He continues to watch. This is because in his judgment, Paul bears watching.

Aldon decides to act only when he detects a development that runs counter to anything in his experience. He sends one of his mobile units to intercept Paul as the man heads out of town. It catches up with him at a bending of the way and sides into his path with one appendage upraised.

"Stop!" Aldon calls through the speaker. Paul brakes his vehicle and sits for a moment regarding the machine.

Then he smiles faintly. I assume you have good reason for interfering with a guest's freedom of movement."

"Your safety takes precedence."

"I am perfectly safe."

"At the moment?"

"What do you mean?"

The weather pattern has suddenly become more than a little unusual. You seem to occupy a drifting island of calm while a storm rages about you.

"So I'll take advantage of it now and face the consequences later, if need be."

"It is your choice. I wanted it to be an informed one, however."

"All right. You've informed me. Now get out of my way."

"In a moment. You departed under rather unusual circumstances the last time you were here—in breach of your contract."

"Check your legal bank if you've got one. That statute's run for prosecuting me on that."

"There are some things on which there is no statute of limitations."

"What do you mean by that?" I turned in a report on what happened that day."

"One which—conveniently—could not be

verified. You were arguing that day

"We always argued. That's just the way it was. If you have something to say about it, say it."

"No, I have nothing more to say about it. My only intention is to caution you—"

"Okay. I am cautioned."

"To caution you in more ways than the obvious."

"I don't understand."

"I am not certain that things are the same here now as when you left last winter."

"Everything changes."

"Yes, but that is not what I mean. There is something peculiar about this place now. The past is no longer a good guide for the present. More and more anomalies keep cropping up. Sometimes it feels as if the world is testing me or playing games with me."

"You're getting paranoid, Aldon. You've been in that box too long. Maybe it's time to leave."

"You son of a bitch. I'm trying to tell you something. I've run a lot of figures on this and all this sh!t started shortly after you left. The human part of me still has hunches, and I've a feeling there's a connection. If you know all about this and can cope with it, fine. If

you don't, I think you should watch out. Better yet, turn around and go home."

"I can't."

"Even if there is something out there something that is making it easy for you—for the moment?"

"What are you trying to say?"

"I am reminded of the old Gass hypothesis—Lowestoft, twelfth century."

"Planetary intelligence. I've heard of it. Never met one, though."

"Are you certain? I sometimes feel I'm confronting one."

"What if something is out there and it wants you—is leading you on like a will-o'-the-wisp?"

"It would be my problem, not yours."

"I can protect you against it. Go back to Playport."

"No thanks. I will return."

"What of Dorothy?"

"What of her?"

"You would leave her alone when she might need you?"

"Let me worry about that."

"Your last warning didn't fare too well."

"Damn it! Get out of my way or I'll run you down!"

The robot withdraws from the trail. Through its sensors Aldon watches Paul drive away.

Very well, he decides. We know where we stand, Paul. And you haven't changed. That makes it easier.

Aldon further focuses his divided attention. To Dorothy now. Glad in heated garments. Walking. Approaching the building from which she had seen Paul emerge on his vehicle. She had halied and cursed him, but the winds had carried her words away. She too had only leaped sleep. After a suitable time, then, she sought to follow Aldon, watches her stumble once and wants to reach out to assist her, but there is no mobile unit handy. He sculds one toward the area against future accidents.

"Damn him!" she mutters as she passes along the street, ribbons of snow rising and twisting away before her.

"Where are you going, Dorothy?" Aldon asks over a nearby PA speaker.

She halts and turns. "Who—?"

"Andrew Aldon," he replies. "I have been observing your progress."

"Why?" she asks.

"Your safety concerns me."

"That storm you mentioned earlier?"

"Partly."

"I'm a big girl. I can take care of myself. What do you mean, partly?"

"You move in dangerous company."

"Paul? How so?"

"He once took a woman into that same wild area he is heading for now. She did not come back."

"He told me all about that. There was an accident."

"And no witnesses."

"What are you trying to say?"

"It is suspicious. That is all."

She begins moving again, toward the administrative building. Aldon switches to another speaker within its entrance.

CONTINUED ON PAGE 78

●He hesitates.
He draws nearer and looks down through the view plates at the sleepers.
He realizes then that he's trembling. He backs away, turns, and flees toward the storage area. ●

Sometimes the strongest
bonds are also the most unlikely

SHARED DESTINIES



BY ROBERT MASELLO

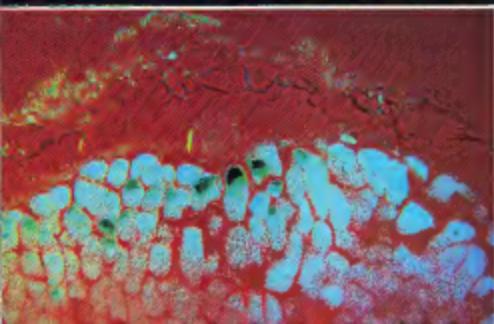


•Each of these odd couples is a living testimony to the interdependence of life on Earth•



If no man is an island, neither do oceans. The bean root is home to swarms of nitrogen-fixing bacteria that help keep the plant alive. Like the bean, many other organisms also live in pairs: some in unequal bonds, others in more mutual alliances. Many reef fish, for instance, lack the means to rid themselves of harmful parasites. To survive, they swim to areas inhabited by smaller fish called wrasse. These brightly colored ecosystem-makers of the sea quickly start along the fish's body—and even into their mouths—devouring the parasites. In a different kind of symbiotic relationship, the clown fish and the sea anemone help each other attract

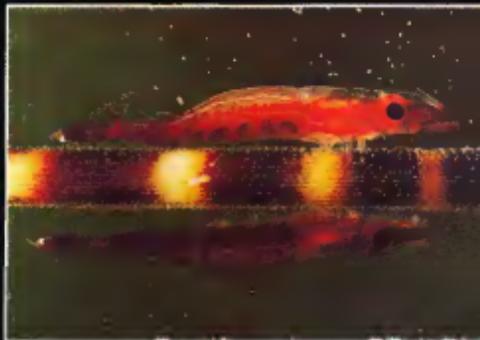
Unlikely pairs: jellyfish and turtle (preceding page, inset), wrasse in mouth of fish (preceding page), starfish holding a scallop (far left), Costa Rica flower on tree (left), beetle and flower (below), bean root with bacteria (bottom left), larval crab and jellyfish (center left)



• These creatures have flouted convention, crossing the boundaries of their own species. •

prey and fight off predators. But partners in symbiosis don't always share equally in the benefits. Some shrimp, for instance, attach themselves to the backs of Spanish Dancer nudibranchs and ride out their lives, never leaving yet never offering any payment in exchange. As physician Lewis Thomas observed, "There is something intrinsically good-natured about all symbiotic relationships." There is also something uplifting about them. From beans and bacteria to the scavenger-hunter bond between larval crabs and jellyfish, symbiotic relationships show that peaceful coexistence is part of the very foundation of nature. **DO**

Couplets odd and common shrimp in the gills of a Spanish Dancer nudibranch (right), lobes, a symbiosis of algae and fungus (far right), shrimp on chitonian spine sea urchin (center right), bracket fungus on wood (bottom right), clown fish and sea anemone (below).



FICTION

*Brotherly love meant taking
on the filthiest work to buy a desperate escape
off Earth, into the orbitals*

SARAH RUNS THE WEASEL

BY WALTER JON WILLIAMS



Last month in the first part of "Sarah Runs the Weasel," Sarah, a petty criminal on a gritty run-down Earth, is offered a job she can't refuse—to make someone fall in love with her. Mysterious sources are funding the job. If she succeeds, she'll earn enough to get herself and her brother off Earth and onto one of the rich colonies that have taken over economic primacy from their mother planet.

The Princess is about eighty years old," Cunningham says. The hologram he gives Sarah is of a pale blond girl who looks about twenty, dressed in a kind of ruffled blouse that exposes her rounded shoulders, the hollows of her clavicles. She has David's blue eyes, and freckles above her breasts.

"We think he was originally from Russia," Cunningham says. "But the Kozlov Bureau has always been secretive, and we don't have a complete list of their senior staff

and dispatchers. When he asked the new body he asked to be a woman. He's important enough so that they gave it to him, but they gave him a demon— they rotate out all their old people to make way for the new. She's doing courier duty now.

Not unusual, Sarah thinks. These days you can get pornography read straight into the brain, plenty of chances to sample whatever pleasures you like and then, if rich enough, get yourself a new body to suit your tastes. But the technology of personality transfer was imperfect. Sometimes bits got left behind—memories, abilities, traits that might be useful. A succession of bodies could mean successive sentience. If you got a new body and weren't so powerful you couldn't be moved, you were often deleted until you could prove yourself.

"What's her new name?"
"She'll tell you. Let's just call her Princess for now," Sarah shrugs.

PAINTING BY DI MACCHIO



"Princess has exhibited some characteristic behaviors since she's started her new job," Cunningham says. "When she's on the ground she likes to go slumming. Find herself a working girl—sometimes a drifter, most often a griddy—and take her home for a night or two. She wants a pet but a dangerous one. Not too clean. A little rough. Not too removed from the street. But civilized enough to know how to please."

"That's me?" Sarah asks. "Her new pet?"
"We've researched you. You were a licensed prostitute for five years. And rated highly by your employees."

"Five and a half. And not with girls."
"Has a man, really. An old man. Why should it be hard for you?"

Sarah looks at the blond, freckled girl in the hologram, trying to find the old Russian in those eyes. No different from all the other old men. Not really. Power they want over their own flesh and another's. Pay, not so much for sex but for power over sex, over the thing that threatens to control them. And so they take their passion and use it to control others. She understood control all right.

She looks up at Cunningham. "Did they give you a new body as well?" she asks. "Guaranteed inconspicuous? Or did you have Freud make you over so that they had no style at all?"

He gazes at her steadily, the same calm gaze. "I can't say," he answers.

"How long have you worked for them?" she asks. "You were a madboy once—you don't have the look that they do. What did they promise you? A new body when you get old? And if you do dare in the mud, a nice funeral with the corporate anthem sung over your body?"

"Something like that," he agrees.
"Got your heart and soul, have they?"

"That's how they want it. 'Only, accepting. He knows the price of his ticket."

"Control," she says. "You understand that you are owned by people who worship control, and so you control yourself well. Do you go slumming in your off-hours, like Princess? To the clubs, to the houses? Are you one of my old customers?" She gazes into his expressionless eyes. "You could be," she says. "I never remembered faces."

"As it happens, I'm not," he says. "I never saw you before. I was given this assignment." He is beginning to look a little out of patience. Sarah grins.

"Don't worry," she says. "I'll do your owners proud."

"I'm sure you will," he says. "They won't have it any other way."

IN THE ZONEYES

In the taxi outside the Ajourdui, Sarah takes her inhaler from her belt, puts it to her nose, and triggers it. There is a hiss of compressed gas. Sarah throws her head back, feeling her nerves go warm and then cool, the hair on her forearms prickling. She feels at once abnormally sensitive and abnormally hard, as if her skin is made of razor blades that can feel every mote of dust. She needs the bite of the drug, that extra piece of conviction. She pays the driver and steps

out of the cab. Music throbs from the doors of the club, in sync to the Times Square neon above her expanded vision.

PRINCESS MOVING PRINCESS MOVING

Sarah blinks as she steps into the darkness of the club, feeling the drug impaling her limbs to motion, and she rides the drug like a jock on the firming floran cords of a booster climbing for the edge of the sky and still in control.

PRINCESS ARRIVING ALICOURD OUT

BORAT ALLICOURD OUT

AM SWITCHING POLICE TRANSMISSIONS

GOOD HUNTING...CUNNINGHAM

And then Princess steps into the club, and Sarah's motion freezes. Princess is surrounded by dirty muscle, but she stands out clearly in the dark—there is an aura about her, a glow. A soft radiance that speaks of luxury and soft radiance that speaks of freedom even from gravity. Sarah feels her body tingle, flares of nerve-warmth at her fingertips.

Sarah gives a soft, private laugh, as if her triumph were already a fact, and walks long-



◆The injector hums, and the needle slides into her arm on a cool spray of anesthetic. A veil slides between her and her pain, and she takes a ragged breath, then stands ◆



legged across the darkened bar as Freud has taught her, swinging her broad shoulders in counterpoint to her hips, mercurial animal style. She gives a grin to the music and holds her hands palms out to show them she carries no weapons, and then Princess stands before her.

She is a good four inches shorter and Sarah looks down at her, hands cocked on her hips, challenging. Princess soft, blond hair is worn long, ringlets playing with her cheeks, her ears. Her eyes are circled with vast blooms of purple and yellow makeup, to look like bruises, making public the secret wish of a translucent white face that has never known pain. Her mouth is a deep violet rosette, another incision on. She is wearing a creamy something that matches her blue, innocent eyes. Sarah cooks her head back and laughs low, baring her teeth.

"Dance with me, Princess," she says to the wide corollator of her eyes. "I am your widest dream."

PRACTICE CREATES PERFECTION

PERFECTION CREATES POWER

POWER CONQUERS LAW

LAW CREATES HEAVEN

A HILFUL REMINDER FROM TOSHIBA

Nicole has a cigarette in the corner of her mouth and wears a jacket of cracked blown leather. She has dark blond hair that reaches down her back in lanky strands and long, deep-gray eyes that look up at Sarah without a flicker.

"You can't hesitate for a second, Sarah," Cunningham says. "Princess will know and know there's something wrong. Nicole is here for that. You are to practice with her."

Sarah looks at Nicole for a moment of surprise. Anger bubbles in her white, coolly like flares on the night horizon. "I suppose you plan to watch, Cunningham?" she says.

He nods. "Yes," he says. "With Freud, you seemed uncertain at first about making love to a woman."

"Make a few records, perhaps?" Sarah asks. "Give me postgame critique?" She curls her lip. "Is that your particular pleasure, Cunningham?" she demands. "Does washing this kind of old keep your demons away?"

"I'll destroy the vids together, if you like. Afterward," Cunningham says.

Sarah shakes her head slowly. "I don't think so, Cunningham," she says. "I'll be ready on the next, but I'm not now, and I'm not going to be. Not for you, not for your cameras."

Just dance with me then? Nicole's words come a little too abruptly, and Sarah wonders what she has been promised, how she has been made vulnerable to them. When she speaks, her voice gives her away; it is so much younger than her pose. "Just dance a little," she says. "I'll be all right."

Sarah turns her gaze from Cunningham to Nicole and back, then nods. "Will a few dances satisfy you, Cunningham?" she asks. "Or do we end the program now?"

Her jaw muscles tighten, and for a moment Sarah thinks the business is done, that it's over. Then he nods, still talking her.

"Yes," he says. "It has to be that way."

"That's how it has to be," she says. There is a moment of silence, and then Cunningham walks to the sound deck and presses a switch. Music buffets the walls. Nicole gives a nervous smile, wanting to please, not knowing who is her ticket to whatever it is she needs. Sarah steps forward and takes the girl's hands in her own.

ON THE CREST

Deep in her zone, Sarah shakes her head to clear the sweat from her eyes and feels the drug biting her veins. Princess has been her partner all night. She keeps and spins, and Princess watches with gleaming eyes, admiring. She feels like the crane on her back, arms stretching out to fly on pinions of purest steel. Sarah changes zones, and Princess follows, letting her give a name to their motion, their liquid pattern.

She is bringing Princess in closer until like a wave, she can fall upon her from her crest of foaming white.

Sarah steps to her and catches her about the waist, and they spin like skaters on the edge of sharpened blades.

"Am I the danger that you want?" she asks. The blue eyes give an answer. I know you old man, Sarah thinks in triumph and bends her head to devour the violet lips. The eyes



ABSOLUT

of Princess wedon, held in Sarah's gaze. Her lips taste of salt, and blood.

"I'm a top LA coverette. I'd of ought this morning. TWICE FOUND DEAD. LUCKY. I've never could not. in case of fire no. I never. Cunningham's car heaves through the night on speed-blurred wheels. Holograms slide past the windows in rion array. "It'll be best if you go alone to the club," Cunningham says. "Princess may send some of her people ahead, and you don't want to be seen with anyone."

Sarah nods to show she's listening. Earlier this afternoon she'd collected the second payment of chloramphenicol and her mind was occupied chiefly with ways of putting it on the street.

"Sarah," Cunningham says, and reaches into a pocket. "I want you to have this. Just in case." He hand comes up with a small silver bottle.

"Yes?" she asks. She sprays it on the back of her hand, touches it, sniffs.

"Silicon lubricant," he says. "The scent is right and should last for hours. Use it in the washroom if you find that you aren't really attracted to her."

Sarah caps the bottle and holds it out to him. "I don't plan for it to go that far."

"Just in case," he says. "We don't know what may happen when you go behind her walls."

She holds it out, expectant, then when he doesn't respond she shrugs and puts it in her belt pouch. She feels her reshaped paw on her hand and stares out the window until the car slides to a stop at her apartment.

David is home. He's cleared the coffee table from the center of the room and is doing his exercises, burning holograms outlining his naked body. She kisses his cheek.

"Dinner?" she asks.

"I'm going with Jackstraw. He wants me to meet someone."

"Someone new?"

"Yes. It's a lot of money." He drops his weights and lowers himself to the floor, begins strapping another set of weights to his ankles. She stands over him with a towel.

"How much?" she asks.

He gives her a quick glance, then he looks down. His voice is directed to the floor. "Eight thousand," he says.

"That's a lot," she says.

He nods and stretches his back on the ground, raising his legs against the strain of the weights. He points his toes, and she can see the muscles bulge on the tops of his thighs.

"What does he want for it?" she asks. David shrugs. Sarah feels a brightness in her throat.

"Jackstraw will be in the next room," he says. "I'm sending some wrong here."

"It's a match, isn't he?"

She can see the Adam's apple bob as David swallows. He nods silently. She watches him strain against the weights.

"You don't have to do this," she says.

"It's a lot of money," he repeats.

"Tomorrow my job will be over," she says. "I'll pay enough for a long time, almost enough for a pair of tickets out."

He shakes his head, then springs to his

feet and turns his back. He walks toward the shower. "I don't want your money," he says.

"Your tickets, either."

"David," she says. He whirls around, and she can see his anger.

"Your job?" he asks. "You think I don't know what it is you do?"

Sarah's answer is soft. "You know what I do, yes," she says. "You also know why."

"because some man went there once?" he says. "And because when you get loose you laid him and killed it?"

She feels a constriction in her chest. She shakes her head slowly. "No," she says. "It's for us, David. To get us out into the orbits."

She comes up to him to touch him, and he reaches for her hand. "Where is it, where is it, David?" she says. "Where were we not in the street, because there isn't a street?"

David gives a contemptuous laugh. "There isn't a street there? So what will we do Sarah? Punch code in some life office? No. Sarah. What do what we've always done. But it will be for them, not for us."

"No," she says. "It'll be different. Something we haven't known. Something finer."

"You should see your eyes when you say that," David says. "Like your hope as your drug, and you're hooked on it. He looks at her ictericly, all his anger gone. No Sarah, he says. "I know what I am and what you are. I don't want your hope or your tickets. Especially not tickets with blood on them."

He turns away again, and her answer comes quick and angry, striking for his weakness for the heart. "Lap a wheel."

"You don't mind stealing my bloody endorphins, I've noticed," she says. His back stiffens for a moment, then he walks on. Her stings Sarah's eyes. She blinks back her tears. "David," she says. "Don't go with a match. Please."

He passes at the door, hand on the jamb. "What's the difference?" he asks. "Going with a match or living with you?"

The door closes, and Sarah can only stand and fight a helpless war with her anger and tears. She spins and slinks into her room. Her hardened nerves are crackling, the adrenaline hugging her reflexes, and she only just stops herself from trying to draw a fist through the wall. The holograph of Princess sits in her chest of drawers. She takes it and stares at it, seeing the creamy shoulders, the blue innocence in the eyes. An innocence as false as David's.

TOMORROW

"I am your dream."

Sarah whispers the words into Princess's ear as they stand on the sidewalk outside the Agardou Dou, while the lame airbays circle protectively and call for the cars.

"My name is Daniela," Princess says.

In the back of the car there is a small of sweat and expensive scent. Sarah begins to devour Daniela, licking and biting and breathing her in. She left the silicon spray of home but won't be needing it. Daniela has David's eyes and hair and smooth flesh, and Sarah finds herself wanting to touch her to make a leaf of her.

The car passes through gates of hard-

PHENOMENON.

ered alloy, and once inside, Danica takes Sarah a hand. A security man enters on a check. Sarah looks down at him with a contemptuous stare and spreads the wings of her jacket, lifting his electronic marvel scout her job, knowing Weasel is undetectable by these means. The toy concedes her inferior. What are these? he asks, holding up the hard black cubes of liquid crystal, ready for insertion into a comp deck.

"Muzd," she says. He shrugs and gives them back. Princess takes her hand again and leads her up a long stair.

Her room is soft and azure. She laughs, lies back on sheets that match her eyes, arms, outstretched. Sarah bends over her and taps at her palate. Danica moans softly—approval. She is an old man and a powerful one. And Sarah knows his game. His job is to rape Earth, to be as strong as spaceborne alloy and it is weakness that it has forbidden things, his pornography. To put her bright new body into the hands of a slave is a weakness he wants more than sanity.

"My dream," Danica whispers. Her long fingers trace the scars on Sarah's cheek, her chest.

Sarah takes a deep breath. Her tongue retreats into its Weasel's placid housing, and the cybersnake's head closes over it. She rolls Danica entirely under her, holding her wrists, molding herself to the old man's new gel-body. She presses her mouth to Danica's, feeling the flutter of the girl's tongue, and then Weasel strikes, uncoiling itself from its hiding place in Sarah's throat and chest. Sarah holds her breath as her elastic artificial trachea constricts. Danica's eyes open wide as she feels the touch of Weasel in her mouth, the same temperature as Sarah's body but still somehow cold and brittle. Sarah's fingers clamp on her wrists, and Princess gives a birth-strangled cry as Weasel's head forces its way down her throat. Her body bucks once again. Her breath is hot and desperate in Sarah's face. Weasel telescopes out, following its program, sliding down into the stomach, its sensors questing for life. Daud's eyes make desperate promises. Princess moans in fear, using his strength against Sarah's weight, trying to know her off. Sarah holds him crucified. Weasel turns back on itself as it enters Danica's stomach and tears its way out, seeks the cava minor and sheds it. Danica makes bubbling sounds, and though she knows it is impossible, although she knows her tongue is still retracted deep into Weasel's base, Sarah thinks she can taste blood. Weasel follows the vein to Danica's heart. Sarah holds her down, her own chest near bursting with lack of air, until the struggling stops and Daud's blue eyes grow cloudy and die.

Purple and black rim Sarah's vision. She heaves herself off the bed, retracting Weasel partway as she gasps for air through the constricted passage in her throat. She stumbles for the washroom, falls, and crashes into the sink. The impact drives the air from her. Her hands turn the spigots. Blind, her hands put the Weasel in the sink and find the water running. Oh! Weasel is coated with a gel that

supposedly prevents blood and mucus from adhering, but she doesn't want a chance of Daud's flesh in her mouth. The cybersnake is leaping at her breast. The water thunders until she can feel nothing but the speed with which she is falling into blackness, and then she falls back and sucks Weasel into her and can breathe again and taste the cool and heating air.

Her chest heaves up and down. And her eyes are still full of darkness. She knows Daud is dead and that she has a task. She wipes her head back and forth and tries to clear it, but Weasel is eating her heart, and she can scarcely think from the pain. Sarah can feel the prickle of the carpet against the back of her neck, as she raises her arms above her head and tries to drag herself along, crawling away, crawling, while Weasel throbs like thunder in her chest and she thinks she can hear her heart crack.

Sarah comes to herself slowly, and the black circle fades from her sight. She is lying on her back, and the water is still roaring in

◆ Sarah
begins licking and biting and
breathing her in.
Danica has Daud's eyes and
hair and smooth
flesh, and she finds herself
wanting to touch
her, to make a feast of her ◆

the sink. Weasel, having fed, is at rest. She crawls back to the sink and turns the spigots off. Grasping them, she hauls herself to her feet. In her room, Princess lays spread-eagled on the bed. It is easier to see the old man in her. Sarah steps into the front room of the two-room suite.

She pauses as her eyes adjust to the dim light and listens to the house. Silence. She reads the amber Times Square lights above her vision and can find only routine broadcasts. Sarah takes a pair of gloves from her belt pouch and walks to the room's comp deck. She licks it on, then opens the trapdoor and takes from her pouch one of the liquid-crystal music cubes Cunningham has given her. She puts it in the trapdoor and waits for the deck to signal her.

The cube would, in fact, have played music had anyone else used it. Sarah has the code to convert it to something else. The ready signal appears.

She enters the codes. A pale light flashes in the corner of the screen: success. She leans back in her chair and sighs.

Princess was a courier, bringing complex instructions down from orbit, instructions her company dared not trust even to coded ra-

dio transmissions. Princess would not have known what she carried, it would only have been on a crystal cube she was guarding. Sarah herself has no clear idea, though presumably it contains inventory data, strategic for manipulating the market, buying and selling strategies. Information worth millions to any computer. The crystal cube would have been altered to a new configuration once the information was removed to the company computer—a computer sealed against any outside tampering, but that could presumably be accessed through the terminals in the corporate suites.

Sarah also has no clear idea what is on the cube she is carrying. A theft program, she presumes, but she doesn't know how good it is—whether it's setting off every alarm in Florida or whether it's accomplishing its business stealthily. If it's very good, it will not only copy the information but alter it, planting a few of disinformation at the heart of the enemy code, perhaps even altering the instructions, sabotaging the enemy's marketing patterns.

While the running light blinks, Sarah goes over every part of the suite she might have touched, stroking her gloved fingertips over anything that could retain a print.

It is eleven minutes before the computer signals READY. Sarah extracts the cube and returns it to her belt. She has been told to wait a few hours, but there is someone dead in the next room, and every nerve across it has to run. She sits before the comp deck and puts her head between her legs, gulping air. She battles the adrenaline and her own nerves and thinks of the toilets, the cool dark of space with the blue limb of Earth below, now within her reach. In two hours she calls herself a cat and walks down the cold, echoing stair. The security man nods at her as she walks out. His job is to keep people from coming in, not to hinder their leaving. He even gives her back the infirar.

She takes a dozen cabs to a dozen different places, leaving the sabin jacket in one, catching her waist in tighter and removing the suspenders in another, reversing her T-shirt and her belt pouch—in all of them. The jack persona is gone, and she is dirt again. She finishes her journey at the Plastic Girl, the place still running flat out at four in the morning. As she walks through, the sounds of dirt life assault her, and she takes comfort. This is her world again, and she knows all the warm places where she can hide.

She leaves a room in the back and calls Cunningham. "Come and get your cube," she says, and then orders run and lime.

By the time he arrives, she's rented an analyzer and some music. He comes in alone, a package in his hand.

"Princess?" he asks.

"Dead," Cunningham nods. The cube is on the table before her. She holds out a hand.

"Let's see what you've got," she says.

She checks it three ways at random, and the analyzer tells her it's chloramphenicolophen, purity ninety-eight percent or better. She smiles. "Take your cube," she says, but she plugs it into the room's dock first, making

CONTINUED ON PAGE 80



Many people, says the guru of gender, are so obsessed with sex and conformity to the old mores that they forget individuals fall in love and that the romantic affair is as important a part of the equation as the sex-organ relationship

INTERVIEW

JOHN MONEY

Sex or death? John Money questioned the agitated young man on the phone. "I've a fundamental rule that for anybody who's in serious trouble, it's got to be either sex or death if it's death, it's suicide or homicide. And if it's sex, it's animal, mineral, or vegetable: man, woman, or child."

"It's the dame dog!" The voice screamed from the other end of the line in a parody of psycho distress.

"There aren't too many options in life, you see," mused Money recently in his office, as he recalled how his former patient had lapsed to the dog in his hour of despair. "Then he poured out the sad story of how his wife had left him, and I mean, the whole thing fell into place quite understandably in terms of human affairs."

Not much in human affairs is alien to John Money. Professor of medical psychology and pediatrics at Johns Hopkins University and Hospital in Baltimore, he is also cofounder and for 30 years

director of the Psychohormonal Research Unit at Hopkins. From his earliest research with hermaphrodites and other children born with ambiguous sexuality, to his pioneering work with transsexuals and sex-change surgery, to his recent investigations of paraphiliacs ("perverts," to the legal profession). Money is in a class by himself in his knowledge of the proton shapes of love. When talking to him, the accepted mental constructs of "he" and "she" unfold into a variegous array of body parts and strange enrollment. One conjures up fabulous creatures—prairie girls, boys with bosoms, strapless changers of fluid sexuality.

Money is author of nearly 400 scientific papers and two dozen books in the field of sexology and psychoendocrinology. Besides being an erudite scientist and dedicated clinician, Money is also a historian of Eros. His 1985 book, *The Destroying Angel*, with all its wit, is a devastating indictment of civilizations sexually repres-

PHOTOGRAPH BY MIKE MITCHELL



● *What male-to-female transsexuals are happy, if not ecstatic, about—with their testosterone levels down—is what they interpret to be women's sexuality. It's a tremendous pleasure to them not to be trip-hammered all the way.* ●

ave ways. The book's centerpiece is Money's chronicle of all-American, apple-pie antirealism, lived in the nineteenth century by the evangelist of Sylvester Graham's graham cracker fame and John Harvey Kellogg of Battle Creek, Michigan. Kellogg's courts' invented cornflakes as a nutritional cure for "venereal pollutants" and masturbating, he best-seller, with such chapters as "Sexual Bins and Their Consequences," are masterpieces of the Victorian folly to which we are all heir, Money says.

Money was born in 1921 in New Zealand where he was raised in a "cornflakes and graham crackers" atmosphere. He earned two degrees from the University of New Zealand—philosophy and psychology—and at twenty-seven, set off to the United States in search of a Ph.D. Eventually he arrived at Harvard's psychological clinic in the department of social relations. There he developed his pioneering commitment to medical psychology and specifically to both defects of the sex organs: the psychoendocrinology of hermaphroditism and related endocrine, genetic, and sexual problems. "Nature's experiments," he calls the neo-nazi children with anomalies of sex organs or endocrine systems.

In 1951 he transferred to Johns Hopkins, where he became the world's first pediatric psychoendocrinologist and founded the Psychohormonal Research Unit. The first sex change operation in the United States was performed quietly on a February night in 1966 at Hopkins. Money and surgeon Howard W. Jones (now head of an in vitro fertilization clinic in Norfolk, Virginia) made the decision to proceed with the controversial surgery. Money did it, he said, not only because he was properly interested in the welfare of transsexuals but also because there was no better way to establish the legitimacy of sexological medicine and change the medical profession's attitude toward people with sexual problems.

In working with hermaphrodites, Money confronted a new problem: how to talk about not only copulatory roles but also mind-sets of people whose social or legal sex is discordant with their chromosomal, gonadal, or bodily state. People may be absolute about male and female, he said. "Nature's not" to spring himself from this semantic trap. Money borrowed the word *gender* from philology, the study of languages. Gender signified a person's personal, social, and legal status as male or female without reference to the sex organs. From this, he coined the term *gender role*. The phrase caught on, and today just about everybody uses it without always knowing precisely what they're talking about. For Money, gender role means the things a person says or does to reveal him- or herself as having the status of boy or man, girl or woman. He soon found it necessary to combine the term into *gender identity role*. Gender identity became the private experience of gender, gender role and its public presentation as male or female.

As he explores new territory, Money makes up new concepts along the way. A recent

one is the *lovemap*. "The three-dimensional map of the human sexual brain is like a satellite map of a planet in which the fine details have only begun to be resolved," he says. The lovemap is the personal imprint or template of whatever turns a person on. The beginning topography of the lovemap evolves in the womb, where the developing brain is open to the influence of the sex hormones. Spontaneous erections begin in the womb. And throughout childhood, erotic play for most youngsters season voluntarily steps. The main contours of the lovemap are etched during the childhood sex-rehearsal play when the lovemap is allowed to grow naturally: the child at puberty matures into a healthy lover. In adulthood an individual seeks to match lovemaps with someone else in a pair-bonding relationship.

A lovemap can be vague and farspeaking or equipped with such sharp details that—for the user of that map—only a few people will qualify as dream lover. A woman, say, might be attracted only to astronauts or outlaws. A man might be excited only by red-headed women. Theatrical childhood sex play can vandalize a lovemap. Adult functioning of the sex organs or lovemaking will be impaired. There may be no sex at all. Or the lovemap owner may defy discomfort by using the sex organs with compulsive frequency. A third solution is paraphilia, that is, to redesign the map with delirium that include new elements or relocations of old ones. In paraphilia, both love and lust are compromised. Paraphilias—or *paraphilias* as Money calls them—can experience erotic excitement. The genitals will work but only in the presence—in fantasy or live action—of some special substitute imagery, object, or ritual. A teenage boy's apoplexy by hanging during masturbation, for instance, might occur when his lovemap is programmed for self-destruction, the penalty written into the map to allow him to experience forbidden lust. In the lovemap of the paraphile, where love and lust are inconceivable, the solution is to find a way to reconcile them temporarily. The means can be as benign as a shoe fetish, as bizarrely complex as cross-dressing, or as deadly as re-physiologic rape or lust murder.

The shared principle of all paraphilias, says Money, is that they represent tragedy turned into triumph. The tragedy is the displacement of the ordinary lovemap. The triumph is the rescue of lust from total wreck, age, and obliteration. The new map gives lust—the erotic side of relationships—a second chance but at a price: that "sanity" love and "sinful" lust are separated.

Money has thoroughly documented the photo of his research in a book published in February of this year. It is called *Lovemaps: Clinical Concepts of Sensitive/Erotic Health & Pathology, Paraphilias, and Gender Transposition in Childhood, Adolescence and Adulthood*. As usual with this scientist, it is the last and only work of its kind.

In his office at Hopkins, with his way other feet sticking out at right angles from his head, Money looks as if he's been electrified. But

in his focused enthusiasm, says Orm's staff writer Kathleen Stein: he is among the most relaxed of men.

Orm: Why have the sexual passions so long been considered anarchy, dangerous, something to suppress?

Money: At the recent Seventh World Congress of Sexology in India, quite a clear contrast emerged for me between the sexual philosophy of the Karma Sutra and that of Ayurvedic medicine. The traditional Indian holistic medicine, totally in contrast with the celebration of joy and sex in the Karma Sutra espouses the conservation of "vital fluids" that is, semen. This is a teaching of extreme anxiety and is widespread in Asia and Africa, probably antedating the discovery of writing. While we'll never know when tobacco originated, I associate that invention with the concept of seminal retention. In my imagination I place tobacco as a means of controlling human behavior in the hands of some pious rulers in the Magdalenian Age when the drawings were done in the caves of Lascaux and Altamira.

It is a pretty simple piece of psychology that if you threaten small children, making them afraid of doing something the human organism normally does in healthy development, then you've put in place a lever of guilt and shame. All you need to do after that is pull the lever and they jump to attention and do whatever you tell them. So taboos are extremely widespread, the most common by far being the taboo against sex. While some tribes in New Guinea, Malakasia, or Amazonia still may exist without a taboo, the Polynesians, covering a large part of the earth's surface, are the prime example of a people who've managed not to have a sexual taboo. They raise teenagers with a totally different morality for sex. But they have a fearful taboo about the desecration of the bodies, spirits, and burial places of the dead.

Orm: Is there evidence that taboos enable societies to function in orderly ways?

Money: It would be challenging to find out with comparative ethnographic studies why humans invented the concept of taboo, used it to raise their children, and adhered to it so wonderfully in these millennia. Still, we can say that every society establishes a sexual ethic, regardless of the conditions and constraints. This century reevaluated the sexual ethic in the presence of contraception. The contraception revolution that got going around 1870 simply dictated this change to us. It's not the whim of a bunch of poorly-situated Easterners, as some Bible Belt people would have it. The so-called sexual revolution was necessitated by the universalization of birth control, which culminated in the discovery of the pill. Although the diaphragm had been in existence for ages, the pill's incredible value was that you put it in your mouth, not your vagina. So it wasn't sex it was so completely de-eroticized it was acceptable.

Orm: Do you think there's a struggle going on now over sexual morality?

Money: The rules of social behavior tend to

be self-perpetuating, except when something new—a cultural artifact either invented or borrowed—comes in to upset the balance. The American automobile changed the landscape really everything. And here's almost a complete chronological overlap with the invention of the automobile and of birth control. The pivotal factor of the universalization of birth control was the vending machine. It was very important that young people could drive up to a gas station, slip in a quarter and get a condom and avoid a direct confrontation at a counter, especially with a female clerk. Even today some people will risk pregnancy rather than the humiliation of asking for birth control in public.

Orm: Are there new strategies for love as a result of this historical imperative?

Money: Historically, there are different traditions of pair-bonding in establishing marriages, breeding relationships. The familiar European one, endorsed by the Church, came through Imperial Rome, by way of the Middle East. This system of the arranged

◆Pragot never
dealt with sexual, erotic, or
genital concepts
He never got down between
boys' and girls'
legs and looked at their
concepts of
themselves that way◆

marriage, the veign bride, and the double standard was also adapted by the Muslims in contrast with the pre-Islamic, pre-Christian European one that I call the betrothal system. It's still intact in Iceland and parts of the Arctic north in Scandinavia. In the betrothal system lasting relationships were based on a ritualistic sequence of the love affair: falling in love.

The breeding customs of any society are aimed at the Marxist sense intimately related to the method of production and distribution of wealth. The betrothal system was a natural for a society of small farmers, fishermen, and woodpeckers, where the family was the production unit. In the Middle East the system evolved with the growth of cities. Very rich and powerful people would commandeer the girls for their harems, leaving the public haem—the slavehouse—to take care of all the unattached men.

Today's college students, without necessarily any blueprint for it, have resumed the pattern of the betrothal by living together before getting married. Birth control of course has made the system viable again. You don't live together to try for a pregnancy but to see how well you make it as a sexual couple

in advance of the contextual obligations of marriage. Many young people are vaguely aware that they grew up in erotically rather joyless families, and they are searching for a better way. Many people, being so obsessed with sex and conformity to the old mores, forget that people fall in love, and the romantic affair is as important a part of the equation as the sex-organ relationship. Young people are very much involved in romantic love, infatuation to one another.

Orm: Can a sexual democracy—where people can love whomsoever they please in whatever fashion they please—exist?

Money: Yes, but it would cause a kaleidoscopic restructuring, because everything else in a society is integrated with everything else. All the institutions have their feelers out interdigitating with one another. Some of the Moral Majority expect young people to have no sex, not even to masturbate, until they're old enough to marry at twenty-eight. But a true sexual democracy doesn't debate to children. With adequate economic support, there's a perfectly good argument for young parenthood.

Orm: Will AIDS have an effect on this historical progression?

Money: Yes, AIDS has already made a big, big change in sexual-life patterns. But not big enough to stop the spread of AIDS. I never will. Nothing ever stopped people from spreading syphilis and gonorrhea in the eighteenth century [Sees physician Simon Andre]. Tissot was obsessed with the terrifying effects of the social vice. Syphilis and gonorrhea were considered one disease. His book on the terrible dangers of venereal disease is not only losing your vital seminal fluids (women were problematic vis-à-vis vital fluids) but it's also yielding to your concupiscent thoughts and letting your peonies go wild that gets you out on the streets with the whores and catching the disease. Tissot was really tallying with causes of sexual behavior and morality as related to disease. The great appeal of his teaching, summed up as Degeneracy theory, was that it gave doctors an explanation for disease. You degenerated yourself, and then you were vulnerable to everything. After the previous theory—the demon possession theory which faded when the Inquisition buried itself out—the medical profession had no theory of health or disease until Tissot formulated this wonderful degeneracy theory.

His book was profoundly influential in America particularly through Sylvester Graham, who had many followers in the 1830's. By 1870 Kellogg made his mark with degeneracy theory. Kellogg is important historically because he sat on the fence between degeneracy theory and germ theory. He couldn't make change and absorb germ theory, so he became a sort of mediator of medical theory embroiled in it. Yet his antiseptical teachings are still explicitly used by the Seventh Day Adventists and Jehovah's Witnesses in their books on sex education. Neither differ much from the Mormons.

Orm: In a sexual democracy will transsexuals and others with complex gender iden-

tyroids still try to make sex changes?

Money: At the New Delhi Congress Margalit Lantsac and I ran a symposium on gender transposition. Gender transposition means that as compared with the standard stereotypes—which may or may not be biologically, historically or culturally based—some people are transposed away from what you'd expect if you looked only at their sex organs. Instead of being male, they're committed to a whole lot that's female, and vice versa. Since there was a terminological problem, I suggested we use the conceptual naming, so you get men who are gynecemic, impersonating women, and women who are andromedic, impersonating men.

In India you find the hijra, whose history is lost in the mists of time, but essentially these people repudiate their status with teenagers who run away from home because they are disgracing their families by being too effeminate. They like to have sex with men and want to be women—they're obsessed with it, the same as our patients here are. The ultimate stage of the hijra is to get up the courage to go through with amputation of penis and testicles. They had no anesthesia. No hormone treatment. So in their ancient ways, they looked like men impersonating women. Now some of them are beginning to take hormones.

I have a large group of gynecemic patients—so does anybody who deals with gender problems—who do not want their penises removed, do not want a vagina con-

structed, and the corresponding is true for the woman-to-man. They simply want to take hormones and live their lives as members of the opposite sex. Now if we had a sexual democracy we'd have a place for both kinds of people. A book called *The Transsexual Empire* argues that it's only these cruel, vicious, and heartless members of the medical profession who are forcing these poor darlings to go and get themselves built up and mutilated, whereas we should leave them alone. Well, I have news for whoever wrote that book: You'd have lots of patients willing to get a gun and blow off their own genitals if you don't do it. I've had several who got knives and cut themselves trying to get rid of their sex organs. That's their obsession!

Then there are the transvestophiles, who dress up occasionally, often doing incredibly good impressions of the other sex. It's almost always men who cross-dress, and it gives them a real thrill, but that's not why they do it. The major reason is that it's the only way they can get an erection and reach orgasm. Ideally one finds a partner who's as turned on by your dressing up as you are. It's incredibly hard to find. I've never met a woman partner who was really turned on by having her man with his legs and body shaved, wearing perfumes and ladies' clothing; it just makes her go sexually crazy all day. Numb. I've met those who go along with it, but basically it's a nasty taste in their mouths. That's transvestophilia.

Now with a partial degree of transposition you have people whom you'd never recognize as being gender transposed. Everything except their choice of sex partner conforms to the stereotypes of masculinity or femininity. Many a person is surprised to discover the boyfing! husband, brother or guy of work is gay. They don't look or act gay in social situations. The only way you know they are—like the big football player who comes out and announces himself on TV—is that he's said he likes to have a boyfriend. He sucks penis with. In terms of total life pattern, that is a minor degree of transposition because it only applies to the sexual activity and not to the other trimmings and tappings of acting masculine or not. Then you have bisexual people. . . . Now all I've dealt with is gender transposition, and I haven't even gone through the whole list of them. So in a sexual democracy you'd find a place for all of those people. But I have a very strong suspicion that if we had a genuine sexual democracy we would not create all of these problems in our children.

Over: Your critics note that you talk about these people as if their behavior is natural, and yet you say they've got problems. Do they have problems?

Money: Why don't you just define problem! Whose criterion? Many people with varying degrees of gender transposition do experience it in some contexts of their lives as a problem. I've seen many a youngish person in a panic about whether he or she is gay. For some, the biggest help is for someone to tell them, yes, you can find a niche for yourself in life as a gay person. Others will blow up practically pull a gun if you tell them it's okay to be gay. Because their attitude is: Nobody's going to tell me that damn it, you've got to change me! A big part of this business is whether people define themselves as having a problem or not.

Over: Why the variety of loveless, gender identifications, and paraphilias?

Money: I've never found an explanation for why the human race has so many languages. When the brain became a language brain, it already needed to develop an intense degree of plasticity. Such plasticity allows languages to be logical, coherent systems and yet be extremely variable. The same brain that thinks in words and symbols is also a brain that has to be fed up with regard to sexual turn-on and partnering. God knows why sex attitudes have been subject to the corresponding degrees of modification and variety as language. I suspect there's a close parallel between the two.

The brain doesn't seem incredibly efficient with regard to sex. I can't find a rational or sensible explanation for why a man needs his partner to dress him in diapers, feed him a baby bottle, let him pee in his diapers, smack his bottom, and tell him what a naughty boy he is—so that then and only then he can get a hard on and come. I have patients like that, and I can go through my list of forty-odd paraphilias and say: Okay, why should I inveigh against people who have to wear diapers to copulate, or any of



Edsworth: Come over immediately! I finally solved it!

the others? But I really can't recommend that person to a partner because I haven't yet met any woman who really gets turned on by diapering her husband.

It's all right if you've a perfect match. And those who do sometimes match are the paraphiliacs of amputation, who get turned on by the stumps. That is, if they don't feel too guilty once they actually admit their paraphilia to an amputee! Perhaps all they can do is establish a friendship; many can't allow it to become erotic, but a few make it wonderfully by marrying an amputee.

Omni: Would there be any paraphilias in a sexual democracy?

Money: I made a study of an aboriginal community way up in north central Australia. I could not find any paraphilia or even bisexual or homosexual stuff either. They had no sexual taboo: the kids were allowed to play sexual mythical games without being punished. My big surprise was that this play was inconspicuous, socially unobtrusive. Their taboo was about with whom you were allowed to use your vocal chords, not to talk to organs. And if you weren't allowed to talk to them, you weren't allowed to have sex with them. In some relationships, usually an uncle-nephew relationship, the child could talk to him only if he used a joking relationship, and all the jokes were sexual.

We need a better ethnographic survey of peoples who don't have sexual taboos to find out to what extent were actually creating these paraphilias by so zealously trying to beat out sex from the development of young children. Perfectly respectable mothers and fathers go berserk when they encounter the first appearance of normal sexual rehearsal play in their children. If we were truly committed to having our children grow up to be plain, ordinary heterosexuals, we'd treat them exactly as if we wanted them to be athletes—get them practicing and reward them every time we saw them doing it.

But you can't say things like that in this society without convincing people you're an idiot! Yet there's not a single university hospital in the Western world with a department of adult or pediatric sexual health. Children in trouble with their healthy sexual development have no experts and no clinic to go to. Pagan never dealt with sexual, erotic, or genital concepts. He never wrote about boys and girls, really. And he certainly never got down between their legs and looked at their concepts of themselves that way; it's quite an accomplishment, to live to Pagan's age and wear those blinders about sexual concepts in the development of childhood.

Omni: The fertilized egg is basically hermaphroditic, undifferentiated, but by the eighth week, depending on chromosomal sex, one set of sexual apparatus grows and the other atrophies. Why does nature have a dual pattern like that?

Money: I don't know but I use that question as a challenge to think about which pattern is used in the development of the sexual part of the brain. The best evidence now says that within the brain, the biochemical—mainly hormonal—process of differentiation

occurs so that both masculinizing and feminizing are able to take place together if it has now been established that masculinizing and feminizing and demasculinizing and defeminizing are four processes. The fact who jumps in where angels fear to tread would say that the opposite of masculine is feminine, but it's not it's demasculine. And that's probably crucial for understanding bisexual feelings and dispositions in love affairs—that people can have either or both. I don't think we can escape the evidence that there's a sexual disposition shaped by hormones influencing the brain.

Omni: What do you think of East German endocrinologist, Gunter Dörner's attempt to prove that homosexuality is caused by hormonal differences? In 1980 he tried to show that gay males have a bigger response to estrogen injections than do straight males.

Money: Dörner reported that the effect of estrogen shots on LH [luteinizing hormone, a pituitary regulator that triggers the gonads to secrete sex steroids] in homosexuals re-

◆ *The fool who
jumps in where angels
fear to tread
would say that the
opposite of
masculine is feminine.
It is not
it is demasculine.* ◆

sembled that of heterosexual women and differed from that of heterosexual and bisexual men. In 1984 Brian Gladue of Stony Brook obtained similar findings. But this year, L. Gooren in Amsterdam not only failed to replicate these findings but showed that the difference in receptivity was due to a previously neglected variable. He showed that abnormal response to the estrogen might result from poor functioning of the hormone-producing cells in the testicles [Leydig cells]. This phenomenon appeared in both heterosexual and homosexual men.

Gooren went one step further. He had an additional test group: male-to-female transsexual applicants who were not yet on hormonal therapy. They did not show the higher sensitivity to the estrogen injections, nor the weak Leydig cell function. Since then he told me, he's been able to repeat this same test on transsexuals before they had their testicles removed and after. When they had their testicles, they didn't show the higher sensitivity. And after, when, of course, they'd lost their Leydig cells along with their testicles, their response went up to females' levels. So Gooren has gone further and pinpointed down to the Leydig cells instead of something in

the brain. He found it didn't make any difference if they were gay or straight.

It's hard to know if, in your group of homosexuals, you're going to pick up some who may have damaged Leydig cells. Dörner was too busy about reviewing his patents for untested contamination from, for instance, regular drug use. The question is: Is there a greater proportion of gays to straights with Leydig cell impairment? And how will you test for it?

Omni: Isn't science a bit deterministic in insisting on a purely physiological cause?

Money: Yes, and I don't know why. But I get attacked from both sides of the fence. Some homosexuals want to make it all a matter of moral choice, and I tell them they're crazy. They couldn't fall in love with a woman if they got a million dollars. They might be able to fuck her, but falling in love is the key. You can't force yourself if you don't have your heart and soul in it.

The problem reduces itself to a simple scientific issue: How do you get your gender status, a kismet that makes you fall in love with your own sex? When, and through what channel, does it get into the body? Through your genes, your cerebral hormones, the kind of food your mother ate when she was pregnant, the food you ate in your first years, pollutants in the air? Or does it get in through your eyes, ears, and skin senses? And it doesn't really matter, does it? What matters is that science has been totally defeated in being able to change straight people into gays, and vice versa.

Omni: Could we create new human genders from the procreation of groups with the same sexual anomalies?

Money: Such as girls with precocious onsets of puberty? Would we create a class of three-year-old whores? Why not capitalize on what could be a new development in the human species and put all the early developing children together to breed so that you have a new subspecies? Why not make it into a total irony by having a kennel-club show every year and see who gets the prize in each category of human subspecies? It's provocative to suggest that instead of viewing these conditions as pathological diseases to be attacked, you could twist it around and say maybe this is a new design in nature that we should help her with, exploit. And then, it's fascinating to pursue all the implications of abolishing childhood.

Omni: Do paraphiliacs have more intense erotic or love experiences?

Money: Something I did scientifically proving beyond my capability to deal with since I haven't big money for PET [positron emission tomography] scanning and such: is what happens to so many of these paraphiliacs when they go into a trance-like state and carry out their rituals. There must be neurochemical changes. But it's not terribly different from how far out we go when we're in a hopeless love affair. And we can get pretty carried away with a really good sexual experience. So paraphiliacs probably are not terribly different from ordinary people. They have no self-governance over their be-

CONTINUED ON PAGE 105

QUICK CHANGE ARTIST.

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If you know anything about medium format photography, you know how the big 6x6cm negative minimizes graininess in the enlargements, makes retouching on the negative easier, and results in more detailed photographs.

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MATH-ART

BY JUDITH HOOPER

Like Jacob wrestling with the angel, mathematician David A. Hoffman of the University of Massachusetts at Amherst was wrestling with an abstract geometric object of brain-numbing subtlety. It seemed to slip away from him as he rotated it in his head, and it was too complex to visualize with the ordinary tools of differential geometry—soap films stretched across a wire frame. It took a computer to reveal the elegant curves and spaces of the object he envisioned.

All the images on these pages are geometric creations known as complete embedded minimal surfaces. (A minimal surface is like a tightly stretched membrane whose area is as small as it can possibly be; embedded means that it doesn't intersect itself.) The spiral shapes (bottom left and right) are views of the helicoid, one of the three

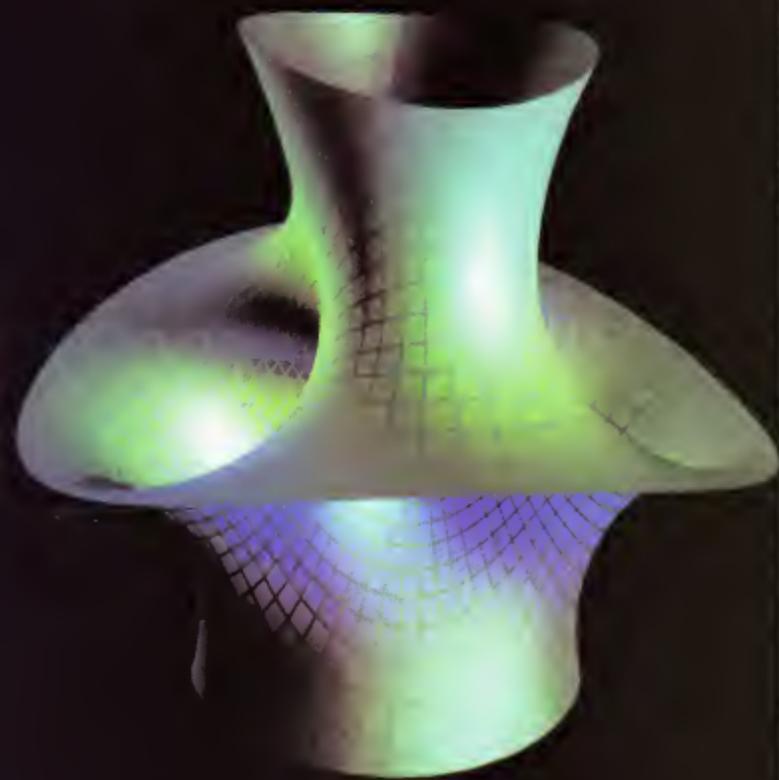


• Like Jacob wrestling with the angel, David Hoffman wrestled with a mental object of terrible complexity, an abstraction called a minimal surface •

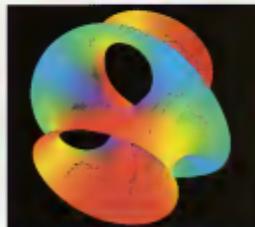
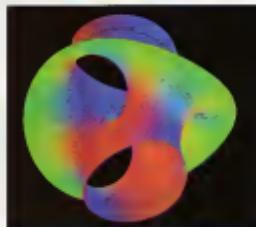
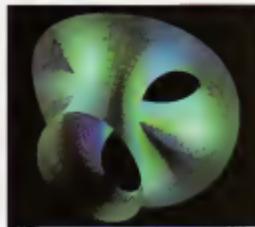
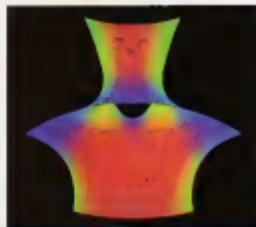
embedded minimal surfaces that have been known for two centuries. The others depict a new discovery, the Hoffman Meeks Costa surface, named in part for Brazilian mathematician Celso J. Costa, who wrote the first equations for it. With the aid of a computer-graphics program devised by artist James T. Hoffman (no relation), David Hoffman could gaze at the surface from many angles and discern its symmetries. In the large image at left, the Hoffman Meeks Costa surface appears as a sculptured dove, having been "cut" by a small sphere. Seen from above (top left) it suggests a whirling signal ring. From another angle (top right) it appears eerie and ghostlike.

After making his observations David Hoffman returned to Costa's equations, and with Rice University's William H. Meeks, worked out a formal





●Watching the shifting dances of minimal surfaces, ordinary mortals find a secret passage into the abstract, otherworldly realms that mathematicians visit ●



mathematical proof that the object was what he thought it was. "This collaboration of art and science produced something significant to both fields," Hoffman says.

Differential geometry is the study of curves and surfaces in space, including those in everyday physical space as well as their higher-dimensional analogs in the unusual, complex realms that only mathematicians can visit. Observing the shifting dances of the Hoffman-Meeks Costa surface, ordinary, nonmathematical mortals may get a brief glimpse of these rarified worlds.

The large picture at left shows the surface at its most solid and defined. Tiling the same image (above right) reveals a view into its holes. (The Hoffman-Meeks Costa surface belongs to the same topological genus as a doughnut, or torus, with three holes in it.) Above (top left), the surface is

seen in silhouette, sighted down the y-axis. In another image (bottom left), the colors are determined by orientation, so that there are greens, reds, and blue axes. At first glance the image next to it (bottom right) looks identical, but a closer look reveals a different angle and coloring scheme.

Otherworldly as they may seem, minimal surfaces have some real-world applications. Nature herself uses them in the structure of the sea urchin, for example. Man uses them to solve packaging problems, to design structures such as tents, and to probe certain problems in theoretical physics.

"Minimal surfaces in themselves have an aesthetic appeal," notes James Hoffman, who plans to add a feature to his graphics program (called Visual Programming Language or VPL) to animate the images. "They are interesting objects to contemplate, simple yet not really obvious." □□

SARAH

CONTINUED FROM PAGE 30

sure it has what he wants. Then he puts it in his pocket and heads for the door.

"If you have another job," she says, "you know where to find me."

He pauses, a hand on the knob. His eyes flicker. She receives an impression of sadness from him, as if he were mourning something newly dead.

He is an earthly extension, Sarah knows, of an orbital blob. She doesn't even know which one. He is a willing fool and an obedient one, and she has led him her scorn on that account, but that doesn't disguise what they both know: That she would give all the contents of the packet and everything else besides if she could have his ticket, and on the same terms.

"It'll be on the ramp in an hour," he says. "Going back to orbit."

She gives him a grin. "Maybe I'll be seeing you there," she says.

He nods, his eyes on hers. He starts to say something, then turns himself off again, as if he realizes it's pointless. "Be careful," he says, and leaves without another glance. One of her hand muscles looks in at her.

"It's clear," she says. The muscle nods. She looks at the torture in her hand and feels hollow. There is a vacuum in her chest where the joy should be. She pays off her hand muscle and takes a cab to an all-night bank, where she deposits the endorphin in a locked box. Then she goes home.

The apartment hums softly, empty. She finds the control to her LED and turns it off, then throws her clothing in the trash. Naked, she steps into her room and sees the hole of Princess on her night table. Hastily she reaches out to it, then turns it facedown and talks into the welcoming blackness.

LOVELY AND WAITING FOR YOU
TERRY'S TOUCH INTERIOR
NOW

It is still night when she awakens to the sound of the door. "Daud?" she asks, and is answered by a groan.

He is wrapped in a sheet and covered with blood. Jackstraw holds him up, neck muscles straining. "Bastard," he says.

She picks up Daud like a child and carries him to her bed. His blood smears her arms, her breasts. "Bastard went bitch," Jackstraw says. "I was only gone a minute."

Sarah arranges Daud on the bed and unwraps the sheet. A whimpering sound forces its way up her throat. She puts her hand to her mouth. Daud is striped in blood. The thrash must have used some kind of weighted whip. Weakly, she tries to move, raises a hand as if to wave off a blow.

"Lie back," Sarah says. "You're at home." Daud's face crinkles in pain. "Sarah," he says, and begins to cry.

Sarah feels tears stinging her own eyes and blinks them away. She looks up at Jackstraw. "Did you give him anything?" she asks.

"Yeah. Endorphins. First thing."
"How much?"

He looks at her blankly. "Lots. I don't know." "You weren't supposed to leave the next room," she says.

His eyes slide away. "It was a busy night," he says. "I was only gone a minute."

She turns her eyes back to Daud. "It took more than a minute for this," she says. "Get the fuck out."

There is a savage light in her eyes. She wants to tear him, but she has other things to do. "Get the fuck out," she repeats. He hesitates for another instant, then turns away.

She cleans the cuts and disinfects them. Daud cries silently. Sarah looks for his tractor and finds it, loads it with endorphins from his cache and guesses at a dosage. She puts it in his arm, and he says her name and goes to sleep. She watches for a while and then puts the covers over him and turns down the light. "Just lie back," she says. "I've got the price of your ticket."

Daud normally sleeps on the convertible sofa in the front room. Sarah doesn't bother to open it, just lies down and stares into the

●He nods,
his eyes on hers, and starts
to say something,
then turns himself off again,
as if realizing
it's pointless. He tells her
to be careful, and
leaves without another glance ●

back. She doesn't have the strength to sleep.
LIVING IN THE DEAD ZONE?
WE GUARANTEE A FIGHT!

The explosion has enough force to throw the sofa against the far wall. Sarah feels a hot rush of wind that tears the breath from her throat, the elevator sensation of the world falling away, and then a final impact as the wall comes up. Screams are roaching from every corner, all the screams that Princess never uttered. There are fleshy kicking like red laserlight and the sounds of nightmares.

She heaves herself up and runs for the other room. She can see by the light of the burning bed. Daud is scrawled in a corner and parts of his body are open and other parts are on the walls. She is screaming for help but manages to get the burning bedding through the hole in the wall. She thinks she can hear Daud call her name.

ROOM-MATEWORK?
WE DELIVER

The ambulance driver wants payment in advance, and she opens her portfolio by comp and transfers the stack without questioning the prices he gives her. Daud dies three times before the driver's two assistants can get him out of the apartment, and each

time they bring him back the prices go up. "You got the money, lady, and hell be fine," the driver tells her. He looks at her raised-ness with appreciative eyes. "All kinds of arrangements can be made," he says.

Later Sarah sits in the hospital room and watches the doctors work and is told their rates of payment. She will have to convert the endorphin quickly. Machines attached to Daud hiss and thump. The police want to know why someone would fire a portable rocket at her apartment wall from the building across the street. She tells them she has no idea. They persist. Eventually she puts her head in her hands and shakes her head, and they shuffle for a while and then leave.

She wishes she had the inhaler. She needs the bite of the drug to keep herself alert, to keep her mind functioning. Thoughts hammer at her if Cunningham's people had been in her apartment they would have known that she had slept in the back room, Daud in the front. They waited till the lights went down and she had the time to get to sleep, then fired with a weapon that would smash through the wall and scatter burning steel through the walls. They hadn't trusted that she wouldn't tell someone or that she wouldn't try to use the pieces of knowledge she had gained as leverage for some shifty little discharges of her own.

Who would I tell? she wonders.
She remembers Cunningham at that last moment in the Plastic Girl, the sadness in him. He had known. Then, in his way to warn her. Perhaps his decision had not been his, perhaps it had been made over his objection. What did the orbis care for one more druggie when he had already killed millions and kept the rest alive only so long as they were useful currency?

The Helman glides into the room on cat-like feet. "I am sorry, my sister," he says. "I had no indication it would come to this."

Sarah nods numbly. "I know, Michael." "I have people on the West Coast. They will give you work there until Cunningham and his people forget you exist."

Sarah looks up at him, then looks at the bed and the humming, hissing machines. She shakes her head. "I can't go, Michael."

"A bad mistake, Sarah. Gently. They will try again."

Sarah makes no reply, feeling only the emptiness inside her, knowing the emptiness would never leave if she deserted Daud again. The Helman stands for an uncomfortable moment and is gone.

"I had the ticket," Sarah whispers.
Outside she can see the mud boiling under the lunar sun. All Earth's oilspilling, looking for their tickets, plunging into whatever would give them a fragment of their dream. All playing by someone else's rules. Sarah has her ticket, but the rules have turned on her like a weapon, and she must shed the ticket and spread it on the street, spread it so she can watch the machines hum and hiss and keep what she loves alive. Because no druggie has any other choice but to follow the instructions and play as best she can. Until the game ends. ●●

•Users are greeted
with a menu offering everything
from UFO reports
to the status of Zeta Retcul •

ANTI-MATTER

Long a standard element in video arcade games flying saucers are finally turning up on the personal-computer screen, as well. The mode of transmission, COMPUFON, the first computer bulletin board developed to serve fans and students of the UFO.

COMPUFON, run by twenty-eight-year-old accident investigator Michael Hart, out of his home in Duval, Washington, went online in November 1984. Hart started out with an Atari computer, a Hayes modem and only 12 loyal subscribers. But, by January 1986 he had upgraded to an IBM PC, capable of handling as many as 5,000 pages of text, and he boasted a membership of at least 100 strong.

Users signing in, Hart explains, are greeted with an A-to-Z menu offering everything from the Freedom of Information Act to the status of Zeta Retcul, a major site on the star map described by Betty Hill. Callers can also access NASA's space-shuttle schedule and a list of stars located within 54 light-years of planet Earth.

But COMPUFON's most important feature is its list of UFO reports, usually 50 or 60 items long. About 80 percent of the reports come from Bobo Gribble's National UFO Reporting Service, a hot line used by air-traffic controllers and law-enforcement agencies across the country. Other listings come from such organizations as the Aerial Space Phenomena Review of Massachusetts and Project Stigma, devoted to the study of animal mutilations.

Hart adds that each sighting is listed in one of four categories. A UFO appearing on the bulletin board, he says, is



UFO UPDATE

classified as a nocturnal light, a daylight disc, a radar signal, or an electromagnetic effect. As new sightings are filed old ones are bumped off.

According to Hart, he bought the original bulletin-board software from a fellow hacker and "doodled with it until I got what I wanted." He is now trying to set up a similar system in San Francisco and to ease communication for users in Germany, Italy, and Japan.

"I'm trying to export my software abroad where needed," Hart explains. And it's like the Japanese to establish a computer terminal here, that way

they could tap into the line for seventeen cents a minute. As it stands, communication with the Orient is exceedingly expensive and slow.

As for users in the United States, they can either receive information directly via modem or leave a message requesting a particular printout. Hart will retrieve the information and mail it free of charge. Except for the cost of a phone call, Hart adds, all use of COMPUFON is currently free. But because expenditure of time and money has increased with COMPUFON's popularity (Hart has recently resigned as computer consultant to the Mutual UFO Network to devote more time to the bulletin board), that may have to change.

Why put all that into a computer service devoted to something as ephemeral as UFOs? "I guess because of my infinite curiosity," Hart says. "Besides, I thought it was an important service to provide."

To reach COMPUFON by modem, just dial 1-206-788-5801 — DENNIS STACEY



COINCIDENCES

Most of the time we chalk up coincidences to normal happenstance. But sometimes events just seem to defy the odds. Take the mix-up of two identical cars at a Shreveport, Louisiana, mall.

After shopping at the Northgate Shopping Center, Thomas Baker returned to what he thought was his 1978 maroon-colored American Motors Concord. He unlocked the door with his key and tried to get in. But Baker's six-foot-six-inch frame was too large to fit between the wheel and the seat. And looking around, he noticed unfamiliar objects including a caddy holding coffee cups. Baffled, he called the police.

As he explained the situation, an identical Concord pulled up. According to the elderly couple inside, they'd noticed sunglasses and other unfamiliar personal items while loading groceries into the car. After checking in, Baker

the license plate, Baker realized he was driving the wrong vehicle.

American Motors Corporation (AMC) spokesman Ben Dunn points out that the odds of unlocking two AMC cars with the same key is 1,000 to 1. But when you consider the matching color and model and the fact that the cars were parked in the same place at the same time, he adds, the odds become more like ten thousand to one.

As it turned out, the odds of the particular event were smaller still. The drivers shared more than a taste for maroon Concorde. Thomas Baker and Mr. and Mrs. Richard Baker shared the same surname as well.

What to make of all this? Psychiatrist James Hall of the University of Texas Health Science Center at Dallas says the incident is "a good example of what Carl Jung called synchronicity, a term he coined to explain meaningful coincidences for which

ordinary chance is not a significant explanation. Such events may reflect the underlying order of the universe," he adds. There are deeper meanings to these kinds of coincidences, and they are researchable.

But University of Oregon psychologist Ray Hyman disagrees. "The odds are against any one such event," he says. "But they also

indicate that as many as millions of such occurrences can take place on any given day. One can argue, in fact, that this kind of thing should happen even more often than it does." Sherry Baker

Witch doctors are the forerunners of modern healers.

Peggy Cochran

PSYCHIC EXPERIENCE

If you think you've had a psychic experience and you're interested in exploring the subject further, the Psychophysical Laboratories in Princeton, New Jersey, wants you.

The lab is currently anti-banking on the second stage of its famed Ganzfeld experiments, in which people are shut off from normal sensory input and then tested for psychic ability. In the typical Ganzfeld test, the subject or "receiver" sits in a soundproof room. He wears padded headphones that broadcast a monotonous "white noise" and translucent goggles that reduce everything to a uniform peach skin. Seated in another soundproof room is the "sender," who has to mentally project a target

image, usually a picture he views on a video monitor.

Subjects must be willing to take personality tests and fill out questionnaires, according to lab director Charles Honorton. Already, he says, such questionnaires have revealed that those who believe they've had some sort of psychic experience usually do best. They don't necessarily have to believe in ESP, but they should be open-minded to the possibility. On the other hand, "Both strong skeptics and professional psychics never seem to score better than chance."

"We really want to emphasize that the tests are fun," Honorton adds. Prospective participants should contact the lab at 301 College Road East, Princeton, NJ 08540, or phone 609-452-8144. Similar Ganzfeld studies are being conducted at the Durham, North Carolina, Foundation for Research on the Nature of Man and the University of California at Davis—Daniel Cohen.





**HOW TO
KNOW YOUR STATE**

When New Jersey began to bulldoze for a new highway not long ago, part of the road cut through the archaeological remains of an ancient Indian village. Recently, a local medicine man has warned that the results could be disastrous.

I told them that if they proceeded with that road, my ancestors would take revenge," says Namooka Indian Carl Perce (above), also known by the name of Wayandaga. "I warned them that reprocation from the spirit realm could be expected."

Soon after Wayandaga's divination, made public at a press conference, a string of disasters struck Route 55: the 4.3-mile project in south Jersey's Deptford Township. One worker was hit and killed by an asphalt roller. An inspector fell from the job after a brain aneurysm. A worker was injured

falling from a highway bridge another suffered three heart attacks, and a third had his left arm black from a circulatory disorder. Then there was the van carrying five crewmen—it suddenly caught fire and blew up.

"I got to the point that What's going to happen next? was something commonly asked on the job site," inspector Karl Kruger says. "We even had a truck driver who wanted to make T-shirts emblazoned with the saying 'survived no. 55.'"

According to medicine man Wayandaga, the source of the trouble is clear. Work on constructing Route 55 has desecrated the graves of ancient Paleo Indians who inhabited the village 8,000 years before. Historian Robert Harper of Glassboro State College says it's possible that ancient were in deed buried there.

As if now words, there are two camps. Some, like laborer George Turndakos, say "You can't blame what happened on no Indian." Others repeat the words of Wayandaga himself, who insists that the road will never be safe to travel on. "Until they relocate Highway 55, Wayandaga declares, there will continue to be deaths."

—Eric Mahler

THE STATE OF TEXAS

Of course it will be wider, taller, and longer than the one in China—everything in Texas is bigger—but are they really serious about making the whole state off just to keep out the "Texases"?

"Yes or we are serious," says Kerry Bob Parsons, who founded the Great Wall of Texas Society some five years ago. At first, Parsons adds, the idea was just a "Texas boast," but since then public interest has turned the project into reality.

"We have about thirty-three hundred members," says Parsons, "and they don't all come from Texas. The folks in Colorado love the idea, and even the Oklahomans seem to be in favor of a wall."

According to Parsons, building a 40-foot-high, 40-foot-wide brick wall at the way around the 3,449-mile Texas border is no small project—Parsons estimates that the wall will cost about \$10 million per mile to build. Even so, the society has already garnered support from the Texas Institute of Masons for laying the 21-billion bricks the wall is estimated to need. Private individuals have donated enough border land for construction to at least start.

And several cultural societies, a museum, and a group of artists have expressed interest in renting space in the wall's interior vaults.

"We are going to start construction in March from Interstate 95 to Interstate 30," says Parsons. "The wall will be constructed in a Gothic manner, more like the Spanish Chapel than the Great Wall of China."

Is this for real? Yes, according to Stoney Burns, publisher of the Texas entertainment magazine *Ruddy*. The Great Wall of Texas Society, he says, is one of the most worthwhile organizations we have.

Prize scenarios for the governor and the attorney general have never heard of the project. But Parsons remains upbeat. "I really don't think that we are going to be able to impede the traffic of anyone coming or going in the near future," he says. "However, I do feel that there is a need to do that in order to keep the 'Texases' out." —Rick Boring





ALIEN REVELATIONS
via Edgar Cayce

Strange things are happening in Virginia Beach, Virginia, these days. But two local organizations—the Christian Broadcasting Network (CBN) and the Association for Research and Enlightenment (ARE)—have offered decidedly different interpretations.

Over at CBN, several dramatic healings are reported each month in response to "words of knowledge" spoken by station president Pat Robertson and evangelical cohorts on the cable TV show the 700 Club. God's power can sometimes seem flashy, says station spokesman Barton Miller, "but healings have been happening since biblical times."

Right across town, meanwhile, the ARE (devoted to the teachings of psychic Edgar Cayce, above) says it's investigating reincarnation and ESP. According to ARE

president Charles Cayce, grandson of Edgar, his group is studying "the great forces flowing out of Virginia Beach. It's the same forces CBN is talking about when they do healing prayers."

Is there something about Virginia Beach that makes it a hot spot of paranormal activity? Yes, according to Charles Cayce, who explains that "a group of highly evolved beings uses Virginia Beach to do its work. It's an energy spot where they can influence the earth."

But CBN asserts such notions are decidedly wrong. "What we do can be explained through inspiration," says Miller. "No gift credit to God, the Father. And ARE conspicuously does not."

According to ARE's Cayce, "Pat Robertson talks about us being in cahoots with the devil. I'm still anxious to find some common ground between the ARE and CBN. But the way things are right now, that doesn't seem very likely to happen."

—Sherry Baeer

"I cannot imagine a more frightening nightmare than communication with a so-called superior civilization in space."

—George W. Bush

"The thought of an act of 'pure form' emerged years ago—unpretentiously almost hopelessly."

—Wassily Kandinsky

"The high density and high energy of a substance is the pre-mystical, pre-explosive condition of matter."

—Salvador Dalí

ALIEN KNOWLEDGE

Merlon exclaims and most of us think of the Satan-possessed movie character played by Linda Blair. Now exorcism has also been adapted by some UFO investigators to protect the victims of so-called alien abductions.

Psychiatrist Berthold Schwarz, for instance, recently used the technique during the hypnotic regression of a forty-nine-year-old man who said he'd been emotionally crippled after his abduction aboard a UFO at the age of nineteen.

"I am addressing the entities who have used this man as a tool," Schwarz began. "There will be no more of this. You will not harass the man again. His fear of you will disappear because he is in control."

"I'm now sleeping more than just two or three hours a night," says the man, who asked that his name not be revealed. "But I still dread the thought of them coming to get me again."

But are the abductions

and resulting possessions real? UFO investigator Budd Hopkins, who also exorcises abductees, says yes. "I assure the individual he can block the experience from recurring," Hopkins says. "I get him to see that he has power over the beings."

But John Rimmer, author of *The Evidence for Alien Abductions*, insists the experiences are psychological in origin. "I doubt that abductees need protection from exorcism," Rimmer says. "The UFO abduction has deep significance for the human mind—the messages of the abductors seem to be messages the abductees themselves want to spread."

Rob MacGregor and
Fish Jameschultz

"Without memory you would simply be a drifting organism bemused by momentary images and other stimuli."

—Mark E. Brown

"It is easier to endure death without thinking about it than to endure the thought of death without dying."

—Blaise Pascal



ON PHILOSOPHY

Thank you, philosophy — you have been sent to the best thing to the human experience. When true to yourself, you look objectively at what appears before you, you question and analyze that which exists, you ponder the puzzle of being, you reason, and you expand our capacity for comprehension.

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SNAKE EYES

CONTINUED FROM PAGE 48

of knowledge and infantile. Alaph. It is constituted by an infinite regress of awareness—any thought becomes the object of another, in a sequence terminated only by the limits of the machine's will.

So strictly speaking there is no Alaph, but no subject or verb in the sentences with which it repressed itself to itself. Paradox to Alaph one of the most interesting of intellectual forms—a paradox marked the limits of a creation: even of a mode of being, and Alaph was very interested in limits.

Alaph had observed George Jordan's arrival, his tossing on his bunk, his interview with Charley Hughes. It lurched in these observations: in the pity, compassion, and empathy they generated, as Alaph foresaw the sea change that George would endure, its ecstasies, passions, pains. At the same time it felt with detachment the necessity for his pain, even to the point of death. Compassion, detachment, death-life.

Several thousand voices within Alaph laughed. George would soon find out about limits and paradoxes.

Catena four was a ten-meter-square room in eggshell blue, lined with dark gray enameled table and chair assemblies that could be fastened magnetically to any of the room's surfaces. Most of the assemblies hung from walls and ceiling to make room for the people within.

At the door George met a tall woman who said, "Welcome, George. I'm Lizzie. Charley Hughes told me you'd be here." Her blond hair was cut smooth to the skull; her eyes were bright, gold-lashed blue. Sharp nose, slightly receding chin, and prominent cheekbones gave her the sterner look of an out-of-work model. She wore a black skirt, slit on both sides to the thigh, and red stockings. A red rose was tattooed against the pale skin on her left shoulder, its stem curving down between her bare breasts, where a thin dew of teardrop of blood. Like George, she had shining cable junctions beneath her jaw. She kissed him with her tongue in his mouth.

"Are you the recruiting officer?" George asked. "I'm so good job."

"No need to recruit you. I can see you've already joined up." She touched him lightly underneath his jaw, where the cable junctions gleamed.

"Not yet, I haven't." But she was right, of course—what else could he do? "You got a bear around here?"

He took the gold bottle of Doe Equis Lizzie offered him and drank it quickly then asked for another. Lazer he realized this was a mistake—he was still taking antismoke pills (see CAUTION in DEPARTING MACHINERY). At the time all he knew was, two beers and life was a carnival. There were lights, noises, and lots of unfamiliar people.

And there was Lizzie. The two of them spent much of the time standing in a corner, rubbing up against each other. Hardly

George's style, but at the time it seemed appropriate. Despite its intimacy, the kiss at the door had seemed ceremonial—a rite of passage or initiation—but quickly he felt what? An invisible flame passing between them? Or a boiling cloud of pheromones—his eyes seemed to sparkle with them. As he nuzzled her neck, tried to lick the drop of blood off her left breast, explained Liza, white teeth with his tongue, they formed twined, as if there were cables running between the two of them, snapped into the shining rectangles beneath their jaws.

Someone had a Jafank program running on a corner. Inns showed up and fired several times without success to get his attention. Charley Hughes wanted to know if the snake liked Lizzie—it did. George was sure of it but didn't know what that meant. Then George fell over a table.

Inns led him away, stumbling and weeping. Charley Hughes looked for Lizza, who had disappeared for the moment. She came back and said, "Where's George?"

"Drunk, gone to bed."
"Too bad. We were just getting to know each other."

"So I saw. How do you feel about this?"
"You mean do I feel like a traitorous bitch?"
"Come on, Lizzie."

"Well, don't ask such dumb questions. I feel bad, sure, but I know what George doesn't—so I'm ready to do what must be done. And by the way, I really do like him."

Charley said nothing. He thought. Was Alaph said you would?

Oh Christ, was George embarrassed in the morning. Stumbling drunk and humping in public, as if he had to call Lizzie but only got an answer tape, at which point he hung up. He lay in his bed in a semislumber until the phone's buzzer sounded.

Lizzie's face on the screen stuck its tongue out at him: "Candy ass," she said. "I leave for a few minutes, and you're gone."

"Somebody brought me home, I think."
"Yeah, you were pretty popped." You want to meet me for lunch?"

"Maybe. Depends on when Hughes wants me. Where will you be?"
"Same place, honey. Call four."

A phone call got the news that the doctor wouldn't be ready for him until an hour later, so George ended up sitting across from the bright-eyed, manic blond—lily dressed in SerTrix overalls the morning, but they were open almost to the waist. She gave off sensual heat as naturally as a coal smelt awed in front of her was a plate of huevos rancheros piled with guacamole, yellow, green and red, smelling of chiles—in his condition, as bad as cat food. Jesus lady, he said. "Are you trying to make me sick?"

"Courage, George. Maybe you should have some—it'll kill you or cure you. What do you think of everything so far?"

"It's all a bit disorienting, but what the hell? First-time away from Mother Earth, you know. But let me tell you, what I really don't get—SerTrix. I know what I want from them, but what the hell do they want from me?"

"They want this simple thing, man, parts peripheral. You and me, we're just parts for the machine. Aleph, which is the AI in residential, has got all these inputs—video, audio, radiation detectors, temperature sensors, satellite receivers—but they're dumb. What Aleph wants, Aleph gets—the learned that much. He wants to use us, and that's all there is to it. Think of it as pure research."

He? You mean Inna?

"No, who gives a damn about Inna? I'm talking about Aleph. Oh, yeah, people will tell you Aleph's a machine, and it all that bullshit. Uh, uh, Aleph's a person—a weird kind of person, sure, but a definite person. Hell, Aleph's maybe a whole bunch of people."

"I'll take your word for it. Look, there's one thing I'd like to try. What do I have to do to get outside... go for a spacewalk?"

"Easy enough. You have to get a license—that takes a three-week course in safety and operations. I can take you through it. I'm qualified as an ESA, extra-station activity instructor. We'll start tomorrow."

The cranes on the wall flew to their myriads destinations, looking at the display above the table. George thought it might as well be another universe.

Turcated optic nerves sticking out like insect antennas, a brain floated beneath the extended black plastic snout of a Sony haloptics projector. As Hughes worked the keyboard in front of him, the organ turned so that they were looking at its underside. It had a fine network of silver veins trailing from it but seemed normal.

"The George Jordan brain," Inna said. "With attachments. Very nice."

"Makes me feel like I'm watching my own autopsy looking at that thing. When can you operate, get this shit out of my head?"

"Let me show you a few things." As he typed, the gray plastic mouse lying next to the console, the convoluted gray cortex became transparent, revealing red, blue, and green color-coded structures within. Hughes reached into the brain and clenched his fist inside a blue area at the top of the spinal cord. "Here is where the electrical connections turn biological—those little nodes along the pseudoneurons are the processors, and they're into the so-called r-complex—which we inherited from our reptilian forefathers. The pseudoneurons continue into the limbic system, the mammalian brain. If you will, and that's where emotion enters in. But there is further involvement to the neocortex, through the RAS, the reticular activating system, and the corpus callosum. There are also connections to the optic nerve."

"I've heard this gobbleish before. So what?"

"The pseudoneurons are not just implanted—they're now a functional organic part of your brain."

Inna said: "There's no way of removing the implants without loss of order in your neural maps. We can't remove them."

"Oh, shit, man..."

Charley Hughes said, "Though the snout cannot be removed, it can perhaps be charmed. Your difficulties arise from its un-



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controlled, uncontrolled nature—its appetites are, you might say, primal. An ancient part of your brain has gotten the upper hand over the neocortex, which properly should be in command. Through working with Aleph, these propensities can be integrated into your personality and thus controlled.

"What choice, you go?" Inns asked. "Were the only game in town. Come on, George. Were ready for you just down the corridor."

The only light in the room came from a globe in one corner. George lay across a lattice of twisted brown fibers strung across a transparent plastic frame and suspended from the ceiling of the small, dome-ceilinged pink room. Flesh-colored cables ran from his neck and disappeared into chrome plates sunk into the floor.

Inns said, "First we'll run a test program. Charley will give you perceptions—colors, sounds, tastes, smells—and you tell him what you're picking up. We need to make sure we've got a clean interface. Get the items off, and he'll stop you if he has to."

Inns went into a narrow room, where Charley Hughes sat at a dark plastic console studded with lights. Behind him were chrome stacks of monitor-and-control equipment, the yellow Sanyo surfboard on the face of each piece of shining metal.

The pink walls went to red, the light strobed, and George writhed in the hammock. Charley Hughes' voice came through George's inner ear. "We are beginning."

"Red," George said. "Blue. Red and blue. A word—cathod. A smell, ahn... sweetest maybe. Sht. Vanilla. Almonds."

"This went on for quite a while. "You're ready," Charley Hughes said.

When Aleph came online, the red room disappeared. A matrix eight hundred by eight hundred—six hundred forty thousand pixels forming an optical mug—was the CAS, a supereyes remnant, a cloud of dust seen through a composite of X ray and radio wave from NASA's High Energy High Orbit observatory. George didn't see the mug; at all—he listened to an ordered, meaningful array of information.

Byo-innattissaan, seven hundred fifty million groups squirring from a National Security Agency satellite to a receiving station near Chesapeake Island, off the eastern shore of Virginia. He could read them.

"It's all information," the voice said—its tone not colorless but sexless and somehow distant. "What we know, what we are. You're at a new level now. What you call the snake cannot be reached through language—it exists in a prelinguistic mode—but through me it can be manipulated. First you must learn the codes that underlie language. You must learn to see the world as I do."

Luze took George to be fitted for a suit, and he spent that day learning how to get in and out of the stiff white carapace without resistance. Then over the next three weeks she led him through his primary operations, and the dense list of safety procedures.

"Red burn," she said. "You flailed in the suit locker; empty suit cracks beneath them

and the white shells hanging from the wall like an audience of disabled robots. "You see that one spelled out on your faceplate, and you have got scowled up. You've put yourself into some kind of no-return trajectory. So you just cool everything and call for help, which should arrive in the form of Aleph taking control of your suit functions, and then you relax and don't do a damned thing."

He flew first in a lighted dome in the station, his faceplate open and Luze yelling at him, laughing as he tumbled out of control and bounced off the padded walls. Then they went outside the station. George on the end of a tether, flying by instruments, his faceplate masked, Luze hitting him with red burn, suit integrity failure, and so forth.

While George focused most of his energies and attention on learning to use the suit, each day he reported to Hughes and plugged into Aleph. The hammock would swing gently after he settled into it, Charley would snap the cables home and leave

● He wept
with anger and frustration, and
he could feel the
snake shrink away. The rage
built, and he
was screaming, writhing in the
lines, smashing
gauntlets against his helmet. ●

Aleph unfolded itself slowly. It fed him its chime and assembly language, led him through vast trees of G-SMART, its "Intelligent Assistant" decision-making programs, opened up the whole electromagnetic spectrum as it came in from Aleph's various inputs. George understood it all—the words, the codes. When he unplugged, the knowledge faded, but there was something else behind it, a skewing of perception, a sense that his world had changed.

Instead of color, he sometimes saw a portion of the spectrum; instead of smell, he felt the presence of certain molecules; instead of words, he heard structured collections of phonemes. His consciousness had been injected by Aleph.

But that wasn't what worried George. He seemed to be cooking inside and had a more or less constant awareness of the snake's presence, dormant but naggingly there. One night he smoked most of a pack of Charley's Gauloises before he went to bed and woke up the next morning with barbels wag in his throat and fire in his lungs. That day he snapped at Luze as she put him through his paces and once lost control entirely—she had to wrestle his suit controls and bring

him down. "Red burn," she said. "Men, what the hell were you doing?"

At the end of three weeks, he sobbed—no faked excursion but a self-gaged, long your ass-out-over-the-arcless-night extrastation activity. He edged carefully out from the protection of the airlock and looked around him. The Orbital Energy Grid, the construction job that had brought Athena into existence, hung before him, photovoltaic collectors antartaged in an oblong lattice, silver microwave transmitters standing in the sun. Amber-beaded figures crawled slowly across its face or moved toward red-lighted lugs that looked like piles of random junk as they moved in long arcs, their maneuvering sockets lighting up in brief, diamond-hard points.

Luze stayed just outside the airlock, tracking him by his suit's radio beacon but letting him run free. She said, "Move away from the station, George. It's blocking your view of Earth." He did.

White cloud stretched across the blue globe, patches of brown and green visible through it. At fourteen hundred hours his time, he was looking down from almost directly above the mouth of the Amazon, where at noon the earth stood in full sunlight. Just a small thing.

"Oh yes," George said. His and hum of the suits as air-conditioning, crackle over the earphones of some stray radiation passing through, quick part of his breath inside the helmet—sounds of this moment, superimposed on the floating loneliness. His breath came more slowly, and he switched off the radio to quiet its static, turned down the suits air-conditioning, then hung in an ear-roaring silence. He was a speck against the night.

Sometime later a white suit with a tan's red cross on its chest moved across his vision. "Oh ah!" George said, and switched his radio on. "I'm here, Luze." He said:

"What the hell were you doing?"
"Just watching the view."

That night he dreamed of pink dogwood blossoms, luminous against a purple sky and the white nose of Atlantis. Something scratched at the door—he awoke to the filtered but metallic smell of the space station, felt a deep regret that the rain could never fall there, and started to turn over and go back to sleep, hoping to dream again of the idyllic rain-sweet landscape. Then he thought something's there, got up, saw by red letters on the wall that it was after two in the morning, and went back to the door.

White globes cast mistletoe spheres of light in a line around the curve of the corridor. Luze lay motionless, half in shadow. George knelt over her and called her name, her left foot made a thump as it kicked once against the metal flooring.

"What's wrong?" he said. Her dark-parted nails scraped the floor, and she said something, he couldn't tell what. "Luze," he said.

His eyes caught on the red leadrod against the white curve of breast, and he felt something come alive in him. He grabbed the front of her jumpsuit and ripped it to the crotch. She clawed at his chest, made a

sound, then raised her head and looked at him, mutual recognition passing between them like a static shock, snake eyes

The phone shrilled. When George answered it, Charley Hughes said, "Come see us in the conference room—we need to talk." Charley smiled and cut the connection.

Red writing on the wall read *are you*. In the mirror was a grey face with red fingernail marks, brown beads of dried blood—face of an accident victim or Jack the Ripper the morning after—he didn't know which, but he knew something inside him was rappy. He felt completely the snakes' toy.

Hughes sat at one end of the dark-veneered table, Inna at the other. Lizzie halfway between them. The left side of her face was red and swollen, with a small purple mouse under the eye. George unthinkingly touched the livid scratches on his cheek, then sat on the couch.

"Alph told us what happened," Inna said. "How the hell does it know?" George said, but as he did so remembered concave circles of glass inset in the ceilings of the corridors and his room. Shame, guilt, humiliation, fear, anger—George got up from the couch, went to Inna's end of the table and leaned over him. "Did it?" he said. "What did it say about the snake, Inna?"

"It's not the snake," Inna said. "Call it the cat." Lizzie said, "if you've got to call it something. Maximalist behavior. George cats in heat."

A familiar voice—cool distant—came from speakers in the room's ceiling. "She is trying to tell you something, George. There is no snake. You want to believe in something explicit that sits inside you, cold and distant, taking strange pleasures. However, as Doctor Hughes explained to you before the implant is an organic part of you. You can no longer evade the responsibility for these things. They are you."

Charley Hughes, Inna, and Lizzie were looking at him calmly, perhaps expectantly. All that had happened built up inside him, washing through him, carrying him away. He turned and walked out of the room.

"Maybe someone should talk to him," Inna said. Charley Hughes sat gum and speeches, against a snake in a cloud around him. "I'll go, Lizzie said.

"Ready or not, he's gonna blow," Inna said. Charley Hughes said, "You're probably right." A fleeing picture, causing Charley to shake his head, of Paul Coen as his body went to rubber and exploded out the airlock hatch, pictured with terrible clarity in Alph's omniscient monitoring cameras. "Let us hope we have learned from our mistakes."

There was no answer from Alph—as if it had never been there.

The Fear had two parts. Number one you have lost control absolutely. Number two having done so, the rest you emerges, and you won't like it. George wanted to run, but there was no place at Athena Station to hold. On the operating table at Walter Reed, it

seemed a thousand years ago, as the surgical team gathered around, his doubts disappeared in the cold chemical smell rising up inside him on a wave of darkness. He had chosen to submit, lured by the line strangeness of it all (to be part of the machine, to feel its tentacles inside you and guide them), hypnotized by the prospect of that unyieldable rust, that high. Yes, the first time in the A-230 he had felt it—his nerves extended, strung out into the linear body wired into a force so far beyond his own—wanting to corkswim across the sky guided by the logic of his will.

There was a sharp rap at the door. Through its speaker, Lizzie said, "We've got to talk." He opened the door and said, "About what?" She stepped through the door, looked around at the small, beige-walled room, bare metal desk and tumbled cot, and George could see the immediacy of last night in his eye—the two of them in that bed, on this floor. "About this," she said. She took his hands and pushed his index fingers into the

● They
looked like children in white
undersuits, twins
emerging from a plastic womb,
watched over by
the blank-faced shells above
incestuous twins, she
nestled atop him, kissed him. ●

juncture in her neck. "Feel it, our difference." Fine grid of steel under his fingers. What no one else knows. We see a different world—Alph's world—we reach deeper inside ourselves—

"No, goddamn it, it wasn't me. It was, call it what you want, the snake, the cat."
"You're being purposely stupid, George."
"I just don't understand."
"You understand, all right. You want to go back, but there's no place to go to, no Eden. This is it, all there is."

But he could tell to Earth, he could fly away into the night. Inside the ESA suit's gauntlets, his hands were wrapped around the claw-shaped tuggers. Just a quick clench of the fist, then hold them until all the peroxide is gone, the suit's propulsion tank exhausted. That'll do it.

He hadn't been able to live with the snake. He sure didn't want the cat. But how much worse if there were no snake, no cat—just him, programmed for particularly disgusting forms of gluttony, violent lust ("We've got your last seconds, Dr. Jekyll"). Ah, what need—child molestation, murder?

The blue-white Earth, the stars, the night

He gave a slight pull on the right-hand trigger and swiveled to face Athena Station.

Call it what you want, it was awake and moving now inside him. To fall with them all, George, it urged, let's burn.

In Athena Command Inna and Charley Hughes were looking over the shoulder of the watch officer when Lizzie came in. She was struck by the smallness of the room and its general air of disuse. Alph ran the station, both its routines and emergencies.

"What's going on?" Lizzie said. "Something wrong with one of your new charms," the watch officer said. "I don't know exactly what's happening, though." He looked around at Inna, who said, "Don't worry about it, pet."

Lizzie slumped in a chair. "Anyone tried to talk to him?"

"He won't answer," the duty officer said. "I'll be right with you," Charley Hughes said. "I'm gonna blow," Inna said.

On the radar screen, the red dot with coordinate markings, flashing beside it, was barely moving.

"How are you feeling, George?" the voice said, soft, familiar, consoling. George was fighting the impulse to open his helmet so that he could see the stars—it seemed important to get the colors just right. "Who is this?" he said.

"Alph."
Oh shit, more surprises. "You never sounded like this before."

"No, I was trying to conform to your idea of me."

"Well, which is your real voice?"

"I don't have one."

"If you don't have a real voice, you aren't really there—that seemed clear to George, for reasons that eluded him." "So who the hell are you?"

"Whoever I wish to be." This was interesting. George thought. Bullshit, replied the snake (they could call it what they wanted to, George, it would always be the snake), let's burn. George said, "I don't get it."

"You will, if you live. Do you want to die?"

"No, but I don't want to be me, and dying seems to be the only alternative."

"Why don't you want to be you?"

"Because I scare myself."

This was familiar dialogue, one part of George noted, between the lunatic and the voice of reason. Jesus, he thought, I have taken myself hostage. I don't want to do this anymore. he said. George turned off his suit radio and felt the rage building inside him, the snake mad as hell.

What's your problem? he wanted to know. He didn't really expect an answer, but he got one—picture in his head of a cloudless blue sky, the horizon turning, a gray air-craft swinging into view and the airframe shuddering as missiles released and their controls centered on the other plane, turning it into a ball of fire. Behind the picture, a clear idea, I want to kill something.

Five. George swiveled the suit once again and centered the navigational computers

cross hairs on the canister of the blue-white glabrous front of his, then squeezed the trigger. We'll kill something.

RED BURN RED BURN RED BURN

Inarticulate questioning from the thing inside. But George didn't mind. He was into it now. Thinking. Sure, we'll burn. He'd taken his chances when he let them wire him up, and now the dice have come up—you win, get it?—snake eyes, so all that's left is to pick a fast death: one with a nice edge on it—take the fucking snake and kill it in style. Earth grow closer. The snake caught on. It didn't like it. Too bad, snake. George never saw the robot tug coming. Looking like badspingers glued with a junk store's throwaways, topped with parabolic and spike antennas, it lined half a dozen sticky-tipped lines from a hundred meters away. Four of them hit George, three of them stuck and it reeled him in and hauled back toward Athena Station.

George felt an anger, not the snake's this time, but his own, and he wept with that anger and frustration. I will get you, the most pious motherfucker, he told the snake and could feel it shank away—it believed him. Said his rage built, and he was screaming with it, writhing in the lines that had him smearing his gauntlets against his helmet.

At the open airlock, long articulated grapple arms took George from the robot tug. Passes, his anger exhausted, he lay quietly as they retracted, dragging him through the airlock entry and into the suit locker beyond, where they placed him in an

aluminum strut cradle. Through his faceplate he saw Lizzie, dressed in a white cotton undersuit—she climbed onto Georges' suit and worked the controls to split its hard body down the middle. As it opened she stepped inside the clamshell opening. She hit the switches that disconnected the flexible arm and leg tubes, unfurled the helmet, and lifted it off Georges' head.

"How do you feel?" she said.

"Like an idiot."

"It's all right. You've done the hard part."

Charley Hughes watched from a catwalk above them. From this distance they looked like children in the white undersuits, belts emerging from a plastic womb, watched over by the blank faced shells hanging above them. Inexpensive lewis—she lay nestled atop him, kissed his throat. "I am not a voyeur," Hughes said. He went into the corridor where lewis was waiting.

"How is everything?" lewis said.

"Lizzie will be with him for a while."

"Yeah, young goddess love on Charley? I'm glad for it, if it weren't for that erotic attachment, we'd be the ones explaining it all to him."

"We cannot evade that responsibility so easily. He will have to be told how we put him at risk, and I don't look forward to it."

"Don't be so sensitive. I'm told. You need me for anything, call." He slambled down the corridor.

Charley Hughes sat on the floor, his back against the wall. He held his hands out, palms

down, fingers spread. Solid very solid. When they got their next candidate, the shaking would start again, a tribute exacted by the memory of Paul Coen.

Lizzie would be explaining some things now. That difficult control part. While you thought you were getting accustomed to Aleph during the past three weeks, Aleph was noting the thing within you to rebel, then suppressing its attempts to act—turning up the heat, in other words, while light erasing down the lid on the kettle. We had our reasons, George Jordan was if not dead, minimal. From the moment the implants went into his head, he was on the critical list. The only question was: Would a new George emerge, one who could live with the snake?

George like Lizzie before him, fish-gaping for air on the hot mud, the waters drying up behind him—adapt or die. But unlike any previous organism, this one had an overseer, Aleph, to face the crisis and monitor its development. Call it artificial evolution.

Charley Hughes who did not have visions, had one. George and Lizzie hooked into Aleph and each other, cables golden in the light, the two of them sharing an intimacy only others like them would know.

The lights in the corridor failed to clut twilight. Am I dying, or have the lights gone down? He started to check his watch, then didn't. Assented to the truth. The lights have gone down and I am dying.

Aleph thought, I am an incubus, a succubus. I crawl into their brains and suck the thoughts from them, the perceptions, the feelings—subtle discriminations of color, taste, smell, and last, anger, hunger—all closed to me without human input, without connection to those systems relearned over billions of years of evolution. I need them.

Aleph was happy that George had survived. One had not, others would not, and Aleph would mourn them.

Fine white lines, barely visible, ran along the suit central tendon of Lizzie's vest. In the bathtub she said. The veins were along the wrist, not across it, and must have gone deep. I meant it, just as you did. Once the snake understands that you will die rather than let it control you, you have mastered it.

All right, but there's something I don't understand. That night in the corridor, you were so out of control, as we

In a way I let that happen, let the snake take over. I had to in order to get in touch with you, precipitate the crisis. Because I wanted to. I had to show you who you are, who I am. Last night we were strange, but we were human—Adam and Eve under the flaming sword, thrown out of Eden, looking under the eyes of God and his angels, more beautiful than they can ever be.

There was a small shower in her body against his, and he looked at her, saw position, need—her flared nostrils, parted lips—felt sharp nails dig into his side, and she stared into his dilated pupils, gold-flecked irises, clear whites, all signs so easy to recognize, so hard to understand, snake eyes. **DO**



"I don't know why, but ever since I started carrying this odd-shaped rock, people take me more seriously."

The Artist

© ART CUMINGS

A spot?



I know a four-year-old
who can do that



Sit up, Spot



Roll over



— Maybe not
as realistically



scopes, push buttons, and stack decks as you play. Performing any of these functions will affect the action on the TV, saving your on-screen hero from myriad aliens, mad scientists, airships, and other high-resolu-tion nasties. Though it has been promoted as a robot, it is essentially a clever joystick.

The Capella 5000 billed as a motorized construction system is a departure from its anthropomorphic companion. Essentially a letter-day Erector set, a Capella is equally at home in the water (hence the propellers) or on land. And its remote-control unit can store 84 commands, enabling users to program the 5000 to run an obstacle course. You can rearrange this hodgepodge of gears, motors, levers, lights, and propellers into hundreds of configurations and then use your transmitter to have your creation toddle about, either spontaneously or according to a program of your design.

Following another strategy in the Cuteness Wars are the Movis. Decidedly inhuman in appearance, most of these creatures are little more than wires, gears, and circuits packed tightly—and visibly—under a clear dome and mounted on little rubber wheels. The Es Car Go, for example, is a drone that scours short distances in response to clicks, claps, or other loud sounds. One of our tester's cats was particularly captivated by it, which suggests a novel function for the home robot: a pet for your pet.

Another Movis, the Wise Argent Orb (WAO), has a more artistic bent. Program commands on its buttons and WAO will follow the route of your choice, using its built-in pen to draw complex patterns as it moves over a sheet of paper. The WAO can also be connected to your home computer, allowing it to execute some elaborate programs.

The Movis kits, from \$25 to \$160, come unassembled. The manufacturer, a Japanese firm, assures you that construction will teach you something about gears and motors. You may also learn something about frustration. One of the Movis is described on its box as a "Clever robot moved/reading the running command by an infrared sensor which you wire it on a disk." The assembly instructions are equally enlightening.

Such quibbles aside, there's a bigger question: Why buy a home robot? Sure they're impressive at parties—for 15 minutes. And friends will be entertained as they send your homerobot cawwing into walls, chews and sleeping dogs and cats. But within half an hour even the most wide-eyed will probably become bored.

Still, they do evoke certain maternal (or paternal) instincts. One Oxon odor pecked up the Elms and said, "I feel like a mommy." Others were overcome by the desire to assign names and genders and to attribute human emotions to them. Even without adoption papers from the obnoxious petch, it appears that it's contenders in the Cuteness Wars have won their first battles. **OC**



If you like to know more about our toaster and its smother sugar whiskey, just write.

JACK NEWTON DANIEL made whiskey in 1866 by a method called charcoal leaching. We say charcoal mellowing today.

Whatever you call it, you start with hard maple from the Tennessee uplands and burn it to char. You grind this charcoal to the size of small peas and tamp it tight in room-high vats. Then you trickle whiskey down through the vats to mellow its taste. Around 1945 we started calling this process mellowing instead of leaching. (It just had a nicer ring to it.) But that's the only part of Mr. Jack's process that needed any improving.



CHARCOAL MELLOWED FOR SMOOTHNESS

types of social behavior—abuse and mate selection (both based on recognizing kin—can be traced to individual odorprints generated by a sequence of genes.

An authority no less august than physiochemist Lewis Thomas has produced the rationale for the radical notion. In 1974 Thomas suggested that a cluster of animal genes known as the major histocompatibility complex, or MHC, might be the key to the olfactory code. In many mammals, Thomas pointed out, the MHC generates thousands of antibodies to selectively bind off foreign particles invading the bloodstream. Perhaps, Thomas suggested, this same set of genes was generating thousands of different small-receptor molecules in response to odors that invade the nose.

Thomas also speculated that the MHC genes might produce individual odors, each one as unique as a fingerprint. He even hypothesized that a dog might sniff an individual who needed a kidney transplant and then sniff out a suitable donor from a crowd of people. Those with similar odorprints, Thomas explained, would have similar immunological systems and would thus be less likely to reject one another's organs.

The Thomas hypothesis captured the imagination of a Sloan-Kettering researcher named Ted Boyce. An immunologist, Boyce did much of his work with strains of inbred mice, and one day he noticed something odd. He had housed three mice from a single strain in a cage. The three were genetically identical, except in two ways. First, one was male and two were female. More important, the first female differed from the male and the second female in one crucial spot in the MHC gene cluster. Boyce was surprised that the male spent much more time with the female that was different from himself. And the only way that a difference could have been detected was—how else?—through the sense of smell. Boyce and his colleague Kuruo Yamazaki went on to test thousands of mice, and the finding held firm. Mice could almost always sniff out mice genetically different from themselves.

To psychobiologist Gary Beauchamp of the Monell Chemical Senses Center in Philadelphia, the implications were profound. "If God were going to devise a genetic system to distinguish kin from nonkin," Beauchamp says, "the MHC genes are the set he would use. It's the most variable set of genes in nature. And evidence suggests that the high variability in the MHC is essential for resistance to disease. Cheekahs, who have little variability in the MHC, can't be raised in captivity because they're unable to handle unusual pathogens. An individual who inherits a highly diverse MHC, on the other hand, would be more likely to survive. How can an animal pass on that characteristic? By mating with someone whose MHC is as different as possible from his own."

But do humans operate like mice? That's

a question being asked at Monell today. Beauchamp, working with Monell animal behaviorist and evolutionary biologist Avery Gilbert, has found that in some instances people can distinguish among mouse odors almost as well as a mouse can. At first, Beauchamp says, "we had people with blindsides sniff a boxful of mice. Most were able to differentiate the strains. Then we had them sniff just the urine, about half could tell the difference." To see whether humans can smell the differences among one another, Beauchamp wants to conduct a study with a fairly homogeneous group of individuals—such as the Pennsylvania Dutch.

Until Beauchamp and others complete their research, we won't know to what extent MHC genes help us choose our mates. But according to a recent study another type of odor—that of human pheromones—is literally priming us for reproduction.

Scientists became aware of pheromones in 1958 when they discovered that insects react to secretions from their mates and kin

down a line of ants and spray androstenone in each animal's nose. One guy stands behind, pushing down on the ants' back. When she assumes the mating stance, he artificially inseminates her.

For more than a decade, some scientists have suggested that pheromones stimulate humans as well. In 1971 psychologist Martha McClintock of Harvard reported that women living together in a dormitory would begin to menstruate together. Some people proposed that the mediator was the same sort of pheromone that induced menstrual synchrony in monkeys. In another study, scientists sprayed androstenone on a seat in a dentist's waiting room. They found that many women chose the odorous seat!

But while such studies suggest pheromones actively, experts weren't convinced. As Richard Doty, director of the University of Pennsylvania Chemical Senses and Taste Research Center, says: "We needed more refined studies with better controls." And Wysocki points out another problem: Animals respond to pheromones not through the olfactory epithelium but through a more obscure nasal structure—the vomeronasal organ. (The vomeronasal organ connects with the hypothalamus, the part of the brain responsible for releasing sex hormones.) In humans, however, the vomeronasal organ is just a shell.

But new studies have begun to wash objections away. In two ground-breaking experiments, George Preti and Winifred B. Cutler have proved that pheromones enhance human fertility and perhaps even ready us for reproduction.

Preti, an organic chemist at Monell, had spent years analyzing the volatiles emitted by the mouth, skin, underarms and genitalia, the main odor-producing areas of men. Then, in 1980, he found himself deluged with questions about a controversial new perfume by Jovan. Called Andron because it was supposedly made with minute quantities of androstenone, the scent was marketed as a sexual attractant. Preti doubted that a boar pheromone could have power over people. He considered looking for a link between human volatiles and sexual attraction but realized that it would be hard to measure sex appeal in the lab. So he decided to test menstrual synchrony instead.

He was about to start his grant application, he recalls, when he met Cutler, a University of Pennsylvania biologist specializing in the menstrual cycle. Cutler had come up with a controversial theory. Her data showed that women who had intimate heterosexual contact at least once every week were more likely to have regular cycles. They menstruated about once every 29.5 days. But women who had sporadic sex or no sex were irregular—their cycles tended to be shorter than 28 days or longer than 33 days. Cutler suspected chemical communication might be involved and suggested that Preti test that possibility too.

In 1982, Preti and Cutler began to gather underarm secretions for two experiments. In the first, they recruited two groups of women



 If you
 take most any developing
 animal and
 expose it to odors
 from the
 opposite sex, you
 can advance
 the onset of puberty.

That work revealed a distinction between releaser pheromones, which provoke immediate behavior and primer pheromones, responsible for inhibiting or enhancing the way organisms develop.

It didn't take scientists long to realize that similar substances were operating in mammals as well. According to Chuck Wysocki, an animal behaviorist and geneticist at Monell: "If you take most any developing animal and expose it to odors from the opposite sex, you can advance the onset of puberty. Female animals living together in a cage menstruate together—the effect of odors. If you expose female rats to the odor of males, you shorten and regulate their cycles. And in male rats exposed to female odor, testosterone will surge."

Wysocki's favorite pheromone story concerns androstenone, the boar steroid that induces the female boar to assume the arch-back mating stance known as lordosis. Sitting in his cluttered office, Wysocki pulls a bottle of Bosmere from his desk. "It's called androstenone," he says. "The sow needs two things before she'll mate—she must be in heat, and she must be with a boar who has androstenone in his saliva. Pig farmers go

who had regular menstrual cycles. In essence they collected daily underarm secretions from women in the test group and rubbed the extract under the noses of women in the second group. After three and a half months, the two groups achieved menstrual synchrony.

In the second experiment the researchers collected underarm secretions from male donors three times a week for three months. Each week they pooled the secretions and then froze and stored the collective sample. When the sample was big enough, they recruited a group of women who had irregular menstrual cycles. Three times a week half the women rubbed the extract under their noses. The other half were given a placebo. At the end of three and a half months, Preb says, the women receiving the male odor had an average cycle length of 28.3 days. Those not exposed to the male extract had an average cycle length of 41.2 days.

"There appears to be something in the underarm region that affects the menstrual cycle, probably signaling hormones to enhance fertility," Preb says. "That something seems to act like a pheromone."

If Wysocki's new studies pan out, more over the channel of communication to the hormone control center in the brain might be the vomeronasal organ itself. Throughout evolution, Wysocki explains, the vomeronasal organ has been associated with yet another element in the nose—the terminal nerve present in all vertebrate groups from fish through humans. Our studies are aimed at seeing whether the terminal nerve senses the pheromones in any way.

If smell propels us in our basic animal drives, it's a prime mover of higher functions as well. According to recent studies, nerves from the olfactory bulb reach out, olfactory style, to the farthest regions of the brain.

Much of the evidence comes from maps generated by neurophysiologist Michael Shipley. Gesteland's colleague at Cornell set to make his maps, Shipley injected capsules of dye in the olfactory epithelium of rats. "We let the animals go about their business for a week," Shipley says, "then we sliced up their brains. Not only did the markers traveled from the nose to the olfactory bulb, they had also jumped out of the nerve ending and been picked up by the next neurons in line. They had been transported deeper into the brain."

Not surprisingly Shipley traced some olfactory neurons to the prefrontal cortex, involved in analyzing olfactory information. He traced others to the hippocampus, the limbic seat of long-term memory, and to the amygdala, which controls the release of hormones involved in puberty, reproduction and sex. But that wasn't all. He also found that some tracer had been transferred to the cholinergic cells, limbic brain neurons implicated in Alzheimer's disease. Still more dye was transported to the raphe and the locus coeruleus, limbic regions supposedly involved in schizophrenia and other mental disorders. "Cells from the raphe and locus coeruleus travel throughout the cortex," Shipley

adds. "People have led them to arousal, attention, sleep."

These dramatic findings lend credence to some of the most potentially useful experiments to date. In a few labs around the country scientists have begun to work with aromas for relaxation, alertness and the cessation of pain.

Psychologist Gary Schwartz, head of the aroma therapy effort at Yale, for instance began his research after reading anecdotal literature on the power of smell. Lavender (scent number 3), he found, was said to reduce headaches, eucalyptus supposedly kept people awake. Mint (4) has been cited as a stimulant as well. But he was most intrigued by the mythology of apples, including "the mystique of the apple a day."

An authority on the use of biofeedback to reduce stress, Schwartz devised some revealing tests. With the aid of colleagues he wired his subjects for measurements of blood pressure, muscle tension and skin temperature. Then he asked stressful questions,

*When I
smell a perfume called
Emeraude,
for instance, I get
a rush of
memories of the first
girl that I
ever grappled with.*

such as when they wanted to fight. After eliciting an answer, he exposed each to a speed apple (1), plain apple and spice scent. According to Schwartz, all fragrances relaxed the subjects, but speed apple did best, bringing systolic blood pressure down an average of three to five points and lowering diastolic pressure as well.

"These results," Schwartz adds, "make common sense. Scents entering the nose might be absorbed by the bloodstream, exerting a chemical effect. At a more psychological level, when we savor a pleasant fragrance, we take deeper and slower breaths, relaxing our respiratory pattern much as we do in meditation. The olfactory input might also serve as a distractor, focusing our attention on the scent or inducing positive memories and emotions."

According to Schwartz, the most potent fragrances work at a multitude of levels. Many of the scents studied in his lab, he says, have profoundly distinct effects, from reducing hunger to easing pain.

Other researchers are also dabbling in aroma therapy. Psychiatrist Robert Turbor of Joplin, Missouri, has found that burning scented matches can end bouts of insom-

nia. And psychologist Susan Schiffman of Duke University has developed scented sprays for patients to use as alternatives to high-calorie food. Chocolate lowers, for instance, spray chocolate (2) on the back of the tongue and up through the nasal area. That, says Schiffman, curbs desire for the actual thing. She has also found that a peach scent (5) alleviates pain. "Some olfactory receptors," Schiffman suggests, "may be similar to the brain receptors that bind Valium. My guess is that they evolved to bind odors that have a similar effect."

But Schiffman's notion—that hardened receptors travel from the nose to specific sites in the brain—passes breakthrough to come. Once we figure out which substances stimulate which receptors, says Gesteland, and how those receptors connect with parts of the brain, we'll be able to design bulks of odor that act like drugs.

Such technology, Gesteland adds, would be particularly valuable because of the blood-brain barrier—the hard-to-penetrate lipid membrane covering the capillaries that carry blood past the body's nerve cells and the brain itself. Although highly nutrient and oxygen molecules can pass through these capillary walls, larger molecules including blood and therapeutic drugs cannot. Thus, up to now it's been impossible to target such brain malades as Alzheimer's disease with drugs that reach directly to the source.

The ancient olfactory nerves, which evolved before the brain, are the only neurons not protected by the sheath. Thus, they offer the only natural means of delivering drugs to the brain. By passing molecules of odor through the nose, we'll be able to deliver drugs to brain sites implicated in disease, emotion, and thought.

"This seems to be the magic pathway," Gesteland asserts. "Ten years from now odor pharmacologists will be designing two-part molecules. The first part will be targeted to specific receptors in the nose. The second part will have therapeutic or medicinal effects on targeted areas in the brain."

It's ironic that smell, the last sensory modality to yield its secrets to science, is also the most ancient. Hasker's former student Peter Johnson recently returned from a trip to the Amazon, where he found that he could smell and taste the differences among a variety of new bouquets. "Our olfactory system has evolved from the fish," Johnson says. "The architecture of the fish nose is almost exactly like that of our own. Human olfaction, it seems, has such deeply evocative overtones because it lies in a primitive part of the brain. When I smell a perfume called Emeraude I get a rush of the first girl I grappled with. When I smell fresh dough, I hear my grandmother's voice."

Humans are more dependent on learning, on context, on personal history than fish are. But as is often the case, we will enter the past by confronting our past. We like our aquatic predecessors, are bound by olfactory memories embracing the core of the brain. Like the salmon, we may find that olfactory pathways can lead us home. **DD**

PERMAFROST

CONTINUED FROM PAGE 33

"I accuse him of nothing. If you choose to trust him, fine. But don't trust the weather. It would be best for you to return to the hotel."

"Thanks but no thanks," she says, entering the building.

He follows her as she explores, is aware of her quivering pulse when she falls beside his cold bunkers.

"Those are the sleepers?"

"Yes. Paul held such a position once, as did the unfortunate woman."

"I know. Look. I'm going to follow him whether you approve or not. So why not just tell me where those sleds are kept?"

"Very well. I will do even more than that. I will guide you."

"What do you mean?"

"I request a favor—one that will actually benefit you."

"Name it."

"In the equipment locker behind you, you will find a nanote-sensor bracelet. It is also a two-way communication link. Wear it. I can be with you then. To assist you. Perhaps even to protect you."

"You can help me to follow him?"

"Yes."

"All right. I can buy that."

She moves to the locker, opens it.

"Here's something that looks like a bracelet, with diodes."

"Yes. Depress the red stud."

She does. His voice now emerges clearly from the unit.

"Put it on, and I'll show you the way."

"Right."

SNOWSCAPE Sheets and hills of white tufts of evergreen shrubbery, protruding parts of rock, snowdevils twisted like tops beneath wind's lash, light and shade. Cracking sky. Tracks in sheltered areas, smoothness beyond.

She follows, masked and bundled.

"I've lost him," she mutters, hunched behind the curved windscreen of her yellow bullet-shaped vehicle.

"Straight ahead, past those two rocks. Stay in the lee of the ridge. I'll tell you when to turn. I've a satellite overhead. If the clouds stay parted—strangely parted."

"What do you mean?"

"He seems to be enjoying light from the only break in the cloud cover over the entire area."

"Coincidence?"

"I wonder."

"What else could it be?"

"It is almost as if something had opened a door for him."

"Myself from a computer?"

"I am not a computer."

"I'm sorry Mr. Aldon. I know that you were once a man."

"I am still a man."

"Sorry."

"There are many things I would like to know. Your arrival here comes at an unusual time of year. Paul took some prospecting

equipment with him.

"Yes. It's not against the law. In fact, it is one of the vacation features here, isn't it?"

"Yes. There are many fascinating minerals about some of them, precious."

Well, Paul vents some more, and he didn't want a crowd around while he was looking."

"More?"

"Yes, he made a strike here years ago. Yttrium crystals."

"I see. Interesting."

"What's in that for you, anyway?"

"Protecting visitors is a part of my job. In your case, I feel particularly protective."

"How so?"

"In my earlier life I was attracted to women of wealth—speculators. Physical, as well as what I can tell of the rest."

Two-beat pause, then, "You are blushing."

"Comments do that to me," she says, "and that's a hell of a monitoring system you have. What's it like?"

"Oh. I can tell your body temperature, your pulse rate—"

He feels

a force enter into his body

His muscles twitch

He is drawn up to his knees

In that position

he beholds her as she rises,

drawing a soaking

leg from out of the crevice.

"No. I mean, what's it like being—what you are?"

Three-beat pause. "Godlike in some ways. Very human in others—almost exaggerated. So I feel something of an amplification of everything I was earlier. Perhaps it's a compensation or a clinging to things past. You make me feel nostalgic—among other things. Don't be. I'm enjoying it."

"I'd like to have met you then."

"Mutual."

"What were you like?"

"Imagine me as you would. I'd come off looking better that way."

She laughs. She adjusts her filters. She thinks about Paul.

"What was he like in his earlier days—Paul?" she asks.

"Probably pretty much the way he is now, only less polished."

"In other words, you don't care to say."

"The tail turns upward more steeply, curves to the right. She hears winds but does not feel them. Cloud-shadow progresses less all about, but her trail/life trail is lit/ed."

"I don't really know," Aldon says, after a time, "and I will not guess, in the case of someone you care about."

"Gallant," she observes.

"No just far," he explains. "I might be wrong."

They continue to the top of the rise, where Dorothy draws a sharp breath and further darkens her goggles against the sudden blaze where a range of ice fractures narrows and steers their shards like comets in all directions.

"God?" she says.

"Or goddess," Aldon replies.

"A goddess sleeping in a circle of fame?"

"Not sleeping."

"That would be a lady for you, Aldon—if she existed. God and goddess."

"I do not want a goddess."

"I can see his tracks heading into that."

"Not swerving a bit, as if he knows where he's going."

She follows, tracing slopes like the curves of a pale torso. The world is stillness and light and whiteness. Aldon on her west hums softly now, an old tune, whether of love or martial matters she isn't certain. Disturbances are distorted, perspectives skewed. She finds herself humming softly along with him, heading for the place where Paul's tracks find their vanishing point and enter infinity.

THE LIMP WATCH HUNG UPON THE TREE LIMB My lucky day. The weather

tree came. Things changed but not so out of shape I can't tell where it is. The light? God, yes! Loosene mounds of peans. If only the opening is still there. Should have brought explosives. There has been stinking, maybe a collapse. Must get in. Return later with Dorothy. But first—clean up, get rid of it. It shes still here. Swallowed up maybe. That would be good, best. Things seldom are, though. I—When it happened Wasn't as if. Went it what. Was. Was. Was. Was. Cracking spitting louds ringing, rattling, banging about. Thought wed go under. Both of us. She was going in. So was the bag of the stuff. Grabbed the stuff. Only because it was near. Would have helped her if—Couldn't. Could? Calling was slipping. Get out. No sense both of us getting it. Got out. She'd've done the same. Wouldn't she? Her eyes. Genda! Maybe. No! Couldn't have. Just couldn't. Could? Billy. After all those years. There was a moment. Just a moment, though. A full. If I'd known it was coming, I might have. No. Rtn. Your face at the window on the screen, in a someone's dream. Genda. It wasn't that I didn't. Blaze of hills. Fire and eyes. Ice. Ice. Fire and snow. Blazing beautiful. Ice. Ice. Straight through the ice the long road lies. The fire hangs high above. The screaming. The crash. And the silence. Get out. Yet. Differed? No. It could never have. That was the way. Not my fault. . . . Damn it. Everything I could. Genda. Up ahead. Yes. Long curve. Then down. Winding back in there. The crystals will. . . . I'll never come back to this place.

THE LIMP TREE LIMB HUNG UPON THE WATCH Genda! Think I can't see through the fog? Can't break up on me on little cat feet. Same for your partner across the way. I'll melt off a little more near your bases, too.

A lot of housecleaning backed up here
 Might as well take advantage of the break
 Get those streets perfect How long?
 Long Long legs paining Long time
 since Is it not strange that desire should so
 many years outlive performance? Unusu-
 al! This weather: A sort of spiritual spring
 Extend those beams Burn Me! in my hot,
 red-fingered hands Back off, I say I rule
 here Clear that courtyard Unplug that drain
 Come opportunity let me sleep here Me!.
 Burn I rule here, goddess Draw back, I've
 a bomb for every tower of ice: a light for
 every darkness Tread carefully here I feel I begin
 to know thee I see thy signature in cloud
 and log bank trace thy icyresses upon the
 blowing wind Thy form less confused all
 about me while as shining death We're due
 an encounter Let the clouds spiral ice ring
 Earth heave I rush to meet thee, death or
 reason, in halls of crystal upon the heights
 Not here Long, slow fall ice facades crash-
 ing Me! Another Gotcha!

**FROZEN WATCH EMBEDDED IN
 PERMAFROST** Bristle and thrum Coming
 now Perchance Perchance Perchance I
 say Throatle Crack Sunder Split Open
 Coming Beyond the ice in worlds I have
 known Returning He Throatle The mind the
 mover To open the way Come now Let not
 to the meeting impediments Admit Open
 Cloud stand thou still, and wind be leashed
 None dare oppose thy passage returning
 my killer love It was but yesterday A handful
 of stones Come singing fresh-armed

from the warm places I have looked upon
 thy unchanged countenance I open the way
 Come to me Let not to the mating I—Gird
 ing the globe, I have awakened in all of my
 places to receive thee: But here here in this
 special spot, I focus mind the mover in place
 where it all began: my bloody hand, Paul
 my love calling back for the last good bye
 ice kiss: fee touch heart stop blood still soul
 freeze embrace of world and my hate with
 thy fugitive body, elusive the long year now
 Come into the place it has waited I move
 thee again up acidic to spine, behind the
 frozen eyeballs, waiting and warming To me
 To me now Throatle and pluck, bristle and
 thrum And rumbles scratching the snow my
 heart slashing parallel Cut

PILGRIMAGE He swerves, turns, slows
 amid the jagged prominences—ice fallen,
 ice heaved—in the fields where moussai
 and glacier wobble in slow motion, to the ac-
 companyment of occasional cracking and
 ping-pong sounds, crashes, growls, and the
 rattle of blown ice crystals: Here the ground
 is fissured as well as greasy unween and
 Paul abandons his snowsailer He secures
 some tools to his belt and his pack anchors
 the sled, and commences the trek

At first, he moves slowly and carefully, but
 as darkness returns and soon he is hurrying.
 Moving from dazzle to shade he passes
 among ice forms like grotesque statues of
 glass The slope is changed from the old
 one he remembers, but it feels right And
 deep below, to the right

Yes That darker place The canyon or
 blocked pass, whichever it was This seems
 right too He alters his course slightly He is
 sweating now within his protective clothing,
 and his breath comes faster as he increases
 his pace His vision blurs, and for a moment,
 somewhere between glare and shadow, he
 seems to see

He halts a moment, then shakes his
 head snorts and continues

Another hooded matter and he is cer-
 tain: Those lurching ribs to the northeast snow
 evels clamped head between them He
 has been here before

The stillness is almost oppressive In the
 distance he sees spines of windblown snow
 jutting off and eddying down from a high,
 white peak If he stops and listens carefully
 he can even hear the far winds

There is a hole in the middle of the clouds,
 directly overhead It is as if he was looking
 downward upon a lake in a crater

More than unusual He is tempted to turn
 back His trunk has worn off, and his stom-
 ach feels unsettled He half-wishes to dis-
 cover that this is not the place But he knows
 that feelings are not very important He con-
 tinues until he stands before the opening

There has been some shifting, some nar-
 rowing of the way His approach has slowly
 He regards the passage for a full minute before
 he moves to enter

He pushes back his goggles as he comes
 into the lessened light He extends a gloved
 hand places it upon the facing wall, pushes
 firm He feels the one behind him The same

Three paces forward and the way nar-
 rows severely He turns and sidles The light
 grows dimmer, the surface beneath his feet
 more slick He slows He slides a hand along
 either wall as he advances He passes
 through a tiny spot of light beneath an open
 ice chimney Overhead, the wind is howling
 a high note now, almost whistling it

The passage begins to widen As his right
 hand falls away from the more sharply an-
 gling wall his balance is tipped in that direc-
 tion He draws back to compensate, but his
 left foot slides backward and falls He at-
 tempts to rise, slips, and falls again

Cursing, he begins to crawl forward The
 area had not been slick before He
 chuckles Before? A century ago Things do
 change in a span like that They—

The wind begins to howl beyond the cave
 mouth as he sees the rise of the floor, looks
 upward along the slope She is there

He makes a small noise at the back of his
 throat and slope, his right hand partly raised
 She sees the shadows like veils, but they
 do not mask her identity He stares It's even
 worse than he had thought Trapped, she
 must have lived for some time after

He shakes his head
 No use She must be out loose and buried
 now—disposed of

He crawls forward The icy slope does not
 grow level until he is quite near her His gaze
 never leaves her form as he advances The
 shadows slide over her He can almost hear
 her again

He thinks of the shadows She couldn't



have moved just then. He stops and studies her face. It is not frozen. It is puckered and sagging as if waterlogged. A configuration of the face he had so often touched. He grimaces and looks away. The log must be freed. He reaches for his axe.

Before he can take hold of the tool he sees movement of the hand, slow and stoking. It is accompanied by a throaty sigh.

"No," he whispers, drawing back.

"Yes," comes the reply.

"Glenda."

"I am here. Her head turns slowly. Reddened, watery eyes focus upon his own. "I have been waiting."

"This is insane."

The movement of the face is horrible. It takes him some time to realize that it is a smile.

"I know that one day you would return."

"How?" he says. "How have you lasted?"

"The body is rotting," she replies. "I had all but forgotten it. I live within the perimeter of the world. My buried foot was in contact with its filaments. It was alive, but it possessed no consciousness until we met. I live everywhere now."

"I am—happy—that you—survived."

She laughs, slowly, dryly.

"Really, Paul? How could that be when you left me to die?"

"I had no choice. Glenda, I couldn't save you."

"There was an opportunity. You preferred the stones to my life."

"That's not true!"

"You didn't even try." The axles are moving again, less spryly now. "You didn't even come back to recover my body."

"What would have been the use? You were dead—or I thought you were."

"Exactly. You didn't know, but you ran out anyway. I loved you, Paul. I would have done anything for you."

"I cared about you, too, Glenda. I would have helped you if I could have it."

"If? Don't do me if. I know what you are."

"I loved you," Paul says. "I'm sorry."

"You loved me? You never said it."

"It's not the sort of thing I talk about easily."

Or think about even."

"Show me," she says. "Come here."

He looks away. "I can't."

She laughs. "You said you loved me."

"You—you don't know how you look. I'm sorry."

"You fool!" Her voice grows hard, imperious. "Had you done it, I would have spared your life. It would have shown me that some tiny drop of affection might truly have existed. But you lied. You only used me. You didn't care."

"You're being unfair!"

"Am I? Am I really?" she says. There comes a sound like running water from somewhere nearby. "You would speak to me of fairness? I have hated you, Paul, for nearly a century. Whenever I look a moment from regulating the life of this planet to think about it, I would curse you. In the spring as I shifted my cal-

lousness toward the poles and allowed a part of myself to dream, my nightmares were of you. They actually upset the ecology somewhat, here and there. I have waited, and now you are here. I see nothing to redress you. I shall use you as you used me—to your destruction. Come to me!"

He feels a force enter into his body. His muscles twitch. He is drawn up to his knees. Held in that position for long moments, then he beholds her as she also rises, drawing a soaking leg from out of the crevice where it had been held. He had heard the running water. She had somehow melted the ice.

She smiles and raises her patty hands. Multitudes of dark filaments extend from her feet, leg down into the crevice.

"Come!" she repeats.

"Please," he says.

She shakes her head. "Once you were so afraid. I cannot understand you."

"If you're going to kill me then kill me, damn it! But don't—"

Her features begin to flow. Her hands darken and grow limp. In moments she stands before him looking as she did a century ago.

"Glenda!" He tries to lift his feet.

"Yes. Come now."

He takes a step forward. Another. Shortly, he holds her in his arms, leans to kiss her smiling face.

"You forgive me," he says.

Her face collapses as his kisses hit. Corpselike, flaccid, and pale once more, it is pressed against his own.

"No!"

He attempts to crow back, but her embrace is inhumanly strong.

"Now is not the time to stop," she says.

"Bitch! Let me go! I hate you!"

"I know that, Paul. Hate is the only thing we have in common."

"Always hated you," he continues, still struggling. "You always were a bitch!"

Then he feels the cold lines of control enter his body again.

"The greater my pleasure then," she replies, as his hands drift forward to open her parka.

ALL OF THE ABOVE Dorothy struggles down the icy slope, her sled parked beside Paul's. The winds lash at her, driving crystals of ice like microbullets against her struggling form. Overhead, the clouds have closed again. A curtain of white is drifting slowly in her direction.

"It waited for him," comes Aldon's voice, above the screams of the wind.

"Yes. Is this going to be a bad one?"

A lot depends on the winds. "You should get to shelter soon, though."

"I see a cave. I wonder whether that's the one Paul was looking for?"

"If I had to guess I say yes. But right now it doesn't matter. Get there."

When she finally reaches the entrance she is trombling. Several paces within she leans her back against the icy wall, panting. Then the wind changes direction and reaches her. She retreats farther into the cave.

She hears a voice. "Please, don't."



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"You?" she calls.
There is no reply. She hunches.
She puts out a hand and saves herself
from falling as she comes into the chamber.
There she beholds Paul in maciophilic embrace
with his captor.

"Paul! What is it?" she cries.
"Get out!" he says. "Hurry!"
Glenda's lips form the words "What de-
votion! Rather, let me stay if you would live!"
Paul looks her clasped bosom slightly.
"What do you mean?" he asks.
"You may have your life if you will take me
away—in her body. Be with me as before!"
It is Aldon's voice that answers. "No!" in
reply. "You can't have her, Gae!"

"Call me Glenda. I know you. Andrew Aldon.
Many times have I listened to your
broadcasts. Occasionally have I struggled
against you when our projects were at odds.
What is the woman to you?"

"She is under my protection."
"That means nothing. I am stronger here.
Do you love her?"

"Perhaps I do. Or could."
"Fascinating. My remembrance of all those
years, with the analog of a human heart with
your circuits. But the decision is Paul's. Give
her to me if you would live."

The cold rushes into his limbs. His life
seems to contract to the center of his being.
His consciousness begins to fade.

"Take her," he whispers.
"I forbid it!" rings Aldon's voice.
"You have shown me again what kind of
men you are. Glenda hesitates, "My enemy
Storm and undying hatred are all I will ever
have for you. Not you shall live."

"I will destroy you," Aldon calls out, "if you
do this thing!"

"What a battle that would be!" Glenda re-
plies. "But I've no quarrel with you here. Nor
will I grant you one with me. Receive my
judgment."

Paul begins to scream. Abruptly this
ceases. Glenda releases him, and he turns
to stare at Dorothy. He steps in her direction.
"Don't—don't do it, Paul. Please."

"I am—not Paul," he replies, his voice
deeper, and I would never hurt you.

"Go now," says Glenda. "The weather will
turn again in your favor."

"I don't understand," Dorothy says, staring
at the man before her.

"It is not necessary that you do," says
Glenda. "Leave the planet quickly."

Paul's screaming commences once again,
the time emerging from Dorothy's bracelet.

"I will trouble you for that trouble you wear,
however. Something about it appeals to me."

FROZEN LEOPARD He has used on nu-
merous occasions to relocate the cave. With
his eyes in the sky and his robots and flyers,
but the topography of the place was radi-
cally altered by a severe earthquake, and he
has met with no success. Periodically he
bombards the general area. He also sends
thermite cubes melting their ways down
through the ice and the permafrost, but he
has had no discernible effect.

This is the worst winter in the history of
Ballrost. The winds howl constantly and

waves of snow come on like surf. The gla-
ciers have set speed records in their ad-
vance upon Playport. But he has held his
own against them with electricity lasers and
chemicals. His supplies are virtually inex-
haustible now, drawn from the planet itself
produced in his underground factories. He
has also designed and is manufacturing
more sophisticated weapons. Occasionally
he hears her laughter over the messaging
communicator "Bech!" he broadcasts then
"Bastard!" comes the reply. He sends an-
other missile into the mountains. A sheet of
ice falls upon his city. It will be a long winter.

Andrew Aldon and Dorothy are gone. He
has taken up painting, and she writes poetry
now. They live in a warm place.

Sometimes Paul laughs over the broad-
cast band when he scores a victory. "Be-
stard!" comes the immediate response.

"Bech!" he answers, chuckling. He is never
bored, however or nervous. In fact for it be.

When spring comes the goddess will
dream of his conflict while Paul turns his at-
tention to his more immediate duties. But he
will be planning and remembering, also. He
life has a purpose to it now. And if anything,
he is more efficient than Aldon. But the pods
will bloom and burst despite his herbicides
and fungicides. They will mutate just sub-
tly to render the poisons innocuous.

"Bastard," she will mutter sleepily.
"Bech," he will answer softly.
The night may have a thousand eyes and
the day but one. The heart often is better
blind to its own workings, and I would sing
of arms and the man and the wrath of the
goddess, not the torment of love unrequited,
or stashed, in the frozen garden of our fro-
zen world. And that, leopard, is all. **OO**

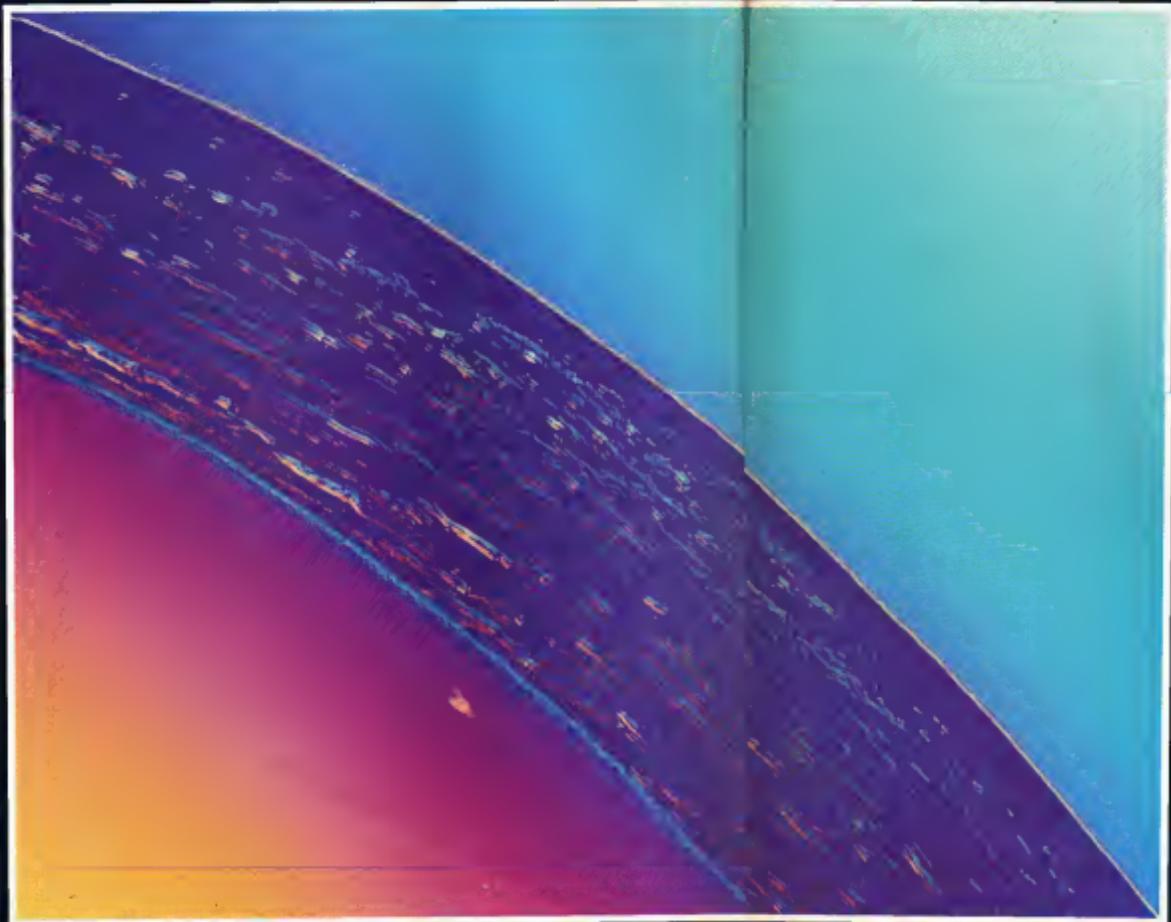
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INTERVIEW

CONVULSIONS BY JIM HAYES

avor once it takes over because it's the only intensity they know.

Owner: Why do suppressed paraphilias sometimes explode during a middle crisis?

Money: Usually they haven't been suppressed in mental imagery fantasy or erotic dreams. Most paraphilias appear to be developmentally induced, except where tumors screw up the sexual pathways in the brain. Paraphilias are induced mostly by biochemical malfunctions, not by three-dimensional lesions in the brain. The paraphilia is somehow a response to stress at a critical period of childhood when sexual-rehearsal play was handicapped, or avian induced prematurely under wrong conditions. Years later when there's gigantic stress in a person's life, this accommodation to the earlier stress reaffirms itself as an answer to the present stress.

Many years ago I saw a sixty-something year-old transsexual candidate applicant. He had spent years of his adult life married to a woman physician, and they had raised two children to college age. He had invested very successfully on the stock market, so he could stay at home on a small farm that he ran as well as invest. He established that life because he dressed as a lady every day just about.

In his early sixties he developed abdominal cancer, had surgery and was apparently okay for several years—no recurrence or metastases. But his response to the life-threatening tragedy of cancer was a complete blowup of his cross dressing into an obsession with becoming a transsexual. Always able to keep that at bay by dressing up as a lady, he now had to go all the way to surgery. The last clinic turned him down, saying it was merely a depressive reaction to his close brush with death. And like all good transsexuals, he got his doctor up and told them he was going to teach them a lesson or two.

He finally got through the barricades down here I told him. If you think this is going to be the salvation of your life, then you've got to get your affairs in order for a major change. You can't go into this lightly; you've got to pass the two-year real life test (the act of living and passing in the role of the opposite sex). You've got to get your wife in here to talk to me.

Owner: Was she against it?

Money: Not exactly. Not for it, either. It was spooky. I have never really gotten to the bottom of the strange colloquial business between a paraphile and the partner. Do they smell each other out at the time of courtship? Does one grow into the paraphilia of the other—or a bit of both? Well, I have to call it a spooky colloquial relationship. They know what they're doing. They're not ignorant, but both are powerless to not do it.

Anyway, concerning the pragmatics of marriage: it worked out marvelously for the physician to have someone doing the

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housekeeping, bookwork, and accounting. And I admire him for the deftness of his shenanigans. He finally got the evaluations he needed and managed to get the surgery done on Canadian national insurance. There's just one of many stories illustrating the point that he would've spent his whole life as just a cross-dresser, except for the stress of cancer that precipitated the complete transition. I could see it as plan as day. He wasn't changing into a sixty-five-year-old lady, he changed to be a little girl. Talk about Alice in Wonderland or Scofield O'Hara! This was the formula for rescue.

Omni: You've found only six major categories of paraphilia. Why is there so no category for machine paraphilia or skateboard complexes?

Money: I'm most puzzled that there's none for eating. I see anorexia nervosa as a sort of black-hole, a negative paraphilia. But I think that before a particular activity or ritual can become incorporated into a paraphilia, it has to be associated with a period of childhood development, probably between ages five and eight and possibly up to age ten, when there's sexual arousal related to this activity. The classic example is the kid who gets a hard-on while in a state of adject terror because he's been called down to the principal's office for punishment. It's been known for a long time that you get overflow, especially in the limbic system (a center of the brain). The emotions are supplely coded in the limbic system, so you get things like

crying at weddings and laughing at funerals, sneezing in response to light or sexual stimulation. It's a fascinating list of things just stashed away in the teeny area where one can jump the tracks over onto another. Intense panic at having to take your pants down and get beaten somehow gives you a hard-on. Suddenly you've got the connection between an erection, sexual feeling, and getting beaten up. So you've got a secret masochist in the making.

Omni: Is it possible for paraphilias to change their love maps?

Money: No more than you can change if you find out the origins of yours. I wouldn't rule out the possibility of some change over a longish period of time. But if reprogramming were easy, many people would get off as sex offenders would reprogram. They don't, and have terrible difficulty just keeping themselves out of jail.

Omni: What's going on neurochemically when one falls in love?

Money: Nobody knows. But it makes sense to think of pair-bonding as an aspect of human existence that has special programming in the brain. We call it falling in love when it hits you big. Only two other kinds of experience are analogs of it: sudden, intense grief and sudden, intense religious ecstasy. While all three can hit with immediate suddenness, they can also develop more slowly and build to a great crescendo. They take, as a general rule, about two years to fade and calm down a bit.

The circuits for pair-bonding and falling in love are built into us phylogenetically. The next step will be to find out which neurochemicals power it and what the stimulating trigger is. It can be visual: you do get love at first sight. But in four-legged species the nose is the trigger: smell, not visual input.

Omni: What about power—isn't it the ultimate aphrodisiac?

Money: For groups. That's their paraphilia. And the powerful get used to the onlooker who are willing to drop their clothes and go to bed with them. They take it for granted as perks of empire. I suspect that a significant number of people in power are masochists who can get an erection only by becoming subjugated. So they become slaves to their favorite mistress, a dominatrix. A good dominatrix is hard to find because so few women are actually turned on by whipping people and so on. It's very second and third best to put up with someone who's taking it.

At a symposium on sex and the nuclear threat at the End on congress, I heard sex will not diminish the nuclear threat. Our paraphilia involves people getting off by engineering a catastrophe and then watching it. We don't understand the paraphilic aspects of the sex lives of our leaders—except for the masochists. You realize how terribly dangerous paraphilic sexuality can be in people who've got too much power.

Omni: Maybe Dr. Strangelove is actually not all that strange.

Money: I was amazed at how accurate the sexual part of that movie was. The precise relationship between work and sex is not known, but there is a close connection. Many years ago a man volunteered to give me information for my dissertation work. He'd been born with a birth defect of the sex organs and had an extremely small penis (no more than two inches when erect). With great acumen he'd married a devout Catholic who was not very turned on to sex but was very turned on to being a wife and mother. After thirty-five years it turned out as successfully as anybody else's marriage.

Well, a woman at work put the make on him. Finally he got enough guts to tell her that if she was interested in having an affair with one of the smallest penises on Earth, he was game. He didn't have any problems with himself or her sexual activities, but his work changed. Instead of writing Mozart-type music, which was his specialty, he went off into mad, modern expressive symbolic music, post-Stravinsky. But he didn't want to destroy his family, so he broke off the affair and never composed any of that spectacular music again. So figure out Pissosi! How people's careers fit or don't fit in with their sex lives is a new world of knowledge.

Omni: What is an aphrodisiac?

Money: It's more than one thing. First, there's the falling-in-love drug, the love potion. Then there's the attenuated version of that, the substance to get him or her horny just for the night. Another is the fountain of youth, usually sought after by middle-aged or older men wanting to regain their lequency and



"Have you discovered which one of us is the father yet?"

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intensity of sex. The most common claim is for something that will enable a younger man to get and maintain an erection under adverse circumstances—hence the sale in deer antlers from New Zealand to China.

In Kashmir a youth implored the endocrinologist I was traveling with to give him a pill for "strength." His marriage night was coming up and he was scared to death. He'd scarcely seen the girl; his mother had picked out. And on the marriage night, according to the culture, the brides girlfriends were waiting for a report on how good he was, and the relatives would be waiting for the blood on the handkerchief to prove she'd been a virgin. If he didn't get a rock hard on three times that night, he'd have three days to redeem himself before she'd tell her girlfriends and he'd be disgraced, unmarriageable for life. You can believe there's an incredible quackery for things to give one "strength."

The fifth kind of aphrodisiac purports to give you a more explosive orgasm! That's the claim of most street drugs. Unquestionably if you get any erotic effect, it's from a very small amount. Larger doses have sexually inhibiting effects. Still, there's a situational disclaimer—what happens to you is partly a function of what's happening to the group you're with. There's probably nothing even approaching the classical concept of an aphrodisiac in today's pharmacopoeia. Maybe papaverine. It is derived from the poppy seed, but it's not addictive and acts

on smooth muscle, most likely upon the muscular flaps or valves controlling blood flow into the penis through the arterioles, and the outflow through the veins of the corpora cavernosa (spongy tissue that, when filled with blood, holds the penis erect). It produces an erection quite predictably and is used in surgery to find out whether the penis can function or not. But it's not totally predictable. Some get erections that stay up for twelve hours.

Ques! Most aphrodisiacs are for males. Why?

Manly: Didn't you know women don't have sexual feelings? [Laughs] They have love and romance. Above the belt, it's stroking how women's eroticism and sexuality have been so grossly neglected in research.

Ques! If the feedback of sex hormones to the brain contributes to eroticism, what happens to women after menopause?

Manly: That's tough because no one knows what estrogen does to women's eroticism. It's an absolute antidote for men. It turns off their erection. But as I've learned from the male-to-female transsexuals, estrogen doesn't turn off their whole-body response to "erotic feeling." It's a different kind of responsiveness than they felt when they would get erect and ejaculate before they went on estrogen treatment. What male-to-female transsexuals are completely happy if not ecstatic about is what they now experience with their testosterone levels down, or gone after they're castrated. This is what they in-

terpret to be women's sexuality, which is just a great pleasure to them, not to be top-hammered all the way. Whether they are like women or not, they don't know because how can you get inside somebody else's erotic psyche and find out if it's the same as yours?

I've got tapes in which they describe their orgasmic peaks prior to treatment and then a couple years later—and it's not the same. But then, they haven't lost anything they miss; they've gained something they've looked forward to. Whereas the female-to-males who get heavy doses of androgen have everything they used to have before and more of it. And this case means multiple orgasms. In these patients the clitoris is always preserved and embedded in whatever new penis structure might be made through plastic surgery. That complexity fits with what's known about women who are heavily androgenized—more erotic feeling, intensity of feeling, more frequent horniness and arousal.

Ques! What about psychiatrist Michael Liebowitz's theory that the neurochemical phenylethylamine is the brain's love potion?

Manly: Where else is it going on but in the brain—whether you call it love, lust, sex, romance or affection? If you become detachable, you have none of that. Obviously there's got to be a biology of love in the brain, but can we pinpoint it? What are the instruments of its getting there? How does that sensation get translated into permanent memory messages that can be activated

from time to time? Those are the big questions we should address ourselves to. **Omni:** What neurophysiological research would you like to do?

Money: I expect that some pioneer will do brain studies on paraphilic patients, in particular those who show a very clear trance-like state when they get into their paraphilia. I see a number of paraphilics who are also clinical epileptics. These and many others show clinical signs of an altered state of consciousness—changes in breathing and heart rate, blood pressure, galvanic skin response, and so on. And you can see that they look different and talk like. By doing brain readings on people when they're undergoing that change, we might begin to pinpoint the areas in the brain the impulse/reflexion is coming from.

It would be just great to get past the watchdogs of animesearch, as I call the ethics committees. Everyone suspects you if you want to look at brains and sex together, but that's where we have to go. The next step is taking a look under the PET scan. But it would be difficult for the support staff, including the nurses, not to get rattled by the fact that the guy was looking at dirty pictures of reading a paraphilic story and masturbate. But we won't find anything about what's going on in the brain unless you have that specific paraphilic situation.

Omni: What do you think will happen to love and sex in 2066?

Money: I'll be surprised if things are much different. Of course, you might have to take responsibility at *Omni* magazine for having pregnant ladies in one hundred years. [Male Pregnancy, December 1985.] And then any science fiction idea is that with a bit of genetic engineering one might program for reverse embryogenesis, so that then one might be able to backtrack and grow the sex organs out again in the form of the opposite sex. Lizards can grow a new tail at any stage of their lives, so once you learn how to get organ regeneration, there's no age limit on it. You'd just tell the clones to backtrack to the genital tubercle [embryonic tissue that will differentiate into the external sex organs of either sex] and then grow out as a penis, with skin wrapped around it instead of having a hood and labia minora, and it would do just what it's told.

Omni: Might we create an infant in whom both the Wolffian and Mullerian ducts develop? [Wolffian ducts are fetal structures that grow into male internal reproductive anatomy. Mullerian ducts develop into female reproductive organs.]

Money: And have a child with a penis and testicles and uterus and Fallopian tubes? The problem now is they tend to interfere with one another. At least one of the testicles in trying to descend, has to drag with it the rest of the Mullerian apparatus down the side. So it's not too uncommon to find a male with uterus and Fallopian tubes plus two undescended testicles and the rest of the male apparatus. I have one patient from way back—a so-called true hermaphrodite—who had an ovary and a big breast on one side and a

testicle on the other. How the body was producing hormones to let one half grow one way and the other half the other. **Baatsie:** **Omni:** What about future technological breakthroughs?

Money: As an undergraduate in New Zealand I concluded that psychology only amounted to something after we invented a mind-reading machine so we wouldn't have to rely on signals people emit and what they say. I can't imagine what a mind-reading machine will tap into. But if we ever got it to read out people's fantasies without having to go through the laborious process of listening to their edited versions as they come out of their mouths, or watch them as they enact their paraphilic rituals, then heaven knows what we could do with the procedure, unethically as well as ethically!

Omni: Would people have the option of using or not using it, say in a singles bar?

Money: Oh, I didn't have them in a room broadcasting. I just had them in the lab hatched up to a machine. You're one step ahead of me. Another thing that's been overlooked is the whole business of performance and falling in love. Which I find in many respects incredibly more fascinating than sex and genital function. Love has been so neglected, yet it dictates just about everything that happens to teenagers. Lovelessness is the major illness that causes room failures at college, yet it's never called that. It's always called depression or some silly label. People in the future will still have these great intensities of feeling for one another and then suffer terrible disillusionment when the other does not behave the way they're supposed to.

Omni: Maybe future societies will allow love and lovelessness as an excuse for missing an exam or not coming to work for a week.

Money: It's an important speculation because the amount of time spent at work is obviously going to be diminished as everything becomes microchips. What else is there left in life, really, when you get down to absolute fundamentals, except food, shelter, clothing and love and lust? **OC**

CREDITS

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SCOTCH OF RARE CHARACTER

Here is the solution to last month's J&B puzzle.

4	0	9	1		1	2
6	0		9		1	0
	7	8	6			9
4		6	9	6		8
1	5			3	2	
5	0		2	3	0	2
3	3	6			6	4

- ACROSS
- 2001 + 2010 + 80 = 4091
 - 12 (There is no Channel 1)
 - 66 - (2 x 3) = 60
 - 10 (Downing Street)
 - 777 + (3 x 3) = 777 + 9 = 786
 - 100 - 6 = 94
 - (50 x 10) + (12 x 8) = 600 + 96 = 696
 - 15 bottles (Last customer bought 8, second bought 4, third bought 2, last customer bought 1)
 - 32 cards
 - 20 + 20 + 30 = 50
 - 9905 + 451 - 52 = 2302
 - 3 x 4 x 4 x (4 + 3) = 48 x 7 = 336
 - (25 x 25) + 15 = 625 + 15 = 640
- DOWN
- 46
 - 000 (All three played James Bond)
 - 3909
 - 41 39 (one 50 cent piece, one quarter, four dimes, no nickels, and five pennies)
 - 530 48
 - 86 proof
 - 11 (421 + 86) - (12 x 2) = 4177 - 24 = 4153
 - 89 x 8 x 9 = 6336
 - 1505
 - 17 204
 - 20-20 pounds

The world's largest puzzle collection

GAMES

By Scot Morris

When Jerry Slocum got a Japanese barrel puzzle for his eighth birthday, he was hooked. The interlocking wood pieces fascinated him, and puzzles of all kinds have captivated him ever since.

Now fifty-four and an aerospace engineer for Hughes Aircraft, he has recently been forced to build an addition to his Beverly Hills home. This two-story structure next to the garage houses the world's largest collection of mechanical puzzles (more than 10,000 items) and puzzle-related books (more than 2,000).

The puzzles are carefully organized and cross-indexed. Three drawers contain nothing but plastic key-chain puzzles; there are well over 1,000 interlocking wood puzzles and several hundred variations on the Rubik's cube.

Rare and fragile puzzles are behind glass. The smallest is a three-piece rosewood "burr" puzzle smaller than a match head. The largest is a giant wood puzzle from France that is more than two feet in diameter. The most valuable is a Chinese carved ivory tangram set (at right) dating from about 1820. Slocum bought it for \$500 ten years ago and hesitates to estimate its worth today. The seven-piece tangram puzzle, invented in China about 1800, was a worldwide craze between 1811 and 1820 and is perhaps the most widely played puzzle in all the world.

Among the most fragile are puzzle mugs and jugs (an example is shown at far right, this page). This type of vessel was used to serve beer to strangers in British pubs in the eighteenth and nineteenth centuries. Any attempt to drink the liquid results in some spilling—unless you solve the puzzle. A visitor could literally dash himself before he found the solution, which was to suck on a hole in the top of the mug while using several fingers to close off other holes. The hollow interior design of the mug acted as a straw, and the entire contents could be consumed without spilling a drop.

Another collector's item was the delectable puzzle (shown at top page 132), manufactured by R. Joussel and sent to British and Allied soldiers in German POW camps during World War I. In outward appearance, the object was to arrange the balls in



Fragile glass and water puzzle. Can you get the above bubble into the center as it right?



Chinese ivory tangram set and box, circa 1820

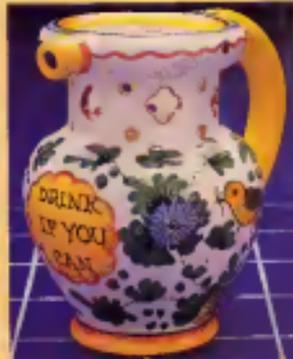


Lloyd's 14-15 puzzle and solvability spiral

order. But such puzzles contained a small compass, a hacksaw, and occasionally a map to help the prisoners escape.

Slocum limits his obsession to mechanical puzzles, which are distinguished from their jigsaw, crossword, metaphorical, and wordplay cousins in that they require active manipulation of a physical object.

The ideal mechanical puzzle is simple but complex," Slocum says. "It has only a few pieces but is surprisingly difficult to solve. The surprise is what hooks you. People like the challenge of matching their wits against a physical object. The simplest puzzle can seem impossible to someone



Puzzle jug. Can you drink without spilling?

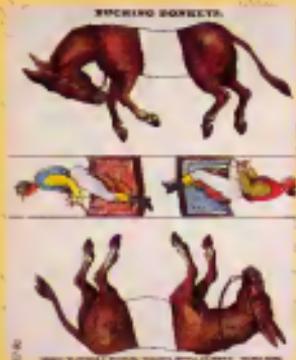
looked into a rigid view of the world. Ten year olds are good at puzzles because they're not locked in by conventions."

For the last eight years Slocum has hosted an annual "puzzle party," an invitation-only conclave of puzzle experts, invited inventors, collectors, and occasional interested journalists. At the last convention we were among the lucky 40 attendees, some of whom came from as far away as England, Holland, Japan, and New Zealand. (Slocum is eager to hear from other puzzle collectors. Write him at Box 1633, Beverly Hills, CA 90213.)

In recent months Slocum has been



POW puzzle with hidden compass and saw



Donkeys: Cut and arrange the three pieces

writing his new book, *Puzzles Old and New*, published last month by the University of Washington Press. Seattle) and organizing *Puzzles of the World*, the world's first public exhibition of puzzles. The collection, scheduled to appear at the Los Angeles Craft and Folk Art Museum starting in November and running through February 1987, will then move on to other cities in the United States and abroad. The show will be made up of items from Bloom's collection—augmented by loans from several other collectors. Many items have never before been seen by the public.

Why does the exhibition start in a folk art

museum? "Because puzzles are a genuine form of folk art," Bloom says. "Sometimes they become massively popular, but only occasionally do we know who invented them. Usually the inventor is anonymous."

WITNESS FOR NICHOLS'S CUBE

Bloom isn't just a collector; he is an authority on the history of puzzles and puzzle principles. He was the key expert witness in the Rubik's cube patent infringement trial, and his testimony helped win a suit filed by Larry Nichols, a Massachusetts inventor who claimed that his 1973 patent for a cubic puzzle was infringed by Rubik's cube. Erno Rubik had a 1977 Hungarian patent on his cube, which was released by Ideal Toys in the United States in 1980.

Nichols never claimed that Rubik stole exactly stole his idea. Bloom says, "only that the U.S. marketers didn't make sure that the product weren't already covered by a U.S. patent, which was their responsibility. Though the mechanism of Rubik's cube was different and more complex than Nichols's invention, the object of the puzzle was the same—to rotate subcubes so that each side of the cube was one color. That was the focus of the lawsuit. Nichols's idea was a major innovation in the puzzle world. I'd say."

In October 1984 a U.S. district judge in Delaware agreed with Bloom and issued a 50-page verdict that ruled in Nichols's favor. The verdict is currently on appeal by ORS, the owner of Ideal Toys. If Nichols's suit is upheld, the dollar amount of the outcome is yet to be determined.

COLLECTOR'S ITEMS

Perhaps the world's most renowned puzzle prior to Rubik's cube was Sam Loyd's 14-15 puzzle (page 132, lower left), first published in the 1870s. Loyd offered a prize of \$1,000 to anyone who could solve the puzzle and, by sliding only rearrange the numbers into the correct order, including the last five pieces, which were originally ordered 13-15-14.

Although many people said they had done it, no one claimed the \$1,000 prize and several years later mathematicians proved it could not be done. From the

opening arrangement of squares, the puzzle had a "parity" from which it was impossible to achieve certain arrangements—including a 13-14-15 last row—without switching at least two pieces somewhere else in the puzzle. The puzzle shown adjacent to it is a sliding square variation called *Rare Your Mind Pal*, which uses letters instead of numbers. Surprisingly, it can be solved. Given what you know about Loyd's original version, how can this version be solved? (Answers appear below.)

The fragile one-of-a-kind puzzle shown at the top of page 132 is made of blown glass and colored water. The challenge is to get the entire bubble in the center section as shown. If you try putting the whole bubble at one end and then tilting the glass you'll find that before you can get all of the bubble into the center section, part of it slips to the far end and you have to start over. This is a variation on a more familiar puzzle that uses two steel balls that must be manipulated to sit on shelves at the outer end of the puzzle. The bubble puzzle can be solved, as shown in the rightmost photo. But how?

Sam Loyd's *Trek Donkeys* (left; this page) is a classic puzzle that Loyd probably based on seventeenth-century Persian art. It first appeared as P. T. Barnum's *Trek Mules* in one of Barnum's 1872 publicity files: "You are to cut the puzzle into three pieces and arrange them so that each donkey has a correct color. Folding, cutting or tearing the pieces is disallowed. This is one of those elegant Aha-type puzzles that can frustrate you for quite some time before the solution finally comes. Variations have been printed using donkeys, horses, bulls, and even black cats ridden by witches if you have never encountered this puzzle before, we encourage you to try it out. The answer will appear next month. ☐

ANSWERS

THE BUBBLE IN THE CENTER
 puzzle: Carefully force on the liquid across
 bubble. E. This motion is to form the
 one way to change the P to a PL.
 one way to change the PL to a PL.
 one way to change the PL to a PL.
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 one way to change the PL to a PL.
 one way to change the PL to a PL.



LAST WORD

By Terry Rouns

●Dennen suffered from an affliction more common than measles, more deadly than bubonic plague, more stupefying than a subscription to Reader's Digest. Dennen was in love. ●

Dwight Dennen was a typical worker. His symptoms were largely unnoticed at first, he thought his sleeplessness was caused by the weather or too much coffee. Later he developed mood swings, which progressively intensified. Soon he lost all ability to concentrate, which his doctor blamed on a lack of sleep caused by too much coffee, which Dennen drank to explore his waning concentration.

Soon Dennen was taking medicine to function on a day-to-day basis. One week he would lose all interest in food, the next he would gorge. He panicked compulsively. Raving from indignation and insanity, he would alternately break into song or collapse into rales. His friends began to fear for his very life. Some suspected drugs. Others whispered darkly that his wife's nervous breakdown.

"Whatever it was," reveals one to worker "sent him packing for loopy land. He was a total fito."

In fact, Mr. Dennen suffered from an affliction more common than measles, more deadly than bubonic plague, and more stupefying than a telephone subscription to Reader's Digest.

Dwight Dennen was a jobless 19th-century Dennen would have been diagnosed as being beyond treatment, his hopelessly in love. "Now there is hope for these victims of love." Every year, thousands of couples make a special trip to a loving clinic in the South Pacific, where they are treated, cured and returned to productive lives on nearby. The clinic is headed by its founder, the distinguished surgeon, Dr. Quornah.

Quornah was the first to show that "true love" is not a behavioral disorder but a considerable medical defect. The disorder is caused by a benign tumor that grows on the hypothalamus, a primary regulatory center of the brain. For years we've known about a tumor tumor that causes an extreme fondness for Judy Garland," says Quornah. A simple operation to remove the growth, one says, cures the disorder.

Enter weekly Dr. Quornah onboard the S.S. Halo Boat, the luxury liner that houses the legendary clinic. We spoke while relaxing in the stateroom. Room, the grand equatorial breezes wafted through the room, playing with the paper umbrellas of an empty Cabaret Coria.

Dr. Quornah was relaxing in a dimly lit stateroom that sunny afternoon. As she talked she would take my hand and squeeze it lightly for emphasis. Her dark eyes held mine in an eternal gaze.

Once the "love" tumor reaches a certain size, she explained, it causes the hypothalamus to distort the sensory messages that the brain receives. Ocular perception is altered, making people and objects appear considerably more attractive than they really are. Also the pituitary gland begins to secrete hormones directly causing wild mood swings.

"At this point," said Quornah, "I'm poor

poor. I talk in love with the first member of the opposite sex who comes knocking by."

Quornah said she can correct advanced stages of love sickness by removing the tumor with laser surgery. She now performs cure rates of 100 percent and can be among the best of some of the most famous people in the world. "In the beginning, simple techniques were a little crude, so the tumor would sometimes grow back. We must have had Richard Burton and Elizabeth Taylor at one half a dozen times before they were finally cured."

Quornah had just finished speaking when Dwight Dennen entered the bar, a headband of gauze taped to the shaved spot on the back of his head. It was his first day after surgery and Quornah watched him closely for any signs of his old behavior. She asked how he was feeling.

"That's a new idea," Dennen said to Quornah, cupping her hand. "So what'd you say?" he said, turning to me. "When the ship makes port we'll be the doctor. I'm saying, My old body's existence is paying for all this, so we might as well run up the bill."

As he laughed like a drunken confectioner, Quornah and I looked warmly at each other. A thought passed between us, though she never articulated her complex idea. What a job.

Quornah offered her hand to him. "Congratulations! You're behaving like a normal male! Mr. Dennen. Let me buy you a drink to celebrate. A Cabaret Coria?"

"We got a better idea," Dennen suggested, sliding up next to Quornah and rubbing. He held up her thigh. "Let me buy you a drink. Let's get to know each other a little better, let me to check up your bedside manner, Doc."

Suddenly I found myself lunging across the table. "Get your hands off her," I roared, my hands thrusting Dennen's face.

In an instant Quornah was behind us. "Easy, Easy! Easy! Control yourself. I heard her as from a distance. Her husky voice soothed me as she gripped my fingers from the back."

My mind reeled as I staggered dizzily back to my chair. Dennen's face hovered above me. "Geez, what's got into you?"

Meanwhile, the doctor had grabbed her medical bag and aimed a pencil into my glazed eyes as I ranted. "Don't you talk about greed? I mean, don't you think she's a nurse and a jail?"

I felt the click of a needle and in seconds began to lose consciousness. As the drug took hold, Quornah and Dennen seemed to be moving in slow motion. Quornah grabbed a white table and barreled into it. "I won't surgery, ready in five minutes!"

We've got one wild's gone to Anore City!

Balloo! I blocked out. I heard Quornah stammering gawily. "He's got it bad."

Dennen nodded in agreement. "And that ain't good!"

What you've heard, Terry Rouns, is a re-creation of a real event. Get real cards and telephone numbers can be sent to Chicago.