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OMNI®

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CONTENTS

Their sights set firmly on planet Earth alien space explorers catapult from a neighboring asteroid on this month s cover titled Invader from Mars *a futuristic illustration created by Japanese artist Takashi Terada*

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FIRST WORD

By Tom Wicker

"As events transpire and controversial questions arise, reporters and their editors can make independent decisions about what news is necessary to cover, and what news isn't."

When the Miami *Herald* staked out Gary Hart's town house last year, the newspaper's disclosure that a woman who was not his wife had spent the night with him led to Hart's withdrawal from the presidential campaign—and to a new round of handwringing in the old debate about the ethics of the American press.

Then it was disclosed that Joseph Biden had copied some of his speeches from other politicians and had altered his law school records. He pulled out of the presidential race, and Michael Dukakis's campaign staff was identified as having leaked the Biden "scandal" to an entirely receptive press.

Later Douglas Ginsburg, President Reagan's Supreme Court nominee, was forced by press inquiries to confess that he had smoked marijuana, whereupon two more presidential candidates, Bruce Babbitt and Albert Gore, admitted they too had puffed a few joints in the past. Babbitt and Gore survived, but Ginsburg's nomination had to be withdrawn.

For many Americans, this spate of disclosures caused the press to appear preoccupied with the private lives of public persons. Had Hart's privacy been invaded without reason? Had Biden been driven from the presidential race by an overzealous press? Has a presidential candidate any right to privacy, anyway? Would stakeouts and sexual inquisitions become accepted tactics for reporting on public figures?

Some public figures who might have run for President raised another question by leaving the impression that press scrutiny was one reason they had decided not to run. Was press prying not only driving some candidates out but also preventing others from running?

The public's agitation inevitably revived discussion, even among journalists, concerning a national press council to consider press ethics in controversial cases and from whose judgments a more or less uniform set of journalistic standards might emerge. Such a council, sponsored by the Twentieth Century Fund, had functioned unofficially and briefly before dying in 1984 of acute lack of support from the press.

Should the council be revived? After all, as General William Westmoreland once complained to a Harvard Law School forum, when he felt himself maligned by a CBS documentary, he had to choose between writing a protest letter to the network or suing it; he took the second course and lost. Shouldn't he have had a more useful and less costly option, such as the news council from which to seek what he considered justice? It's easy to see why Westmoreland thinks so and why some Americans believe someone ought to sit in judgment of the Miami *Herald*'s stakeout of Gary Hart's home.

The old news council was nevertheless a bad idea, and a new incarnation would be no better. Through its considerable power to hold such offenders up to public scorn, a press council might become a threat to robust journalism, a disservice to the public rather than a protection for it.

Such a council would be empowered to question editorial judgments, inquire into editors' or reporters' states of mind at the time of certain decisions, to ask why this was published or broadcast and why that was not, and to substitute its own standards for those of journalists who had the actual responsibility to decide what should or shouldn't be printed, often under newsroom and deadline pressures.

Few who have worked in the field can doubt that the mere existence of such a council—peering, as it were, over the shoulder of every news executive—would tend to inhibit them, particularly the considerable number who already seek more often to conform than to confound. Like most people, journalists would rather be admired than denounced, many would fear the possibility of later being called to account for an audacious judgment that might go wrong.

Suppose, moreover, that the council's second-guessing did lead to something like a set of generally accepted guidelines for news organizations. Would that really be a protection for the public? Not if it resulted in more standardization of press reports and less journalistic initiative as well as more caution and less diversity in news and editorial columns.

Besides, there probably is more debate among journalists than among the public on the subject of the invasion of once-private lives. This free-flowing dialogue is more useful and in the long run will prove more fruitful than guidelines that can't possibly cover all eventualities.

As for the Hart story, neither stakeout nor sexual inquisition has, in fact, become a new norm. If ours is to be a challenging, skeptical, inquiring press—the press I believe most thoughtful Americans want—how can a line be drawn between relentless reporting on public affairs and relentless reporting on the private lives of those engaged in public affairs? How can reporters be taught that truth is the object on one side of the line, but complicity and cover-up are the rule on the other?

They can't and shouldn't be. But as events transpire and controversial questions arise, reporters and their editors—reflecting the vast diversity of American journalism—can make independent, reasonable decisions about what's necessary to cover and disclose and what's not. Not all will make the same decision, not all will make the right decision, not in all cases will the right decision ever become clear.

It's nevertheless the responsibility of a free press to decide these hard questions as they arise—and not that of a review panel sitting in distant judgment. ∞

Tom Wicker writes "In the Nation," a political column in The New York Times.

CONTRIBUTORS

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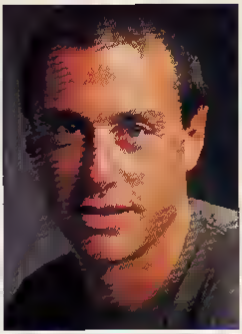

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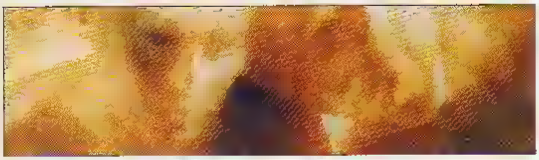

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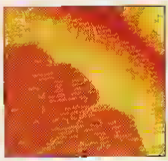

SCENTUOUS

WILD WILD HORSES

Sweetness such sweetness just to walk away from the daily routine workin nine to five—deadlines reports meetings, orders barked out from oval holes the big offices upstairs Split Transcend the stuff Fly above the hassles How many times in any given week do you hear your friends or co-workers say "I'm bored gotta do something else"? Do you ever sit at your desk or word processor and compose resignation letters drifting off into another realm, a place where there are no lists—get mayo toilet paper more dill—a make believe town where you really are "happy" "contented "fulfilled"?

Well some of us leave our surroundings more easily than others do In fact say a number of fantasy researchers that dude sitting in the cubicle next to you may be daydreaming in some la-la land 95 percent of his waking hours Really Some people just live in "Fantasia" and if you want to know more about what scientists call fantasy-prone personalities check out the story by *Jessica Maxwell* that begins on page 64

Doug Lenat's not a fantasy-prone individual—at least not that we know of But he's heavy into a real-life dream he's trying to create a computer that's got as much common sense as a six-year-old child No mean accomplishment If all goes well, Lenat's intelligent offspring, named CYC (pronounced *psych*—short for *Cyclopedia*) will be able to think for itself—in about the year 1996

As part of its first breakthrough CYC was able to make sense of two sentences "Napoleon died on St Helena Wellington was saddened" If that doesn't impress you turn to page 44 to the story "Brain Trusts" and writer *Michael Leibowitz* will tell you how much blood sweat and tears went into getting CYC past the half-wit stage

In the same article writer *Grant Fjermedal* tells us the psychological significance of personal robots—a story about machines that supposedly will have human characteristics intelligence sociability the ability to talk to us listen comfort, and love us when we come home and cry the blues A psychiatrist Fjermedal interviewed for "Brain Trusts" says, "Whoever finds a way to solve the problem of human loneliness with or without machines will go down in history as a great benefactor of humankind"

Sarah Hrdy probably wouldn't like to be described as a "great benefactor" but the subject of this month's Interview (page 90) a behavioral biologist has reshaped key ideas about female sexuality Females says Hrdy aren't passive receptacles genetically doomed to a life of monogamy but may possess a powerful sex drive and tend to seek out sex with a number of males

Now go easy Hrdy is not espousing promiscuity She's an expert in primate sexuality monkey sex as practiced by one group of monkeys—the sacred hanuman monkeys in India In the process of trying to find out why male hanumans were killing infants as the females stood by apparently helpless" she discovered that long-standing anthropological assumptions—male assumptions of course—were wrong At the center of Hrdy's work is her concern about social control throughout history of female sexuality—whether it's primate or human

Hrdy's not the only one to take on history In "Wild Wild Horses" the fiction story beginning on page 80 *Howard Waldrop* reshapes a bit of Roman history Waldrop's collection *All About Strange Monsters of the Recent Past* (Ursus) has been nominated for the Bram Stoker Award given by the Horror Writers of America And in "The Domino Master" (page 52) physician *Michael Blumlein* tells us about a very unhappy boy who finds happiness in a strange place

Some other people are also playing with history but this time it's art history Move over Motherwell It seems that smart machines are going to replace paintbrush and easel At least that's what Ken Evans claims in the pictorial "Paint by Numbers" Evans is a computer scientist and mathematician turned nouveau artist You don't have to stand in line at the museum to see his pictures just turn to page 72 In this month's second pictorial "Scentuous (page 58) *Nina Guccione* tells you what some people do with perfume—besides splashing that dab daintily behind your earlobe Rita Hayworth sort of outdid everyone

LETTERS

COMMUNICATIONS

And on the Eighth Day . . . UFOs

Your recent article on heaven-sent UFOs [Antimatter, "UFO Update," March 1988] really intrigued me. We all know the story of the Red Sea and have asked how God pulled this one off but which is more believable: a "mere" wave of His omnipotent hand, or some high-tech UFO manned by angels? There are supernatural realms we know nothing of, so why try to box them up in our own human sense of reality? The bush burned. Manna fell. And the Red Sea parted. No explanation needed.

Kathryn Mills
Delphos, OH

More Power to Tesla

Bill Lawren's article ["Rediscovering Tesla," March 1988] has left us with some wrong impressions. Note that Tesla did not invent alternating current (AC) but the multiphase AC motor. What we salute is Tesla's conception of generating AC, stepping up the voltage for low-loss transmission to remote locations, and then reducing it to a safe, usable level to drive the motors he invented. Also, Tesla's contribution to radio technology lay not simply in building a "high-frequency coil" but rather in his elucidating the concepts of resonance to provide transmission and reception of radio signals and power.

Myron J. Boyajian
International Tesla Society, Inc.
Homewood, IL

Knightclub

Now, here is a very novel approach to religion. What better way to start a new religion than to tell people they are godlike [First Word, March 1988]. Science will uncover the causes of humanity's shortcomings by asking the right questions, not by telling people what they want to hear—for profit. The jury is still out on J. Z. Knight, channelers, and the New Age religion. Their success will be measured by the size of their bank accounts. Finally, when the followers of Knight and the gang find out they have no more answers than they did when they started, this fad will end. Then J. Z. Knight and Ramtha will have to sit down and think of new "godlike" ways to spend all that money.

Randy Beck
Wisconisco, PA

Wise for Her Years

About your story on Superman [Books, "Golly, Miss Lane, Superman's 50," March 1988]: I read science fiction, and in my book Superman is the worst. There are too many stories about nonhuman humans. They make me sick. I'm thirteen years old. When I was twelve I knew I wasn't "delivered by a stork" or "pulled out of a nook in the sky." It seems to me that child psychologist Jane Kessler is implying adolescents are stupid.

Elizabeth Hedgeman
Colorado Springs

Shh, Boom, Bah

It is obvious from reading the article on social loafing [Continuum, "Loafing in Groups," March 1988] that the researchers involved have never been cheerleaders or any other sort of performers. I have been both, and I could have told them that a good cheerleader is not supposed to cheer louder than those around her. I certainly hope they did not share the results of this experiment with the test subjects, or they might have ruined a perfectly good cheerleading camp.

Richard Schwartz
Alexandria, VA

Of Mice and Men's Saliva

In "Tapping the Healers Within" [March 1988], Carol Kahn informs us that epidermal growth factors [EGF] are found in the salivary glands of mice. If this is also true of humans, might not there be some physiological foundation for man's instinct to suck on a small cut? In the animal kingdom, when a creature is injured one of the first actions taken is to clean the wound by licking. Could this be nature's way of delivering EGF to the site of the injury? With this in mind, the old standby "Let Mama kiss and make it better" takes on entirely new meaning.

Charles Cutler
Ponca City, OK □□

SEX AND THE STEGOSAURUS

FORUM

The fearless speculation of a few Cretaceous hypothesizers has shed a whole new light on what love might have been like among the plate-backed *Stegosaurus, Dimetrodon, Tyrannosaurus rex, Brontosaurus,* and *Diplodocus.* In our February 1988 issue, writer Sandy Fritz explored the controversial ideas of a few paleontologists and dinosaur mavericks in his piece "Tyrannosaurus Sex: A Love Tail." They had their opinions. Many readers had theirs.

Copulating dinosaurs? Even if the article was meritorious and worthy of publication it should have been in a magazine that caters to the prurient element of society, not the cerebral. The illustrations only added to the denigration of an otherwise fine journal. My wife is currently reading the issue cover to cover, and if she likes it we will keep our subscription. If not, out you go, and you will know why.

T. Wilson
Plymouth, MN

Really, now—dinosaurs? You have reached the limit of some kind of taste: good? Perhaps for the dinosaurs, but they no longer exist and couldn't read if they did. Bad? Except my quirky sense of humor saved you. Indifferent? That's me.

Emolyn Bouchounek
Santee, CA

While Ron Embleton's paintings were marvelously detailed and, well, . . . um, charming, I was disappointed that the cartoons Beverly Halstead showed to Sandy Fritz (which were described in the article) were not included in the piece. After reading the article, I got an idea for a cartoon of my own. Many thanks. I enjoy *Omni* 100 percent.

A. R. Morian
Ladysmith, WI

Concerning dinosaurs and sex: alternatives—perhaps like salmon, eggs were fertilized after having been laid. The eggs, admittedly had a hard shell but may have been made porous with a semipermeable membrane beneath to hold the contents. In the moist world of the dinosaurs, it could be possible. Or maybe dinosaurs did not differentiate between sexes and just laid eggs when they felt like it. This would result in a static state for each species, with changes due only to mutation. This could explain why the dinosaurs lived so long without evolving and why they died out. Or maybe it was kissing. Everyone knows kissing causes pregnancy.

Nye Marnach
Salinas, CA

I was interested in your article because of the apparent single-mindedness of the various scientists involved. As I began reading the article, it all made some sort of sense. But one question, which was addressed later in the article, immediately popped to mind. What about the stegosaur, with its plates and spikes? The only method of mating mentioned is with the male mounting the female from behind. Is it possible that some breeds of dinosaurs did it in a similar manner to fish or turtles, with no actual contact between the male and female, but rather the fertilization of the egg occurring outside the female's body?

Margaret C. Rule
Columbus, Ohio

Hunk a hunk of burnin' love

Other possibilities concerning the mating of dinosaurs may be that they were like frogs. The males were considerably smaller than the huge females, and they mated in the water. Or they may have had frenzied mating orgies in the water, with the males releasing sperm as salmon do and the females collecting it with fanlike genital organs.

Arden Aradon
Hollywood, CA

About the dinosaurs' social lives: Too much fussil was made about them. Innately shy, they resented the snooping people of the future. Afraid of being buried by the blizzard of publicity, they spermanently stopped reproducing. So we are left with guesses as to what really happened. Was their story banal? Were there any angles the scientists failed to mention? It is nice to be on top of current research. Penetrating stories are interesting, even if they do involve some muckraking.

Bob Jones
Washington, DC

After reading your article, I rather fancied myself a female brontosaur lying about on some ancient seashore, languidly lacing the sand with my tail, my head thrown back in an ecstasy of heat. Now, wouldn't one of those egotistical 80-ton pea-brained males have sense enough to nail me in the proper missionary fashion? As for those kinky *Kentrosaurus* broads . . . the spikes were to hold a thrasher in place.

Betty J. DeVries
Ferndale, WA

Talk about compact education and entertainment—super article! These guys (dinosaurs) were some of the original experts long before any forbidden fruit. Who knows what they could have done on a moonlit night under the shadow of a

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THE UNTOUCHABLES?

BODY

By Mark Teich

In 1983 Hacib Aoun, a young resident at Johns Hopkins Hospital in Baltimore, had a minor accident while drawing blood from a teenage leukemia patient. As he sealed the delicate crystal tube of blood, it shattered in his hands, one shard slicing his index finger. Aoun soon forgot the incident, going on to become chief resident at Johns Hopkins, then a fellow in cardiology with a seemingly boundless future.

Three years later Aoun came down with a persistent fever. He grew fatigued and kept losing weight. His doctors guessed he had a malignancy, but tests showed no abnormalities. On an off chance, Aoun had himself tested for AIDS. The test came back positive, so he had it repeated. On Christmas Eve of 1986, the results were confirmed. Aoun had AIDS.

It seemed impossible. Neither homosexual nor bisexual, he had never used intravenous drugs or had a blood transfusion. A married man, he had not been promiscuous. He could think of only one route through which the infection could have entered his bloodstream: the cut he had received while handling the leukemia patient's blood. The hospital had stored samples of the teenager's blood for research purposes, and an AIDS test confirmed Aoun's suspicion. His young patient, the recipient of more than 100 transfusions, had unwittingly transmitted the virus to him. That Aoun had contracted the disease while providing routine care for a sick patient made no difference. The young doctor was going to die.

Dr. Aoun's tragedy is at the eye of an ethical storm. According to the Centers for Disease Control (CDC) in Atlanta, which has monitored the AIDS epidemic since it first surfaced in the United States, 13 other health care workers have contracted AIDS directly from their patients. Consequently, many members of the medical community—particularly those who regularly handle blood—have grown increasingly wary of AIDS patients. Some doctors have begun turning them away.

The upshot, according to civil liberties and human rights organizations around the country, is that many AIDS patients are forced to scrounge and claw for health care anywhere they can get it. Bounced from one reluctant professional to another, or stalled with endless superfluous exams, the patients are experiencing dangerous delays in getting appropriate treatment. It is a new and virulent form of discrimination against people with AIDS, their advocates say, and one that could easily become even more rampant than the discrimination they already face in the workforce and in schools.

"The majority of our discrimination complaints now are against those who provide health services," says Azi Khalili, a supervisor for the AIDS Discrimination Unit of the New York City Commission on Human Rights. "Now that more people are coming down with AIDS, and caregivers are needed outside the gay community, we're seeing many more refusals."

Sometimes, says Khalili, the results are disastrous. She cites the recent case of an AIDS patient with a badly infected mouth who was denied treatment by a Bronx hospital. For four days he lay in the hospital getting sicker, but no one in the dental care unit would work on his mouth. He died from his oral infections.

Blood simple? Doctors, patients face off

Those who refuse to treat such patients frequently offer a chilling rationale: The person would have died soon anyway. Because any treatment would serve only to postpone the inevitable, they say, the risk to medical personnel—not to mention the loved ones and future patients a practitioner with AIDS might go on to infect—is simply not justified. "In a hopeless situation, to further add the risk to twenty or thirty dedicated professionals who have to wake up the next day and provide services to other patients, I think is morally wrong," says Newark, New Jersey, cardiovascular surgeon Ronald Abel, who has turned down four AIDS-infected intravenous (IV) drug abusers for complicated heart bypass surgery.

The American Medical Association (AMA) officially deplores this kind of attitude, but it's not doing much to discourage it. Its stance is that doctors "may not ethically refuse to treat a patient whose condition is within the physician's current realm of competence," yet it neither punishes nor censures doctors who refuse treatment to AIDS patients. The AMA stipulates only that reluctant doctors refer patients to other physicians, and it maintains that virtually all patients in this referral limbo are directed to someone who can provide treatment. "We know of no cases where [AIDS] patients have failed to receive care because of not finding a physician. People with AIDS in this country are getting good medical treatment," says Dr. Alan R. Nelson, chairman of the AMA's board of trustees.

In reality, the situation is somewhat less heartening, say some advocates for AIDS patients' rights. For example, declares Khalili, the patient who died from oral infections was not referred to anyone. "In many cases before our commission, the doctors never make a referral," she says. "Once they hear the patient has HIV [the AIDS virus], they can't wait to put down the phone."

The AMA-advised referrals often boil down to a patient's being passed from an appropriate doctor to one who is less

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WATER WORKS

ARTS

By Judith Bell

Fiberglass rods float like streamers in a soft breeze. Clap your hands and they sway like marine plants in an ocean current.

A shower of water reflects light: a cascade of fragmented prisms. Laugh and the droplets react by forming a spiral that rises, falls, or simply stands still.

Wen Ying Tsai's cybernetic or "living" sculpture displays physical impossibilities—solid rods merge and divide, water falls upward—in reaction to viewers' audio input.

Tsai has concentrated on large-scale environmental waterworks since the late Seventies. His fountains have been commissioned for atriums and plazas throughout the world. His use of computer programs allows him to create illusions controlled by the decibels and frequencies of sounds made by the audience. "I often reproduce the movements of nature in dynamic equilibrium," he says.

Of his four works in the "Computers and Art" exhibit at the IBM Gallery of Science and Art in New York (through June 18)—*The Living Fountain* is a three-part water sculpture formed by a ring of bubblelike jets and hundreds of tiny spouts geometrically arranged around the fountain's base. The third component, *Upward Falling Fountain*, is a spiral of water droplets that appears to pulsate through the use of strobe lights. The entire work, commissioned by IBM, responds to programmed music, but only *Upward Falling Fountain* reacts to viewers' laughter, handclaps, and other sounds that alter the water's direction and speed.

"Tsai's strength is his ability to bring together age-tested craft and sophisticated technology, ancient sensibility and pioneering vision," says Gyorgy Kepes, founder of MIT's Center for Advanced Visual Studies. "His work captures the core of every vital art—the rhythm of life."

A graduate of the University of Michigan, Tsai began his career in 1953 as a mechanical engineer, working as a consultant on projects for such architectural firms as Mies van der Rohe, Walter Gropius, Eero Saarinen, and Skidmore, Owens, and Merrill. Despite a successful career, he felt "like something of a misfit because I was always an artist at heart."

Art had been a part of Tsai's life since his childhood in China, where he studied painting. He took art classes in college and later spent his evenings studying at New York's Art Students League. "I felt some inner need was not being satisfied," he says. "Engineering is concerned with the outer world; its goals determined by what the industry and consumers dictate. Art has a very different objective. An artist does things intuitively because they are pleasing to him and delight his soul."

Winning a John Hay Whitney Opportunity Fellowship for painting, Tsai decided in 1963 to devote all his time to art. Soon realizing that he missed using his engineering skills, however, he experimented with welded sculptures and three-dimensional relief paintings.

Despite the ensuing recognition in the artistic community, he remained dissatisfied. The work, he felt, was too static. With his technical background asserting itself further, he then moved into kinetic art because he "wanted the sculpture to be alive, as if it could talk to you, to interact with the observer in a spontaneous way," he says.

While walking through the woods one day, Tsai watched the light flicker through the trees. The sight reminded him of strobe lights, which single out phases of an object's movement, giving the illusion of freezing or accelerating motion. "It dawned on me that vibration—the harmonic motion I had studied in engineering school—could be the solution to my search," Tsai says. Engineering would enable him to convey "the sense of awe I felt watching sunbeams shimmer through forest leaves."

Tsai translated this into sculptures of vibrating steel or fiberglass rods, strobe lights, and audiofeedback controls. Responding to sound, the strobes seem to make the rods, which vibrate at a constant rate, move in different ways—first swaying expansively, then trembling frantically. With the use of high-frequency strobes, the effects are barely noticeable, unlike those created by the lower-

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Divining rods. Water and fiberglass react to the sound of your voice.

PRIMORDIAL BOOZE

EXPLORATIONS

By James I. Killgore

Rivers of fine Scotch whisky flow from the distilleries of modern-day Scotland. Yet before Scotch, legend holds that the drink of choice in ancient Scotland was heather ale—a powerful beverage sweetened with the nectar of heather blossoms.

The Picts, ancient inhabitants of central and northern Scotland, supposedly brewed this ale from a secret recipe that had been passed down from generation to generation. So closely guarded was this recipe that the last Pict said to know it threw himself off a high cliff rather than surrender the secret to a rival band.

Most historians have discounted the legend of heather ale, says Edinburgh archaeologist Caroline Wickham-Jones. "But it's been a sort of Scottish preoccupation to recover the lost recipe, at least in the last couple of hundred years."

So a curious excitement greeted the recent announcement that Wickham-Jones and a team of archaeologists had found a primitive recipe for heather ale.

In 1983 on the mountainous Hebridean island of Rum, a farmer plowing a field churned up a "lithic scatter"—thousands of tiny flint flakes and tools spread over a wide area of soil. Wickham-Jones, an expert in prehistoric flint, was sent to investigate. She uncovered the fire pits and stoneworks of a hunter-gatherer encampment dating back 8,500 years—the earliest evidence of human occupation in Scotland. Further excavation turned up traces of later occupation—thick shards of pottery from the Scottish Neolithic period, about 4,000 years ago.

Several of the shards were encrusted with a black, fibrous residue. Archaeobotanist Brian Moffat did pollen analyses on the residues, hoping to discover the original contents of the pots. Four of the shards yielded an odd mixture of pollen grains and spores that could never have occurred naturally.

Much of the pollen was from *Calluna*, or heather—a low evergreen shrub that blankets the moors of Rum with purple blossoms in summer. Moffat believes the most likely source of the pollen was heather honey. Neolithic farmers probably robbed honey from beehives lodged in hollow trees or peaty banks.

Moffat also identified pollen grains from the aromatic herbs bog myrtle and meadowsweet, as well as the spores of a rare ornamental plant called royal fern. But the most curious part of the mixture was cereal pollen, thought to be from domesticated barley and oats. All the ingredients seemed to add up to only one thing—Neolithic booze.

The discovery doesn't make Rum the birthplace of alcohol on Earth. Sumerians had been knocking back beers more than 1,000 years earlier. But the discovery does provide direct evidence of the oldest alcoholic drink in Scotland.

So it was no surprise when the makers of Glenfiddich Scotch whisky agreed to re-create this ancient heather ale using the data from Moffat's pollen analyses.

"If one could produce a drink that was reasonably palatable, it would be quite an interesting thing," says George Wilkins, former chief chemist at Glenfiddich. "Yes, interesting and possibly profitable. Scotland has built a huge business around traditional foods such as shortbread, salmon and whisky. Heather ale, based on an 'original' recipe, might be a natural."

A secret that should stay underground?

Working with plant samples sent by Moffat and with locally produced grain and heather honey, Wilkins began experimenting. Most of the brewing techniques he used were available to Neolithic man. A mash of herbs was added to warm water and honey, then mixed with ground barley and oats over a flame. Natural yeasts in the brew converted sugars from the cereal and honey into alcohol.

"I did filter it after about three or four days, when it had reached about seven or eight percent alcohol," says Wilkins. "But the Neolithic brewers would probably have drunk it turbid."

"The first lot we got was awful," says Wickham-Jones. "They put in too much royal fern, which has a lot of tannins, so it came out like rather murky tea."

Wilkins scaled back on the royal fern, adding only the stems. The result smelled strongly of heather—yet tasted surprisingly dry, almost like vermouth.

Sixty bottles of the stuff emerged last November at a reception thrown by Glenfiddich at the Royal Museum of Scotland in Edinburgh. Here archaeologists and reporters got their first taste of what one British newspaper headlined "THE BRAW BREW FROM BARNEY RUBBLE DAYS."

Glenfiddich has no plans to market heather ale, but the company hasn't ruled out the possibility—albeit with some changes. "One might need to rebalance it," says Glenfiddich chemist Mike Webber, "to better suit modern tastes."

Perhaps the only snag in the whole affair was provided by British Customs and Excise. Since Glenfiddich is a licensed distiller, not a brewer, it was allowed to produce the ale only on the condition that all undrunk bottles would be destroyed.

"Helpful archaeologists were only too happy to comply," says Wickham-Jones. "Basically they destroyed it by drinking it. In fact, the Highland region archaeologist drank half a bottle," she adds. The next morning he woke up with what may have been the first Stone Age hangover in millennia. ☒

COMET RELIEF

STARS

By Randall Black

In the depths of space beyond Pluto circle vast swarms of comets. Preserved since our solar system began, these icy masses may provide scientists with clues about the origin of life itself. The problem: How will scientists unearth the deep secrets buried with the comets?

"Comets look like they contain all the elements of the human body," says Marcia Neugebauer, a project scientist at NASA's Jet Propulsion Laboratory. Indeed, bombardment of the earth by comets may have added the vital seasoning of organic molecules to the primordial soup—in effect, creating life. The comets' chemical composition, the ratios of rare isotopes they contain, and the size of the particles that make up the comets may even reveal how solar systems form.

Neugebauer and other scientists around the world hope that within the next 20 years NASA and the European Space Agency (ESA) will send a spacecraft to land on a comet and snatch a sample of it as it hurtles toward our inner solar system.

Here's one scenario. An unmanned spacecraft called the *Comet Nucleus Sample Return* (CNSR) would be launched from Earth by the most powerful conventional chemical rockets, with gravity assists from Venus and Earth.

Tremendous speed would be required for the CNSR to match orbits with its target comet. The craft would probably first fire a traditional chemical booster and then switch over to an advanced solar-electric propulsion system (SEPS). Converting the sun's energy into an electromagnetic field, the SEPS would propel the craft on a stream of high-velocity atomic particles.

As it neared its quarry, the CNSR would first survey the comet from a long distance, sending telescopic images of it to scientists on Earth. Given the go-ahead, the spacecraft would close in for a better look.

One or more modules would be launched from the mother craft. The unit would land on the comet and plunge a penetrator into the comet's surface, snatching a sample of the comet inside the penetrator's shaft. The sample would be sent to the mother craft, which would rush it to Earth orbit for analysis aboard a space station or return the sample to scientists on the ground.

Or another plan. Using explosive charges, the mother craft itself would anchor onto the comet and drill about one meter into its surface to extract a sample of pristine ice. The cost? A cool $1 billion.

And while this figure will increase with inflation, scientists consider the project well worth the investment. The ESA has already designated the comet-sample-return mission as one of four mandatory long-term missions in its Horizon 2000 space program and has earmarked $400 million for the CNSR. NASA's Solar System Exploration Committee has also recognized the importance of the CNSR and has given it high priority; first, however, NASA prefers a less ambitious and less costly mission called the Comet Rendezvous/Asteroid Flyby (CRAF).

The CRAF craft would observe the asteroid Iris, then rendezvous with the comet Wild 2. Upon reaching the comet, the CRAF would launch a penetrator into the comet's surface and perform an on-site analysis of the sample.

"It might be physically possible to do a sample return without first attempting a rendezvous," says Neugebauer, "but it would be much riskier and probably much more expensive because you have to design for a full range of unknown possibilities." The CRAF mission could limit these unknowns by testing the hardness of the comet's surface. Such information would help scientists plan for the drilling, sampling, and return mission envisioned with the CNSR.

While some scientists wish only to uncover the secrets of our solar system's past, others predict that comets—which are actually large, mobile mines—could provide raw materials for space colonization. Could travelers land on Halley's Comet when it returns to our solar system in 2061, tapping its precious stores of carbon, water, and other volatiles for use by a space colony? If so, they will have to thank Neugebauer and scientists like her who have put their dreams of missions to comets into action today.

It will cost $1 billion to get a piece of these rocks, but the minerals may be worth the bill.

LOST WORLD EARTH

By Bill Lawren

Ahead of them stretched a limestone plateau studded with razor-sharp pinnacles that looked impossible to traverse. Indeed, for the nine-member group, crossing the plateau became a matter of leaping from one peak to the next, knowing all the while that some of the limestone pinnacles which had been undercut by erosion tottered. A slip or fall could mean serious injury, even death.

"It was the most ferocious terrain any of us had ever seen anywhere," says one of the eight British scientists (and one spelunker) who knew before they began this journey that such a wild, lost world awaited them.

Their adventure began when Phil Chapman, a zoologist at the City Museum and Art Gallery of Bristol, England, read a French survey report about Ankarana, an isolated, 150-square-mile nature preserve in northern Madagascar. The report described strange, dark forests alive with huge caverns, subterranean crocodiles and carnivorous eels. An explorer at heart and a veteran of biological expeditions to Venezuela, Hawaii, New Guinea, and Borneo, Chapman contacted Jane Wilson, a British physician and zoologist who had visited the area five years earlier. Wilson told him that despite the Madagascar government's classification of the area as a preserve, it was doing nothing to ensure its survival. Open grazing, burning, illegal cattle ranching and wildcat logging were destroying the outer edges of Ankarana at what Chapman now calls "horrific speed."

The two scientists decided to mount a new expedition to Ankarana to conduct a detailed ecological survey of the reserve. Such work, they hoped, would help prod the government into action. After obtaining funding and supplies, Chapman, Wilson and their team of experts flew to Antsiranana, a city in northern Madagascar, in August 1986. They then traveled by truck to a village about six miles from the border of the Ankarana preserve. From there the group journeyed by oxcart to the edge of the massif, across a dry and dusty basalt plain rimmed by a sheer 700-foot cliff into which, according to Chapman, ten deep and mysterious canyons slice like ax strokes.

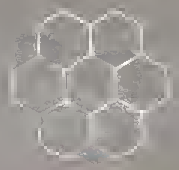
After establishing a camp in one of the canyons, the group set out to explore Ankarana's 60 miles of caves. In the center of the massif they found huge, stalactite-filled caverns and a 30-foot-wide underground river, which the French had dubbed the Styx, after the principal river of the underworld in Greek mythology. It was an apt name. The water was bright green, its source unknown, and it quickly drew the scientists and their inflatable boats into a darkness so total that without their cavers' lamps, they would have been blind. "It was," Chapman says, "very, very mysterious, very spooky."

Heightening the scientists' general nervousness was the presence of what Chapman calls "the world's only underground crocodiles." These crocs, some up to 13 feet long, spend the wet season living in the area's external rivers, where they sometimes ambush and eat local cattle and even an occasional human being; then as the weather dries up, they seek shelter in the cool, wet darkness of the Ankarana caves. The darkness and closeness of the caves made the crocodiles seem that much more frightening. "Anyone sensible," Chapman says, "is going to be a little bit freaked by the thought of rounding a bend and running into a big crocodile in a confined space. It took me a while to get over my terror."

In the end, though, the crocs turned out to be shy and wary, slipping into the dark water as the scientists approached. Much bolder and more problematic were the eels—big enough, myth has it, to feed a family. "They looked," says Chapman, "rather like morays, big mouths and nasty little steel-white, beady eyes. They'd come sliding out of the crevices and have a good look at you. If they thought you looked tasty, they'd have a good bite." When the scientists tried to capture one of the eels, the aggressive beast engaged them in what expedition entomologist Simon Fowler calls a "prolonged battle," lunging ferociously as its would-be captors backed respectfully away. In the end, Fowler says, the eel

Can rare species survive if the Ankarana is left open to slash-and-burn farming?

CONTINUED ON PAGE 112



CONTINUUM

YOUR HEAD IS UNDER ARREST

A generation has passed since the Sixties, when consciousness expansion was the passion of the young and the avant-garde. It was a unique moment in history, catalyzed by the introduction of powerful mind-altering compounds, most notably LSD, that promised a quantum leap for psychotherapy and self-awareness but ultimately proved too powerful for most people.

Psychedelic drug use has waned in the past two decades. But several private researchers have been quietly producing a whole generation of synthetic mind-benders with effects more subtle, specific and manageable than those of their crude ancestors. The effect of one new compound, for example, is so specific that it alters only the perception of sound. And David Nichols, professor of medicinal chemistry at Purdue University, has invented MBDB, a drug chemically similar to the recently banned Ecstasy (MDMA) but that he feels is the prototype of a new class of drugs. He calls them entactogens, from a Latin/Greek root meaning "to produce a touching within," and hopes they will help patients do just that in psychotherapy.

Discoveries such as this may help lead to an improved understanding of the relationship between the biochemistry of the brain and how the mind works. Looking into the future, scientists predict pills to help us compose music or write better; pills that will enhance intelligence; even socially approved recreational drugs—preferred alternatives to alcohol and other abused substances. One prolific chemist has come up with more than 200 new psychoactive compounds, and a few years ago predicted that there would be ten times that number by the end of the century. That was before the Analogs Act.

Previously, drug control laws banned a list (or schedule) of specific chemicals, clearly defining the boundary dividing legal and illegal psychoactive compounds. For a substance to be "scheduled" (i.e., made illegal), the Drug Enforcement Administration (DEA) required evidence that it was being abused and lacked medical usefulness. By contrast, the Analogs Act, pushed through Congress in 1986, allows the DEA to ban drugs whose chemical makeup is "substantially similar" to any drug already banned. It also criminalizes drugs that have effects "substantially similar" to or greater than those of drugs already illegal. But what does "substantially similar" mean? The language could be interpreted to mean just about anything, leading some lawyers to brand the act as unconstitutionally vague.

The Analogs Act was intended to combat "designer" drugs constructed by sophisticated chemists to be slightly different from illegal substances in their chemical structures—and hence legal. Some designer substances have in fact proved deadly, but it is unlikely that the act will stop their production. A more probable consequence of the law may be to stop promising research into all mind-altering compounds. This is the scenario envisioned by Harvard psychiatrist Lester Grinspoon, M.D., who testified before Congress that "under the provision of this law a chemist who synthesized a new drug might be committing a crime by taking it. Self-experimentation of this kind is the way in which many, if not most, new psychoactive drugs have been discovered. If the federal government makes it a crime to work with any new substance thought to have a resemblance to a controlled drug, entire fields of pharmacotherapy may go undiscovered."

Because the act bans effects as well as chemicals, this piece of legislation creates the nightmarish possibility that our government might outlaw states of consciousness it doesn't like. As Thomas Roberts, professor of educational psychology at Northern Illinois University, has said, the Analogs Act "works on the assumption that the only worthwhile or valuable state of consciousness is our ordinary awake state. Very clearly this is cutting off many future lines of human growth. Finally, as electronic brain-altering machines evolve and multiply, we may find a corresponding cadre of 'brain police' knocking on people's doors to confiscate their newly purchased megabrain tuners."

As it stands, the Analogs Act is so poorly written that even nutmeg (which contains a substance similar to the illegal drug MDA) and herbal sassafras teas (containing an MDMA-like chemical) could be considered contraband. And if all this seems a little remote from *your* concerns, consider this: The human brain contains a critical neurotransmitter called dopamine. Dopamine bears a close chemical relationship to the psychedelic drug mescaline—possession of which is a felony. How would you like your brain seized in a drug raid?—*BRUCE EISNER*

Bruce Eisner is a psychologist and the author of Ecstasy: The MDMA Story, *to be published this fall by Ronin Publishing.*

CONTINUUM

WHEN IS A WHALE LIKE A BAT?

A crystalline curtain of ice extending more than 70 feet below the Arctic Ocean loomed in the path of a herd of migrating bowhead whales. A scout whale swimming about a mile ahead of the herd detected the ice by bouncing a low moaning cry off the blockage. Alerted, the animal then increased the rate of its vocalizations, signaling the rest of the herd.

Aided by its scout, the herd began to turn well ahead of the obstruction. This event is being called the first known example of large mammals using echoes of their own sounds for navigation. Christopher Clark, director of bioacoustics programs at Cornell University and William Ellison of Marine Acoustics, plotted the courses of bowheads off Point Barrow, Alaska, both visually and with hydrophones. Circumstantial evidence, says Clark, points to the conclusion that the whales are using low frequency echolocation.

In general, bowheads chatter back and forth so the group can stay together. But when they detect heavier ice, the amount of their chatter increases. "We call it a burst mode," he explains. "When we look at where the whale tracks and the ice blockages were on our plotting board, we see that they didn't swim up to the ice and bump their noses. They started to change course before they made visual contact. It all adds up that they hear echoes and swim around ice. Not only that, but the animals behind the lead whales started turning several kilometers before they approached blockages. This suggests that whales are hearing their colleagues and their echoes.

"The emerging picture is that these animals have a very refined and sophisticated acoustic spatial map of their environment. They make sounds and listen to sounds of their surroundings to help themselves survive in an incredibly hazardous environment," Clark says.

—Joel Schwarz

Whale song is also collective sonar. Researchers are learning that the haunting s[illegible] produced by a single "scout" whale can help an entire pod navigate in its hazardous environment.

SLIDE RULES SAVED

Once slide rules ruled. But all that changed in 1972 when calculators that could handle logarithms and other complex functions were put on the market. "Never has anything once as common as slide rules disappeared so fast," says Art Orans of Philomath, Oregon. "There's not one American company making them anymore. Somebody has to save slide rules, or they'll go the way of the dinosaurs."

Toward that end, Orans has established the Philomath International Slide Rule Society. Its goal: to collect and preserve the endangered objects. So far more than 400 people have joined by donating a slide rule to the cause. Orans notes that the mechanical calculators come in all shapes and sizes. "I have several tiny, working tie-tack models—sort of designer jewelry for nerdy-type engineers. And there's a ten-foot-long slide rule that once hung on a high-school class wall."

What's the appeal of a slide rule compared with a modern pocket calculator? "You have a challenge with a slide rule," Orans answers.

"You have to do a bit of thinking to remember where the decimal point goes But with a dumb old calculator a kid today just punches in a number and doesn't even know if the answer is off by a power of ten or a thousand" —Sherry Baker

It can't handle haute cuisine options like tomatoes and onions yet but a computer directed hamburger chef with photooptic eyes may soon be cooking it your way at the local fast-food emporium

WINNEBAGOS IN ORBIT

By the year 2020 you may be able to pile the kids into the family vehicle and—for the price of a European vacation—take a trip to the moon This space getaway comes courtesy of the Apollo Lightcraft, a project under development by Leik Myrabo assistant professor at Rensselaer Polytechnic Institute in Troy New York

The Lightcraft will be 1,000 times cheaper to fly than the shuttle making space travel affordable for everyone, says Myrabo who envisions a ship the size of a Winnebago Flight costs will be cheap because the craft will rely on laser beams and microwaves (beamed from satellite power stations) to boost it to orbit The Lightcraft will reach zero-g hotels or amusement parks in low Earth orbit in four minutes and fly anywhere in the world in 45 minutes

NASA technical consultant Roger Luidens applauds the proposed craft Unlike today's rockets the Lightcraft wouldn't have to carry fuel and an oxidant into orbit—meaning it will be one of the cheapest forms of space travel It's something we ought to be looking at —Devera Pine

Getting away from it all could soon mean a weekend trip to outer space in a Winnebago-size airship powered by lasers and microwaves

McROBOT

A robotic hamburger maker guided by computer and cued by photooptic cells could be the answer to the woes of the fast-food industry—now mired in a growth slump and faced with manpower shortages

True, the prototype designed by Translab a Menomonie Wisconsin research-and development firm still can't handle such tricky haute cuisine options as lettuce, tomatoes or onions But give it time says Translab president David L Brenholt, whose company built the $20 000 robot for a food-lab cafeteria run by the home economics department at the University of Wisconsin's Stout campus

A series of conveyer belts bounces patties and the crowns and heels of the buns as they call their tops and bottoms in the burger business through a cooking tunnel five sets at a time At journey's end less than two minutes later the meat and buns reach photooptic sensors that determine if the orders have been properly cooked Then if all goes well the robot arm flips over the browned buns, plops the patties inside and presto, the finished product emerges on a final conveyer

Says Craig W Schowalter a University of Wisconsin fast-food-operation instructor "We're on the cutting edge of hamburger technology With some chain-speed adjustments this robot's second generation could handle ten hamburgers a minute

Right now the Translab contraption can produce three every 60 seconds That doesn't compare favorably with the demands of a busy fast-food outlet, where production speeds must be ten times faster

Translab's Brenholf blames the prototype's kinks on the fact that the school's model had to be retrofitted on existing Burger King equipment Even so he thinks the robot could be a big labor saver in a highly competitive industry where efficiency is everything Neither Burger King nor McDonald's is yet speaking publicly about the future of robot-made burgers —George Nobbe

"We don't see many fat men walking on stilts"

—Bud Miller

CONTINUUM

ACID RAIN VS. DINOSAURS

If dust clouds from an asteroid impact didn't wipe out the dinosaurs 65 million years ago, acid rain might have gotten them. So say Ronald G. Prinn and Bruce Fegley Jr., of the Massachusetts Institute of Technology. They aren't talking about the acid rain harming today's environment but stronger stuff, with a pH (a measure of acidity) of 0 to 1.5, about that of strong laboratory acid.

Today's acid rain is about as strong as vinegar. It won't burn holes in your umbrella but it can kill trees and fish by slowly changing mineral concentrations in soil and water. Prinn and Fegley's rain would have been fierce enough to attack plants and animals caught in it. It would have devastated life in the oceans as well as on land.

Scientists digging into stratified layers of sediment around the globe almost always find high levels of the rare metal iridium in layers laid down 65 million years ago. Based on the known concentrations of iridium in asteroids and comets, scientists have theorized that a small asteroid or a large comet struck the earth at that time, raising an enormous cloud of debris that lightly dusted the earth with iridium.

The comet (with iridium concentrations much lower than that of an asteroid) would have to have been about 20 times larger than the asteroid, and its impact would have heated up the earth's atmosphere, "cooking" atmospheric nitrogen and oxygen into nitrous oxide. This would have combined with rain to produce nitric acid, or very acid rain.

Prinn and Fegley are now looking for proof of their theory, hoping to find traces of normally insoluble minerals that 65 million years ago were dissolved by the same corrosive rains they think killed the dinosaurs.

—Jeff Hecht

A new theory suggests the dinosaurs became extinct 65 million years ago because they were caught out in some very acid rain.

In a recent experiment, bees used their wings to make their hive breathe air in and out. Is a hive really a kind of superorganism?

BEES' BREATH

Behold the beehive, a biological entity so intensely cooperative and coordinated that some scientists think of it as a "superorganism." Now biologists at the State University of New York College at Brockport report new evidence for this old idea. Groups of bees, say Edward Southwick and Robin Moritz, act together to keep the entire hive "breathing."

Southwick and Moritz knew that honeybees control the temperature and humidity inside the hive by fanning their wings to create a current of air. But they also knew that in nature honeybee hives have only one opening to the outside world. *How,* they wondered, *do the bees manage to exchange old, stale air inside the hive for fresh air from outside?*

The scientists imitated nature by sealing off a captive hive so that it had only one opening. They then watched as the bees established what Southwick calls a "typical breathing pattern." As several hundred "fanner" bees kept the air circulating inside the hive, a few others stationed themselves at the inside and outside of the hive entrance. When these bees fanned their wings, old

air moved out of the hive When they stopped fanning, new air moved in

Southwick likens the pattern to the exhalation and inhalation that characterize the breathing of individual vertebrates and notes that the bee 'breathing' slows down at night in much the same way that human breathing does It s gone out of vogue to talk about superorganisms he says "But this breathing is one of a number of group responses that seem to indicate that honeybee colonies do act as an organic unit '—Bill Lawren

SPACE SHRINKS

In the future the men and women who have the "right stuff" will also have compatible stuff " thinks psychiatrist Nick Kanas of the San Francisco Veterans Administration Medical Center

Kanas believes that as missions become longer and more complex, crews will become more heterogeneous with emphasis placed on specialists over generalists The astronauts psychological makeup will take on more importance They will have to get along to go along

The problem is that we don't know what psychological mix of people will work best together during long term weightlessness and close confinement The work that has been done is Earthbound, says Kanas and except for a few submarine and Arctic studies, the subjects have usually known they could bail out if the going got too tough

Are "right stuff" types too inbred and inbent for space crews?

The space program has historically shown a prejudice against psychological studies, but Kanas expects to see NASA-funded research soon In some circles at NASA there is growing interest in the kinds of things I'm writing about he says

Kanas would like to see among other things screening tests to assess motivation and covert psychopathology a comparison of crews that are and are not trained in psychological techniques to enhance mission performance, and the development of reliable methods to identify and deal with psychiatric emergencies in space such as acute psychotic or suicidal reactions

To accomplish this says Kanas researchers could videotape the crews throughout their missions monitor voice communications, administer pencil-and-paper tests and 'obtain measures of physiological correlates of stress such as endocrine function '—Paul McCarthy

NEW ANTIBALDING DRUG

Minoxidil, the experimental hair-growth drug developed by the Upjohn Company may be getting all the publicity but the newest entrant in the fierce competition for the American bald market is a cosmetic lotion formulated by the Angio-Medical Corporation of New York

It s called Zomexin and it is extracted from the omentum the fatty tissue surrounding the large intestine of pigs and cattle It was developed from the company's research on angiogenic growth factors substances that naturally trigger the growth of tiny blood vessels in the human body Angio-Medical s vice president Jan Mirsky is certain that Zomexin applied to the scalp does promote the flow of blood to hair follicles and four clinical studies, performed by independent dermatologists and commissioned by the company, have shown that this will promote hair growth Zomexin is currently being tested on 1,000 balding men

Says Mirsky 'The results of the trials will not be used in marketing these products as no therapeutic claims will be made because formulas containing Zomexin are products for the hair and will be marketed as cosmetics'

—George Nobbe

'To America one schoolmaster is worth a dozen poets, and the invention of a machine or the improvement of an implement is of more importance than a masterpiece of Raphael'

—Benjamin Franklin

'The average man who does not know what to do with his life, wants another one which will last forever'

—Anatole France

'If the Aborigine drafted an I Q test all of Western civilization would presumably flunk it

—Stanley Garn

The latest remedy for baldness this one a lotion made from the innards of pigs is undergoing final testing on 1,000 men and women

CONTINUUM

LIGHTSAT

In the old days a battlefield commander who wanted to know the enemy's position had to send some brave scout over the hill to look. In the future, if one Pentagon group has its way, commanders will get this information by launching lightweight, high-tech spy satellites into orbit directly from the battlefield itself.

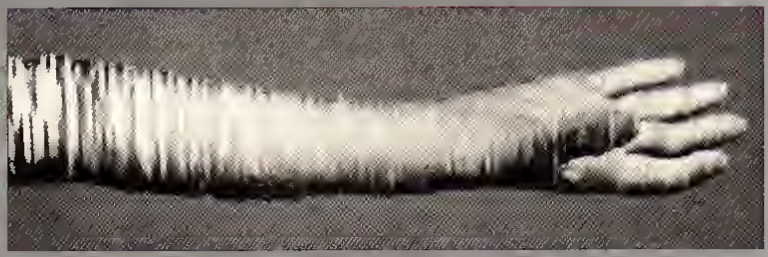
Existing satellites, explains Department of Defense researcher William Marquitz, are cumbersome beasts that can be launched only from a few sites in the Western world. These satellites usually have assigned strategic surveillance tasks and would thus be unavailable to handle impromptu battlefield requests. But the new satellites, called Lightsats, would weigh as little as 500 pounds, meaning they could be launched from the battlefield by mobile Poseidon or Pershing II missiles—a system that Marquitz calls "you call, we haul."

At a cost of $1 million to $10 million each, Marquitz claims, Lightsats would actually be cheaper in the long run than ultracostly reconnaissance planes. Plus, he says, "so far, at least, no one's ever tried to shoot a satellite out of the sky."

Right now, Lightsat is still very much a drawing-board item. Marquitz asked Congress for $100 million to develop the idea further, but he says, "what we got was thirty-five million dollars."

—Bill Lawren

Spy satellites may one day help our soldiers in battle



Today medical students have to share cadavers. But a computer program, which already contains the digital image above, will soon let students tour the human body on their personal computers.

COMPUTERIZED CADAVERS

To understand living bodies, medical students dissect dead ones. The problem is, there aren't always enough cadavers to go around. "Students work on them in teams, on different days. So a body may not be in the same state you left it in when you return for your next session," notes Michael Kabo, associate professor of biomechanics at UCLA Medical School. "Discontinuity can be a bigger problem than a scarcity of cadavers."

But Kabo and UCLA physician Roy Meals, whose work *Omni* first profiled in June 1985, think the development of simulated, reusable corpses could change all that, so they are developing a computer system that can dissect images of limbs and organs and reconnect them. They started with a hand and a forearm, cut into 160 slices, each of which was photographed. Next, each photo was digitized and stored on a videodisk as a series of numbers. This coded information can be viewed on the computer in several ways. For example, the path of a single artery may be traced, or an image of a specific bone can be "rotated" to be seen in a 360° perspective.

Ultimately, Kabo and Meals want the videodisk system to contain around 54,000 frames and be capable of creating images of the entire body. Students will be able to use a personal computer to control the selection of these images from the videodisk, Kabo says. "They will be able to 'dissect' limbs or organs over and over," giving them the time they need to analyze and memorize the sizes, shapes and relationships of body parts. Kabo believes this will markedly enhance students' appreciation of how the body functions. —Sherry Baker

"To say that a man is made up of certain chemical elements is a satisfactory description only for those who intend to use him as a fertilizer."
—Herbert J. Muller

"There is no place as good to think as a bathtub."
—Leo Szilard

CAFFEINE AND FAST SPERM

Caffeine may be good for something other than staying awake. It can increase a man's fertility by boosting the performance of his sperm. This finding could lead to a new method for improving the chances of conception during in vitro fertilization.

A computer analysis of sperm images at the University of Pennsylvania School of Medicine has shown that exposure to caffeine increases both sperm velocity—the rate at which it

travels—and motility—the percentage of sperm that are moving. Both of these characteristics improve chances for impregnation.

The researchers found that the effect on caffeine-spritzed sperm was immediate when compared with uncaffeinated matched controls. Not only did caffeine increase the percentage of sperm that were moving, it also jacked up their speed. And with higher doses of caffeine, more sperm moved, and they moved faster. As time passed, the effect snowballed, with the hyped up sperm retaining their staying power, while the uncaffeinated sperm lost their spunk—so much so that by the end of four hours the hyperactive sperm showed 80 percent more velocity and motility than their control-group counterparts.

But those who are looking for a fertility tonic shouldn't head for the nearest coffee pot. "The concentrations that we used were so high that if you and I drank coffee like that, it would be toxic," says Dr. Jeffrey Ruzich, who collaborated on this research while he was working at the School of Medicine. Even so, the research does have a practical side.

According to Ruzich, who is currently at the Hospital of the University of Pennsylvania in Philadelphia, in cases where a man has sperm with low motility, in vitro fertilization rates can be enhanced by adding caffeine to the husband's sperm before it is commingled with his wife's egg in a petri dish. This method is being used in Israel and Europe, says Ruzich.

—Paul McCarthy

I have never met a man so ignorant that I couldn't learn something from him.

—Galileo Galilei

Want a [illegible] spritzed sperm swi[illegible] which may

Bioengineered bacteria may eat up the PCBs in waste dumps

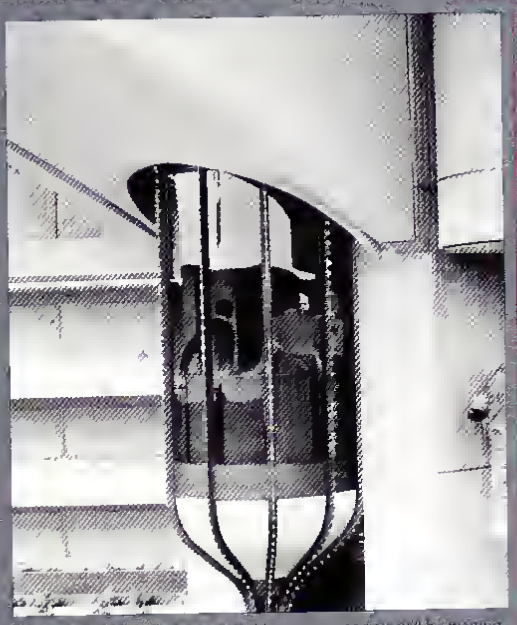
BACTERIA THAT EAT PCBs

Dennis D. Focht of the University of California at Riverside has patented a new process to genetically engineer a recombinant bacterium called *Pseudomonas putida* that literally feeds on a specific PCB—1,4-Dichlorobenzene. When there are no more PCBs to eat, the bacteria die.

Harvested recombinant bacteria would have to be purified and grown on a grand scale, of course, before they could be of commercial value. But if Focht is right when he says this is theoretically possible within a few years, PCBs—now considered major health and environmental hazards that the Environmental Protection Agency says could cost $90 billion and take decades to clean up—could soon be swallowed up far more cheaply in just a few weeks.

—George Nobbe

CONTINUUM



A new smart elevator can predict how many people will be waiting at what floor and where they will want to go during the day

SMART ELEVATORS

Elevator pranksters your days are numbered The Elevonic 401 knows who you are and what you're up to

Developed by Otis Elevator a subsidiary of United Technologies and now installed in more than 500 buildings worldwide Elevonic 401 is the newest wrinkle in "smart elevator control systems Every 200 milliseconds the microcomputer-based system samples the location, destination, and passenger load of each car, rerouting individual elevators to eliminate several irritating hallmarks of elevator life no more long waits in the hall, no more stops by elevators already too full to admit additional riders

An upgraded model slated for introduction this year will include sophisticated learning systems capable of predicting how many people will be waiting on each floor and where they will want to go at any given hour of the day "The logic implemented in the software is based on mathematical game theory and statistics says Merton D Meeker, director of technical marketing for North American operations at Otis Elevator

The control system also uses solid-state strain gauges under individual elevators to estimate the number of passengers in each car making possible a new "antinuisance" feature "If the system senses that there's only one person in the car says Meeker "but there are seven or eight floor buttons pushed then someone is playing around, right? So the system cancels every thing and makes them start again Elevonics will patiently cancel the floor buttons again and again until the perpetrator finally plays it straight —Dirk Hanson

"Life happens too fast for you ever to think about it If you could just persuade people of this, but they insist on amassing information"

—Kurt Vonnegut, Jr

"My grandfather always said that living is like licking honey off a thorn"

—Louis Adamic

3,000-YEAR-OLD WINE

Will it be better than Chateau Lafite Rothschild or more bitter than vinegar? China awaits the verdict as archaeologists at Beijing University prepare to use specialized equipment from Britain to "uncork" two beetle-brown laboratory bottles filled with what is believed to be 3 000-year-old wine

The wine was discovered by a team of archaeologists near Xinyang a small town in southern Honan province in 1980 Scientists unearthed a tomb they believe was constructed around 1300 B C in the latter years of the Shang Dynasty They found an engraved potbellied bronze vessel with a braided bronze swinging handle The lid of the vessel, called a *you* was still sealed

"They sent the *you* to us on September twenty second, 1981 recalls Lin Zuming an assistant professor of chemistry at Beijing University That day Lin and chemical engineer Wang Hsianlun extracted the liquid from the vessels which Lin describes as a pale brownish, yellowish color with faint green tinges and a very weak smell, a bit like fresh grass"

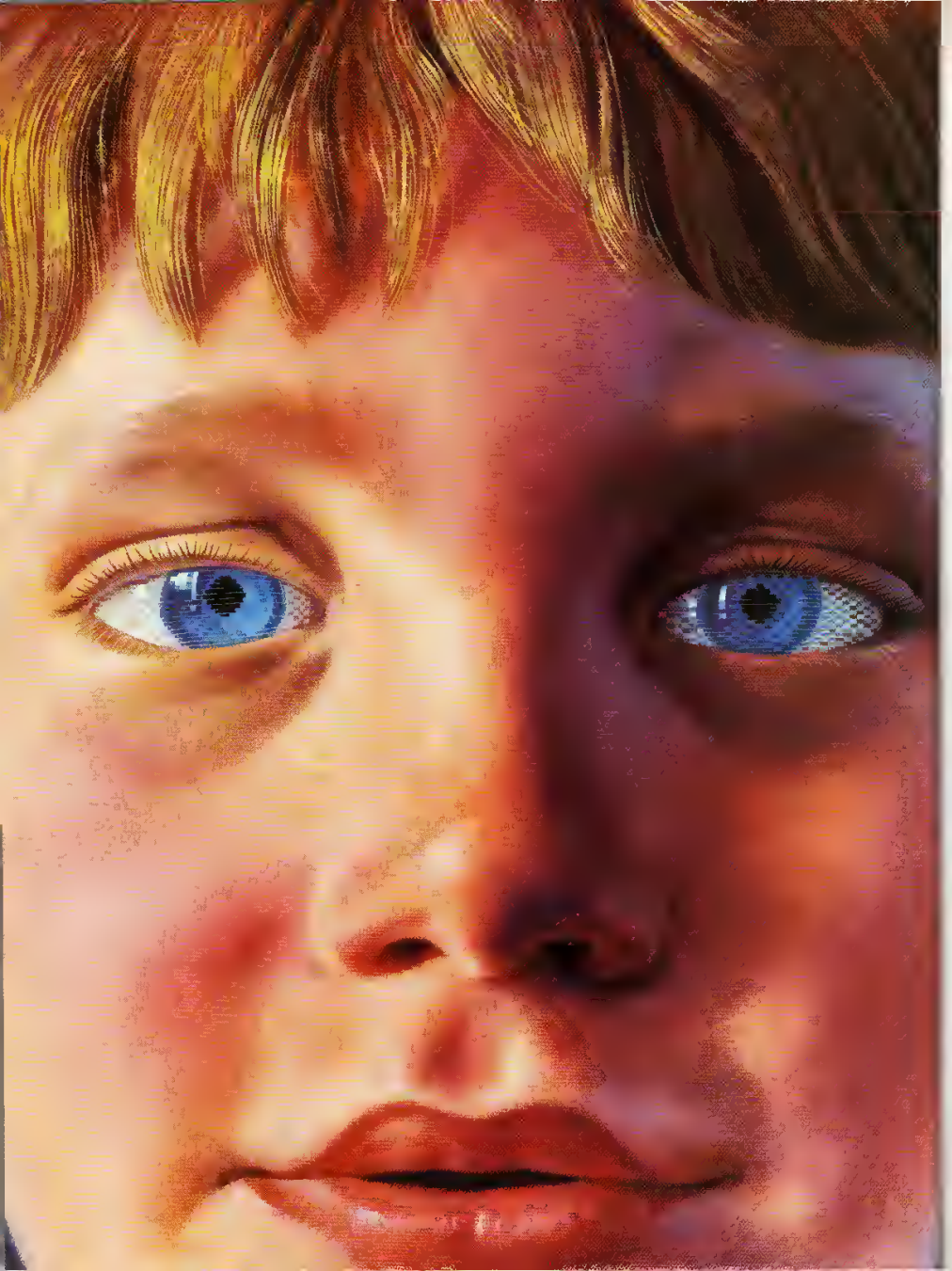
Kwang Chih Chang a Harvard anthropology professor who has written extensively on ancient China speculates on the untasted 3 000-year-old wine stored in Lin's laboratory It might have turned to vinegar It might be sweet It might be salty I think there is almost no alcohol content left—well perhaps a little

Lin and Wang will know soon enough though as a $10 000 gas chromatograph a machine they hope can analyze the chemical composition of the vintage vino has been acquired from Britain But because there is only a bit less than two quarts of the liquid remaining the two scientists first will conduct chromatograph tests on the more commonplace wines and liquors available in Beijing to establish a reference for comparison

—Michael Dale

"Idealism increases in direct proportion to one's distance from the problem"

—John Galsworthy



ARTICLE

Curious, sensitive, and quick to comprehend, the computer of the future possesses the vision and virtue of a six-year-old

BRAIN TRUSTS

Four years old, it's full of promise, possessing the potential for deep intelligence. It knows who Napoleon Bonaparte was, can describe the port city of Algiers and will tell you how many wheels a car has. If it continues to learn at its present rate, if it doesn't encounter some insurmountable barrier, it will be as "smart" as a six-year-old child.

Or so its creator, thirty-eight-year-old Doug Lenat, believes. The former professor of artificial intelligence (AI) at both Stanford and Carnegie-Mellon universities has developed CYC (pronounced *psych* and short for *Cyclopedia*), one of the most daring projects in AI today. In fact, if a poll were taken of AI researchers, it might well be voted the project least likely to succeed. Lenat's goal, you see, is to create a computer that has all the general knowledge—or as AI researchers call it, common sense—of a child, a computer that can think for itself and learn new knowledge as humans do. Then, says Lenat, the door will be open for such futuristic items as an intelligent wristwatch that would serve as a sort of traveling companion to advise and comfort its owner.

Lenat has long been known as one of the gutsier and more outspoken wizards of AI, a man who's not afraid to take on the impossible or to criticize his colleagues for their timidity. As he puts it: "Most AI people are spending their research lives creating bumps on logs." Although he won accolades early in his career for work in machine learning, CYC is by far his most adventurous effort. Lenat himself gives the project only a 50 percent chance of success and warns that he won't know until the end of the project (about six years from now) whether it will work. If it does, however, the payoff will change the field of artificial intelligence forever. "It's the most exciting thing on the horizon," says artificial intelligence guru Marvin Minsky. "I think it's the best hope for making machines do things that people would call smart."

At heart, CYC is the quintessential "scruffy" project, a term used in AI to describe quick-and-dirty programming efforts—ones in which theory is set aside in the interest of getting something practical done. In true scruffy tradition, CYC is founded on one simple principle: Don't waste time theorizing about why it can't be done. Just go ahead and do it.

Interestingly, Lenat is doing it at the presti-

PAINTING BY KEN JOUDREY

gious Microelectronics and Computer Technology Corporation (MCC) a consortium of high-tech firms such as Digital Equipment Corporation NCR and Kodak Located on the fringe of the University of Texas Austin campus MCC was set up in 1982 to help American companies compete with Japan's fifth generation project a government- and industry-sponsored push to create artificially intelligent machines One of MCC s jobs is to provide an environment for innovative high-risk research that might not receive appropriate funding elsewhere MCC hopes that Lenat s project to which the corporation will have allocated $25 million by 1994 will produce the crucial understanding needed to build intelligent machines

Before computers can act as independent intelligences they will need to possess an extensive and intricate database of knowledge Humans rely on a veritable warehouse of general knowledge for communicating and for solving problems To date however even the specialized programs known as expert systems lag far behind They can handle only narrow bands of highly focused information An expert medical diagnostic system for example will be able to help you if you use the word *headache*, but type in the sentence "My head feels like it s ready to explode" and it won't have the faintest idea what you're talking about It also wouldn t be able to tell the difference between a ten-year-old Chevy with reddish rust spots on its body and a ten-year-old child with the same symptoms It would tell you to treat both for measles That s because an expert system looks for certain key words like *reddish* and *spots*, and ignores words it doesn t know, like *Chevy*

Lenat s project would overcome these limitations and remove as he puts it "the mattress in the road clogging up progress in AI." If all goes well CYC will eventually have access to a small encyclopedic memory bank in addition to the several million things a child knows when he or she enters grade school facts like the common properties of liquids or that a railroad train runs on tracks and such broad concepts as the understanding that winter is colder than summer and that a red fire engine remains red even when you take it into a different room to play with it

In the four years since the project began Lenat and two other MCC researchers have scoured hundreds of articles in newspapers magazines and encyclopedias picking sentences or pairs of sentences at random and then loading CYC with each sentence's basic concepts those that the program would need in order to understand the meaning

The first two sentences programmed into CYC took Lenat and his group three months to input The sentences were "Napoleon died on St Helena Wellington was saddened" For CYC to figure out what these statements meant Lenat and his associates had to feed the program some basic information Napoleon was a French emperor and commander who had fought many battles against Wellington once a person dies he or she stays dead, sadness is an emotion frequently caused by death the probable reason Wellington was sad was that his old archrival whom he respected and with whom the battles had long ended was dead

Of course they also had to define such concepts as war life and death as well as describe the information that was implied Someone discovered Napoleon's body and told someone else Napoleon's death was considered newsworthy, reports of his death were printed in the newspapers in France and England and Wellington was somehow informed of Napoleon's death

Today these and more than 500 000 other pieces of information are part of CYC's memory In fact last September Lenat and his colleagues celebrated a milestone in CYC s development—its first steps so to speak—when the knowledge base reached what Lenat calls a semantic convergence This occurred after enough fundamental concepts were contained in CYC that new knowledge could start to be defined in terms of what the system already knew Instead of having to construct each new piece of knowledge from the ground up, terms can now be defined in relation to other terms Lenat can enter *François Mitterrand* for instance as a specific case (or example) of the category 'person,' a term CYC already knows Similarly *Cadillac* can be defined as a specific case of "automobile"

> *"Lenat foresees wristwatch-size personal companions to provide users on the go with advice and information on everything from business decisions to train schedules"*

Achieving convergence has been Lenat s greatest breakthrough to date and one that has impressed other computer scientists "It makes it look like he's definitely on the right track" says Apple Computer consultant and AI virtuoso Alan Kay

Presently seven team members whom Lenat dubs cyclists are feeding CYC information But eventually Lenat hopes CYC will be sophisticated enough to be hooked directly to online computer databases and absorb massive amounts of information Shortly after that time (about 1996) Lenat thinks the first commercial uses for CYC will emerge "Developers of expert systems" says Lenat will connect their computers' narrow highly specialized databases with CYC so they can fall back on common sense just as humans do when novel problems come along" A hospital administration program equipped with CYC for instance could without the aid of a human programmer automatically draw the news of an earthquake from the news services interpret the news and figure out if there will be casualties Then it could use its expert system to advise personnel on how to handle the emergency

Lenat s supersystem might also become the center of a sort of international brain trust By linking CYC to the grab bag of expert systems that now exists you could set up applications in all sorts of fields Because the brain trust would be the equivalent of a roomful of experts it could evaluate the feasibility of a proposed experiment in cancer research or suggest alternative routes for new highways As Kay puts it "Expert systems can be thought of as little islands of knowledge CYC is how you paddle from one island to another"

But Lenat has even grander schemes in mind "What I hope to have sometime around the end of the Nineties is a sort of automated intelligent companion" he says Desk-top computers with ten gigabytes of memory will store CYC and also be hooked to outside knowledge systems a telephonelike service that will supply the world s computerized knowledge abundantly and cheaply Then people will be able to use their computers for financial legal or medical advice for supplemental educational material for themselves and their children and even for help in designing a new home

The prospect of applying CYC to education excites Lenat "Public education" he says "is predicated on the assumption that you can't have personalized tutoring for each student You can t worry about what this particular individual ought to hear next in order to maximize his or her understanding of the subject matter That ought to change in the next generation Students should have the equivalent of a private tutor for their education And once they have the world s knowledge at their fingertips, their creativity will be unleashed That will be an exciting time to live"

By the second decade of the next century Lenat foresees wristwatch-size "personal companions' to provide users on the go with advice and information Although the watch would contain some memory a tiny transceiver in it would use radio waves to communicate with its desk-top counterpart The watch could assist in business decisions list train schedules and evaluate prospective purchases such as which microwave oven offers the features most needed by that particular consumer at the lowest price The watch would also contain a personal profile of its owner thus keeping the user abreast of news and information of special interest

Lenat thinks the watch could serve as a kind of moral adviser helping you to make decisions and solve dilemmas that crop up in everyday life. Say you're having dinner in a restaurant and you see that the waiter has made a mistake on your check. The total is $20 too low. Should you alert the waiter or pay the amount as written? Your personal companion says Lenat, would sum up the different possible short- and long-term outcomes of both courses of action—to you, to the restaurant, to the waiter, to the fabric of American society, to humankind. By referring to your personal profile, the adviser would know what kind of moral code you subscribe to, how strapped you are for cash, and whether you'd feel bad knowing the difference might come out of the waiter's pocket. Decision making would no longer be a solitary affair. Although your personal companion wouldn't tell you what to do, it would give you a clearer idea of your options and their possible outcomes.

Kay agrees with Lenat that this personal companion would be popular, but recognizes the potential for misuse. "We could," says Kay, "use it as a prosthetic and decide not to remember anything. It could become a surrogate for our own intelligence, rather than an amplifier."

Lenat's critics aren't worrying about the social ramifications of the personal companion because they don't think his project will succeed. Most of the disbelievers are AI researchers known in the industry as neats. They take a formalist, or theoretical, approach to intelligent machines, arguing that it's impossible to build a general knowledge base until the underlying system for representing complex concepts like time, space, and causality is worked out. The only way to do that, they believe, is by developing a logic-based language for encoding information that will serve as the theoretical foundation for a Lenat-like knowledge bank.

CYC may understand the sentences "Napoleon died on St. Helena. Wellington was saddened." But if you asked CYC if Napoleon knew of Wellington's death, I don't know if it would know how to figure that out, explains Stanford's John McCarthy, a founding father of AI. Like other neats, McCarthy contends that the best way to build an intelligent machine is to develop a way of making inferences from existing knowledge, deducing, for example, that Napoleon couldn't have known of Wellington's death because he died first.

McCarthy is currently working on a logic-based language that he hopes will one day be able to employ this sort of inferential reasoning. "I have the opinion that one is a prerequisite for the full utilization of the other," he says.

Patrick Hayes, a scientist at the Xerox Palo Alto Research Center, agrees with McCarthy. Hayes acknowledges that Lenat is "an accomplished hacker" and gives him credit for taking a crack at such an ambitious project. "It's certainly intriguing," he says. "I don't want to sound too critical because I'm glad that someone's doing it." But Hayes believes that as Lenat tries to represent the more difficult aspects of such concepts as space or time, his system is likely to backfire. At the moment, when Lenat encounters a sentence that requires a word or concept to be defined in a new way, he adds another definition on to the existing ones. Hayes predicts that these ad hoc alterations will eventually become so unwieldy that the system will slow down to the point of uselessness.

Hayes and other neats believe building a computer that possesses humanlike intelligence will someday be possible; they just think Lenat is putting the proverbial cart before the horse. Other critics argue that computer programs, no matter how sophisticated, will never be able to match the complexities of human thought. John Searle, a philosopher at the University of California at Berkeley, describes the problem with the idea of intelligent computers using the now-famous analogy of the Chinese room.

Suppose, Searle says, that you are locked in a room and are given a pile of papers filled with Chinese writing. You can neither read nor write Chinese. In fact, you

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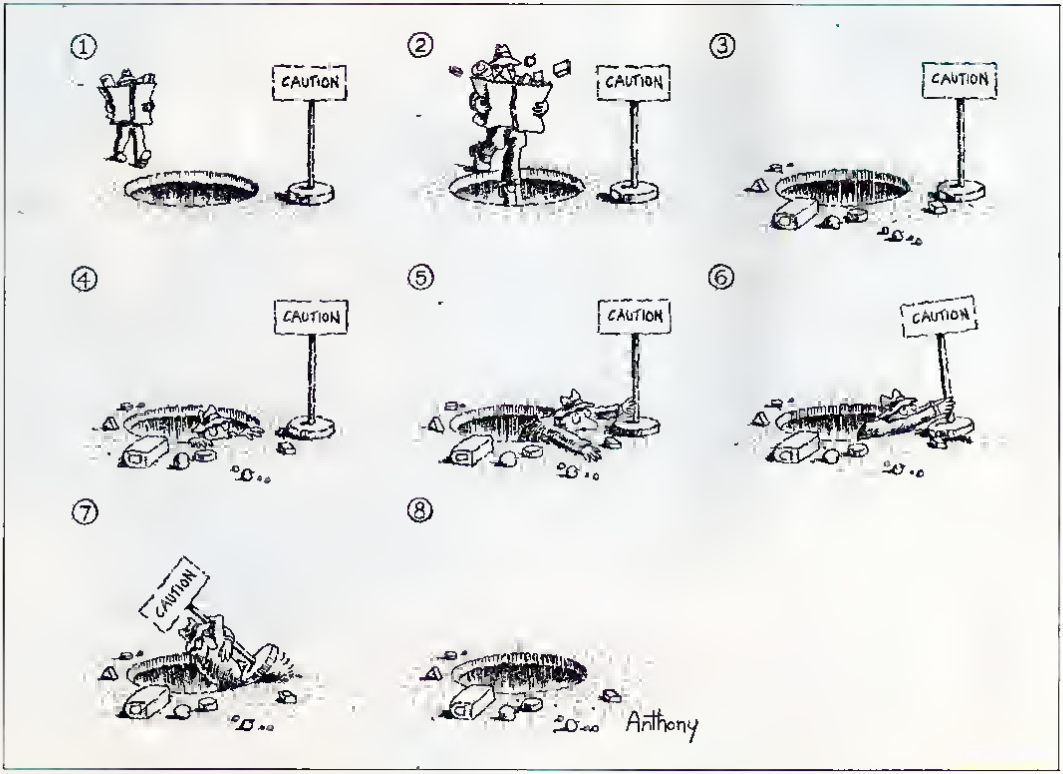


FICTION

An odd little man and an unhappy child journey into the fantastic realm of double blank and soul in ice

THE DOMINO MASTER

BY MICHAEL BLUMLEIN

I first met Jake the night my father came home all drunk. My mother was drunk, too, and they yelled at each other, and then she hit him over the head with a bottle. His hair got red, and blood started coming over his face and eyes. She screamed, and I got scared. She ran to help him, and I ran out of the apartment.

When I got to the stairs I stopped. I wasn't supposed to go out by myself, but I couldn't go back. I took a deep breath and stepped on the first step. When nothing happened, I took another. Suddenly the door at the top of the stairs opened. I froze. Then a cat came out. It was a tired-looking cat, black and white, with the longest fur I'd ever seen. It yawned and trotted off down the stairs. The door stayed open, and suddenly a face appeared in the crack. It had old-looking eyes and bushy eyebrows, but it wasn't much higher than a kid.

"Stupid cat," it said. "You'd think he'd know by now." The eyes turned on me. "Wouldn't you think he'd know?"

I stared at him. I didn't know what he was talking about, and besides, I wasn't supposed to talk to strangers. Especially not if this was the man who lived at the end of the hall.

"*You* know," he kept on. "You're the right size. I'm sure you know." He shook his head. "You'd think a cat would. Especially that cat."

"Know what?"

"Maybe he's just too old. I know he knows. Maybe he just can't do anything about it."

"About what, Mister?"

He looked at me and blinked once. He had whiskers and mussed-up gray hair on the sides of his head. The top was completely bald.

"Come in and see for yourself. See what you think. Then you tell me."

He disappeared, and the door opened wider. Everything inside looked orange. Some kind of song was playing, but I couldn't hear exactly what. I took a step toward the door, then stopped. I listened.

"The ants go marching one by one, hurrah, hurrah. The ants go marching one by one, hurrah, hurrah. The ants go marching one by one, the little one stops to have some fun...." I knew the song from school and went inside to hear more. As soon as I got in, I saw him again. He was kneeling on a rug inside the door, staring at it and looking glum. If this was the man who lived in the apartment, he didn't seem so scary to me. In fact, he seemed kind of sad.

I went over, but when I got close he put out a hand.

"Hold it," he said. "You don't want to step in it." He shook his head. "Stupid cat. My favorite carpet, too."

I looked down. It was dark, but not too dark to see the stain on the rug.

"Is that it, Mister?"

"Jake," he said.

"Is that it, Mister Jake? Is that what your cat did?"

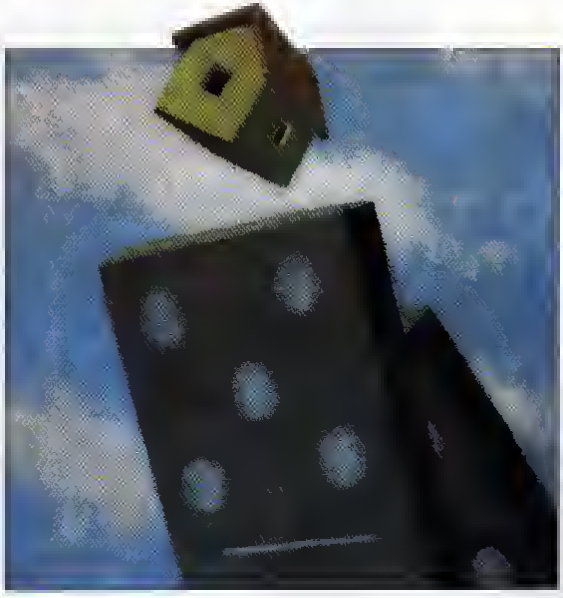
"Not my cat. Not mine. Sometimes I wish it were, but of course, it isn't. Can't be."

"Huh?"

He looked at me. "Don't be simple. You know as well as I do what that cat did. Would you do that on your rug?"

PAINTINGS BY ROB COLVIN

"He had on dark pants, a matching jacket, and shiny black shoes. He wore a bow tie, which I'd only seen old men wear. He looked like a picture of a guy I'd seen once in a museum."



I stared at him, a little scared but not too scared, and shook my head.

"Of course you wouldn't. You've got manners."

"Sometimes I wet my bed."

"Of course you do. Sometimes I do, too. But not the rug. Not that. Stupid cat."

"Maybe it didn't mean to. Maybe it was just a mistake."

He opened his mouth to say something but then shut it. He sighed and sat back on his heels.

"You're very wise, my friend. It was a mistake, that's the sad part."

"My name is Johnny."

"When you wet the bed, it's a part of growing up. When we do it's a sign of growing down."

He ran his fingers through the bunches of hair above his ears. "Poor cat."

"I'll help you clean it up. I know how."

"Do you?" That perked him up. "By all means, then, help."

"I need some salt."

He pushed himself up and left the room. In a minute he came back with an old glass jar with the letters NaCl written across the front. He took off the top and handed the jar to me.

"This is it?"

"From the Dead Sea itself, John. I may call you that, if I may. May I?" I shrugged and poured the salt on the spot. Pretty soon it got caked up, and the yellow began to show through, so I poured out more. By the time I finished, nearly the whole jar was gone.

"You're quite a handy little man, aren't you? I must tell Arsenio your trick. He would want to know."

"Who's he?"

"A little friend. I'm sure you'll meet him, or rather I'm not sure, but you might. But here . . ." He got up again. I guess because he saw that his rug was going to be okay, and took my hand. Then he started to march. Up and down went his legs, and then he started to sing. "The ants go marching one by one, hurrah, hurrah. The ants go marching one by one, then John he comes to have some fun, and they all go marching round and around to get out of the rain, boom, boom, boom . . ." I joined in, and in a minute the two of us were in the orange room, marching around and around, singing and clapping every time we came to the "boom, boom, boom." When we got to ten we went through the whole song again, which no grown-up ever did with me before. After the second time we stopped, Jake was breathing hard, too hard, I guess, to keep going.

He went to the side of the room and flopped down on a stack of pillows on the floor. He stuck out his legs and closed his eyes. I waited for something to happen. When nothing did, I decided to look around.

At first it seemed like the room was full of junk. Things were hanging all over the place, from the walls and tables and even over the backs of chairs. There was stuff piled up high on the floor, and boxes everywhere. I thought what my mom would do if my room ever looked like that, but then I stopped thinking about it because I didn't want to. Instead I looked at the boxes.

All of them were long and skinny, all kind of the same but different. Some of them shined bright like the sun, and some were so dark you couldn't even see what was on them. On top of one were drawings of funny-looking animals, almost but not quite like ones at the zoo. One was a horse with a tail and everything, but also it had wings. There was another horse, too, but that one had the face of a woman with long hair, kind of like a girl I knew from school. And there was a dragon on the box, and a bird flying up out of a big fire. I liked looking at it, but also it seemed stupid to have animals that weren't really animals. So I stopped looking and went to another box.

This one was blue and bright. It flashed on and off like the police lights when they run their sirens. I wanted to open it, but I couldn't figure out how. So I picked it up.

Some things rattled inside, which scared me. Real fast I put it down and walked away. I didn't want Jake to know that I even touched it. Luckily, his eyes were still closed. I couldn't tell if he was asleep or awake, and I went over to see. The room was so crowded that by mistake I bumped into a table. It hurt my leg, and I stooped over to rub it. Then I saw the box on top.

It was the blackest black I had ever seen, blacker even than my friend Joey's birthmark on his face. It was so black it seemed like it wasn't even there, like a hole or something. I put out my hand to see if it was real, and then all of a sudden Jake woke up.

"Don't touch that!" he said.

I jerked my hand back and looked at him.

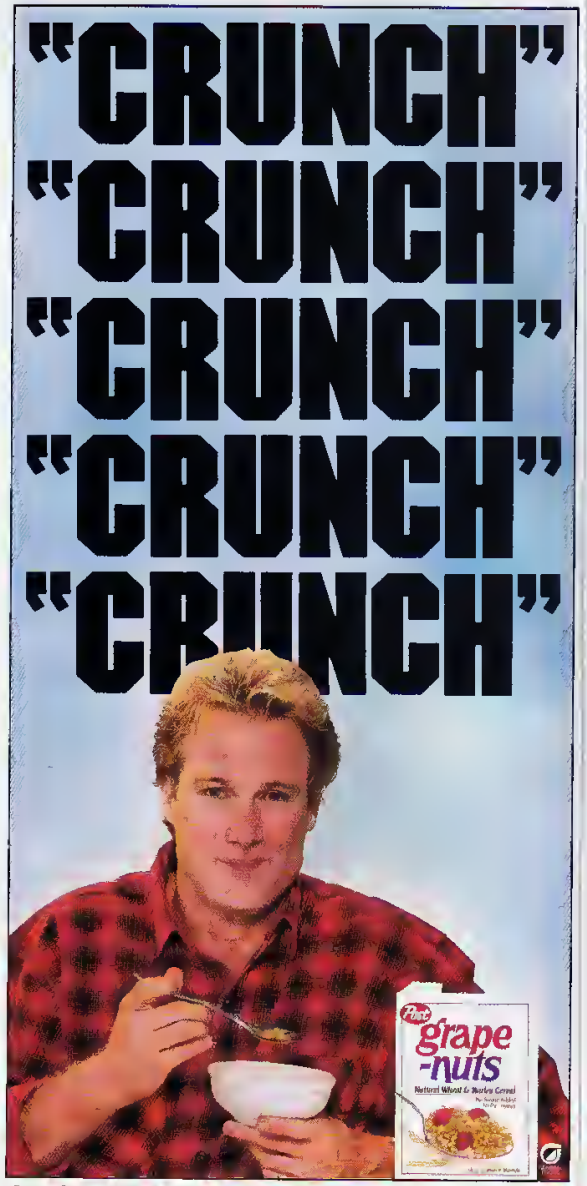
"Good boy." He leaned over and snatched the box away, stuffing it behind one of the pillows.

"How about some milk? Little boys like milk."

I shook my head. "I gotta go home."

"Of course you do. How could I be so sleepy? Your parents must be worried." He smiled and reached into one of his pockets. He held out something in his hand.

'Wait here I'll go and see what that noise was about'



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"Here. It's a present."

I wasn't supposed to, but it didn't seem anything bad. So I took it. It was a pin, and attached to one side were two white squares joined together by a black line in the middle. On each square were some black dots.

"A domino," he said. "Can you put it on yourself?"

I nodded and showed him. Then I turned around and went home.

I didn't see him again for a long time, but I didn't stop thinking about him. Especially that black box which he snatched away from me. I would've gone back sooner, except that after that night my mom moved out of our apartment and took me with her. We moved to her friend Ginny's place, which was even smaller than ours. After a while Ginny said that we had to leave. It was just too crowded. Mom said it was okay because by then she and Dad were seeing each other again. They were back in love, she said. Dad said the same thing when I saw him. He gave me a big hug, which hurt a little. "Welcome back, Johnny boy," he said. He cooked us all a big breakfast, eggs and toast and pancakes, and he gave me a new GI Joe. He gave Mom a real short nightgown, and after breakfast they told me to play by myself for a while. They went into the bedroom, locked the door, and started giggling. I knew what that meant, so I went and turned on the TV. But it was broke, so I played with Joe. He was okay, but after a while I got tired of him because all he wanted to do was hit the other soldiers and make them bleed on their heads. I thought about Jake. And the box.

From the noise they were making, I figured Mom and Dad wouldn't miss me. So I told Joe not to tell, and the other guys, and I tiptoed out the door and down the hall. When I got to Jake's, I looked for a button to push, but there wasn't one. There wasn't a doorknob either. I was afraid to knock because of the noise, and I didn't know what to do. Then I heard music.

It was faraway and real soft. I shut my eyes and leaned against the door. I listened hard.

"The ants go marching four by four, hurrah, hurrah. The ants go marching four by four, the little one stops to knock at the door." And all of a sudden I found myself knocking at Jake's door. Nothing happened, and I knocked again. And the door, without even the smallest creak, opened.

"Come in, come in," a voice said, and right away I knew it was him. I went in, and the door shut behind me. I walked through the little hall into the orange room.

"Hi," I said when I saw him, and he waved me in. He was lying on the pillows, looking the same as before except for the pipe in his mouth. It was a long one, almost as long as his whole body. It was so long, in fact, that he could hardly light it, which he was trying to do with a long, skinny match. By the time he got his hand steady enough to put the flame over the bowl of the pipe, the match had burned down so much that he had to move his hand again. He kept having to stretch out farther and farther. Finally he got the pipe smoking, but then the match went out. He groaned and looked at me.

"I'd use pyrotechnics, but I might burn down the house. Give me a hand, will you?"

I went over and stood next to him.

"A hand," he said. "You've got ears, haven't you?"

I held one out—a hand, I mean—and he lit a match and gave it to me.

"Now, put it there. Over the bowl."

I did what he told me, and he began to puff. The stuff in the bowl glowed red, and then he took the pipe out of his mouth and blew out the match.

"I could do that," I said.

He looked at me while he had some more puffs. Then he took the match and began rubbing its tip between his finger and thumb. He stopped, and in a second it burst into flame. I stared. It was such a great trick that I forgot about blowing the match out. Just before it burned his fingers, I remembered and blew. He looked at me.

"I apologize if I'm a bit out of sorts," he said, "but that cat went and did it again. It seems as though your visits trigger something in him."

"I didn't do anything, Mister Jake. Honest I didn't."

"Of course you didn't. And it's just Jake."

"I can clean it up. Like before."

"I've already taken care of it. Or rather, Arsenio has. Or is. He should be just about finished." Before I could ask who Arsenio was, a kid came walking into the room. He was smaller than me and looked rich, like one of those kids you see sometimes in the store getting their hair done up just like they were a grown-up. His was slicked down and shiny and parted right down the middle. It made him look funny. He had on dark pants and a matching jacket and black shoes that were as shiny as his hair. To top it off, he was wearing a bow tie, which I had never seen anyone except old men on the street wear. He looked like a picture of a guy I'd seen once in a museum, except he wasn't a guy but a kid.

"Arsenio, this is John. John, Arsenio."

He came over, folded his arm in front and bowed to me! Then he straightened up and held out his hand.

"Very pleased to meet you."

I didn't know what to do, so I shook it. It seemed stupid. Then he turned to Jake.

"I did as you suggested. The salt is nearly gone, but the spot, I think, is out."

"John here is the one who showed me that trick."

"Then it is you I should thank," he said to me. "I'm always excited to find new ways to clean up."

Not only did he look funny, but he talked funny, too. There was something else. Something that made me think I'd seen him before or could have.

"Arsenio is half of the double two," Jake said. "Judith's the other. Where is she hiding out?"

"I put her in the closet. The one with all the old clothes and paper and crayons."

Jake nodded and puffed on his pipe. "Why don't you introduce John to her?"

Arsenio made a face, the kind that if I'd made I would have got a whipping. He didn't budge.

"Go on," Jake said.

"I don't want to."

I can see that, but you must. She's undoubtedly already made a big mess."

"Do I have to?"

Jake frowned, as if the question didn't make any sense at all. He puffed on his pipe, then lay back on the pillows and stared off into space. Arsenio sighed, then turned around and started off.

"Come on," he said.

I followed him out of the room into a hall with doors. Partway down I saw the pile of salt and made sure I didn't step in it. He stopped at one of the doors and straightened his bow tie. He smoothed down his hair with his hands. He was stalling, and I felt sorry for him.

"I live down the hall," I said.

He nodded. "Me, too."

"Apartment 206. With my mom and dad."

"I live down *that* hall," he said, pointing to the one we had just walked down.

"You mean here? You live with Jake?"

He nodded. "So does Judith. We live here together."

"Is she your sister?"

"She's my double. She lives on the other side."

"Which one is your room?"

He pointed to the orange one, which surprised me. I was about to ask him where his bed was, when all of a sudden there was a scream from the closet. It was loud and scary. Arsenio threw the door back and jumped inside. I took a step in and stopped. The place was a total mess. In back, under a pile of clothes, was a girl. She had long hair that was all tangled, and her face was dirty. It was also red. That was because she was screaming.

"My foot—it's stuck—it hurts. It hurts! It hurts!"

Arsenio didn't waste a minute. He jumped through the boxes and clothes and crumpled-up papers, found where her foot was stuck, and pulled it out. Then he straightened up and fixed his bow tie.

"Judith," he said, "you're a mess."

"So what?" she answered. She tore up a bunch of paper and threw it in the air. While it floated down, she wiggled around like a worm. Then she started on the clothes.

She was already wearing a dress, and she put pants on top of it and then a shirt, and then another shirt and then a vest. She found some socks, all different colors, and put those on, too. A hat and then shoes. There was a mirror on the inside of the door, and she looked at herself and smiled. Then she looked at me.

"Hi," she said.

"Hi."

"My name's Judith."

"Mine's Johnny."

"Want a sock?"

She gave me a red one, then a green

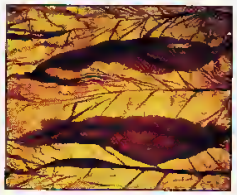
CONTINUED ON PAGE 104

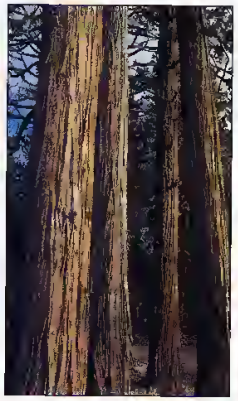
NATURE'S BREATH
SCENTUOUS

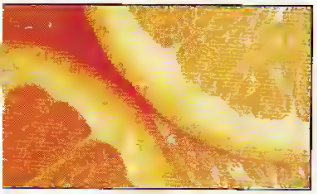
BY NINA GUCCIONE

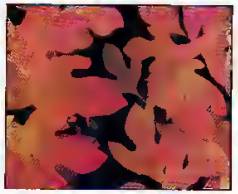
While nothing compares to the smell of soft-petaled roses or the rich sweetness of gardenias, perfumes do provide a special sensory treat. How wonderful to be able to enjoy the alluring fragrances of spring flowers, sweet pipe tobacco, and Chanel No. 5. We don't always realize the impact our sense of smell has until some subtle odor drifts by, sending waves of memories and emotions flooding back from childhood days and love-filled nights. A vase of fresh flowers can return us to a dew-dampened garden, or a whiff of cedar can bring back thoughts of a trunk where Mother lovingly packed away winter

"Like a gentle breath from heaven, perfumes are an alluring tease that lingers in the mind long after the blossom fades"









sweaters. A stranger can leave a lingering odor, bringing a smile and remembrance of someone special who wore the same cologne. Most manufactured fragrances we're familiar with try to capture nature's elusive scents.

Perfumes have been around since ancient times. The Phoenicians used perfumes to barter with, and they enriched the Egyptian culture. (And I thought the French invented them to mask their poor hygiene. This assumption is supported by *The Book of Lists*, which places the French fifth of six European nations listed for soap consumption.) Marketing, not the nose, is responsible for the range of perfumes, the package, name and price tell us the products differ. Yet the diversity of scents seems to be dwindling (unless you have a particularly sensitive snout, like mine, which can distinguish my own week-old fragrance from scent left only hours earlier on a tweed jacket). And marketing is getting daring, notably with the trend of naming olfactory aphrodisiacs after illegal drugs, psychotic behaviors, and deadly substances and having them peddled by the Eighties role models—actresses. Rita Hayworth probably wasn't aware that she could have found endorsement for dumping kegs of perfume in her swimming pool at one of her weddings. It has been reported that alcoholics will resort to perfumes in desperation; if so, W. C. Fields died an untapped advertising source. For most, perfume is a ritualistic part of the day. The scent we use can become our signature or a saving grace should we have no hot water in the morning. ⊡

Previous pages: A red rose and a German perfume factory. Clockwise from top left: Tobacco leaves; incense cedar, pink roses, which are harvested for their petal oils; sassafras, whose roots are used in making perfume; orange slices.

BODY

CONTINUED FROM PAGE 22

equipped to deal with the patient's particular medical needs. Some patients are abruptly directed elsewhere by doctors they've seen for years when they test positive for HIV or admit to having AIDS.

The AMA has avoided addressing the issue of refusing treatment after a history of working with a patient," says Bob Tarbox, client representative for the Gay Men's Health Crisis in New York City.

Sometimes, says Tarbox, the doctor or hospital merely puts up a smoke screen to avoid treatment instead of openly turning a patient down and referring him elsewhere. This practice may be especially blatant at state, city and county hospitals where doctors are legally prohibited from refusing patients. In government-sponsored institutions, a reluctant staff might resort to scheduling endless extra tests, postponing or canceling surgery, or opting for less effective procedures that don't involve blood products.

One such case involves a man we'll call John, a patient at the hospital of the Medical University of South Carolina in Charleston. John had been going to the university's pain clinic because of back problems, when he suddenly started having serious chest pains. A cardiologist discovered severe coronary artery blockage and scheduled John for immediate bypass surgery. He was prepped and ready for the operation when his surgeon noticed he'd listed his occupation as "hairdresser" on the hospital admitting forms. According to John, the nervous surgeon contacted a staff psychiatrist. John had been seeing about his back pain, who confirmed the surgeon's suspicion that John was gay. John was tested for AIDS, and when the test came out positive, the surgeon refused to operate. He was the only surgeon affiliated with a public hospital in Charleston with the expertise to do the bypass. John was unable to afford a private surgeon, so he was effectively prevented from getting the operation he needed.

A week later, John was released from the hospital. If friends hadn't contacted the American Civil Liberties Union (ACLU) on his behalf, that probably would have been the end of his story. The ACLU provided John with a lawyer, Edmund Robinson, who spent the next four weeks fighting to get him bypass surgery. Angina sent John back to the hospital twice that month, but each time he was released again. Hospital doctors, initially convinced that John's need for surgery was urgent, now insisted that his condition could be controlled with medication. The ACLU suggested, however, that the hospital was merely paying lip service to the AMA rule while mollifying its bypass surgeon. Finally, says Robinson, after numerous phone calls to hospital officials, the surgeon "wrestled with his conscience" and performed the bypass—five weeks after it had originally been scheduled.

Robinson and other ACLU officials admit that treating a patient with HIV may confer some risk of infection, especially when a lot of blood is involved. The dispute arises over determining the *level* of the risk. As South Carolina ACLU representative Steven Bates points out, the 13 cases of infection among health care workers reported by the CDC represent a very small proportion of infection, considering the tens of thousands of procedures performed on AIDS patients. For its part, the CDC states that health care workers should be protected against infection if they practice approved safety procedures—which consist of wearing protective clothing like masks, gowns and skintight rubber gloves. In any event, not a single surgeon has been reported infected by a patient thus far.

The issue amounts to whether doctors should be able to turn patients away in response to their possibly rational, but as yet unproved, fears. Fred Siegal, a clinical immunologist at Long Island Jewish Medical Center and author of one of the earliest published papers on AIDS, says that ideally each case would be decided on an individual basis, with the possible benefits to the patient weighed against the relative risk to the doctor. Siegal believes that internists and general practitioners (GPs) face relatively small risks, mainly from excessive needle sticks.

"It's unjustified for the GP to refuse to treat an AIDS patient," says Siegal, "but it's more of a moral dilemma for surgeons." He points out that individual surgical subspecialties carry their own risks. During orthopedic surgery, for example, surgical drills can send blood and bone chips flying through the air. Members of the operating team sometimes cut themselves on the sharp edges of exposed bones. "That may be highly risky," Siegal says.

He maintains that the concept of doctors weighing the risks is a little like playing God. Should an IV drug abuser with end-stage AIDS be granted bypass surgery that would add only two or three months to his life? What about someone like John, who has the AIDS antibodies but is so far free of symptoms? What should the criteria be for making such decisions? Who should live and who should die?

The answer, according to AIDS advocates as well as the majority of health professionals, is that doctors shouldn't be making such determinations. The Hippocratic oath they take mandates preserving the health and life of *every* patient, and so far there just isn't enough proof of risk to justify junking that creed. As Molly Cooke, an internist at San Francisco General Hospital, puts it, empathy for the risks incurred by surgeons and other doctors is not misplaced. "But until their argument that the risk is substantial can be based on fact rather than on perception," she says, "no benefit to a patient should be denied."

"It's a hell of a lot more impressive from a distance!"

ARTICLE

A cross between movies and intense waking dreams, these reveries recall the land of

FANTASIA

BY JESSICA MAXWELL

There's a light. A purple light. It's like an aura. I see rocks. It looks like a cavern. There are rocks jutting up from the ground everywhere. It is a cavern. There's almost no end to it. It looks like a million spikes are hanging down from the walls. Black spikes. They're moving. They look almost like bats. They're not bats at all. They're almost human. With wings. They're all taking off. All flying toward me. They pass me by as if they don't see me. One just flew RIGHT THROUGH ME.'

Rick Tomascewski is a twenty-two-year-old student at the University of Toledo. From the time he was three years old he has been able to conjure up remarkably vivid fantasies like the one above. 'I found I could imagine myself going wherever I wanted to go,' he says. 'It felt as though my entire body were flying through air.'

Tomascewski is a classic "fantasy-prone personality,' a relatively new psychological term that's used to describe someone who spends up to 95 percent of his or her waking hours in fantasy.

While most of us maintain fleeting fantasies here and there, fantasy-prone people build their lives around the time they spend in fantasy. Many pass whole weekends lost in elaborate, deeply plotted stories of their own design.

The fantasy-prone constitute a small group, some 4 percent of the population, and most of them learned at an early age to keep their fantasy lives a secret. What this means is that for every 25 people you pass on the street, one of them is on the planet Mongo. And the fantasies these Mongonians create are different from the occasional daydreams common to us all. Their vivid reveries—part movie and part waking dream—might include elaborate scenarios about such things as

PAINTING BY DI-MACCIO

life in ancient Egypt or adventures on an alien world. One person reported a detailed fantasy involving intrigues in the court of King Louis XIV. Another spun a cloak-and-dagger tale in the form of a mental script for *Miami Vice*.

Intensive fantasizers were first characterized by Josephine Hilgard's groundbreaking work at Stanford University. From 1965 through 1979, in an effort to determine the makeup of a good hypnotic subject, Hilgard interviewed hundreds of people. She found that one characteristic of those particularly susceptible to hypnosis was the tendency to report "long-standing, imaginative involvements in sensory experiences, dramatic arts, reading and religious and creative experiences." In other words, people who were easy to hypnotize were often fantasy-prone.

In the early Eighties, Boston psychologists Sheryl C. Wilson and Theodore X. Barber corroborated Hilgard's findings and made a few stunning ones of their own. Renowned hypnosis researchers, Wilson and Barber interviewed 27 professional women considered to be excellent hypnotic subjects. "With one exception," Barber reports, "we discovered that all our subjects had profound fantasy lives. They would typically see, hear, smell, touch, and fully experience what they fantasized."

Wilson and Barber were the first to recognize fantasy-prone people as a true psychological subset, but their conclusions were seen by other researchers as limited. "My research partner and I were inspired by Wilson and Barber's work, but we felt their study should be regarded as exploratory, and their findings preliminary," states Ohio University psychologist Steven Jay Lynn.

Lynn contends that Barber and Wilson worked with too narrow a group—female professionals—and that their research failed to use controls or to establish objective measures of imagination, fantasy, creativity, and psychopathology.

Further research was needed to determine whether fantasy prone subjects could in fact be characterized as an actual personality type. And six years ago that's just what Lynn set out to do. Working with Judith W. Rhue, a psychologist at Ohio University's College of Osteopathic Medicine, Lynn screened nearly 6,000 male and female college students, identifying 156 as fantasy-prone. The scientists found that some of these individuals seemed to be more creative and empathetic than the rest of us. Others had extraordinary sensory skills—some, for instance, could reach orgasm through fantasy alone.

And Lynn and Rhue reported, though most fantasy-prone people are relatively stable, one in ten has trouble turning off the fantasy long enough to focus on the real world. Moreover, as many as 25 percent show signs of mental disturbance, much of it rooted in violent beatings and other kinds of abuse experienced when young. (The figure is not that high, considering the national ratio of abused and neglected children is one in five.)

Despite these distinguishing traits, however, the scientists say that fantasy-prone people do not differ greatly from the population at large. Heavy fantasizers are divided equally between men and women. And the researchers wrote in the January 1988 *American Psychologist*, "If one conclusion can be drawn from our research, it is that individuals at the extreme end of the continuum of fantasy-proneness do not necessarily conform to a unitary personality type. . . . As we progressed, we were increasingly impressed by the diversity exhibited by the fantasizers we studied."

Generally speaking, the researchers conclude, a rich fantasy life amounts to a sort of health insurance from inner space. If the going gets tough or boring or tense or overwhelming, the fantasy-prone just take a little spin around the universe within. "For the majority of our fantasy-prone subjects," reports Lynn, "fantasizing is a very positive thing that definitely contributes to their psychological well-being."

> *"Meere is a diviner, a gypsy type, and she feels she could make her way reading people. She wants to go north and make her fortune there, becoming the primary wife of a warlord."*

Rick Tomascewski considers fantasizing his "meditation." Nowadays he uses it as what he calls a life-management tool—to counteract stress, for deep relaxation, and just to maintain a positive attitude. "It really helps," he says. "When I'm done I'm a little tired, but I feel so good. Nothing can keep me in a bad mood for long."

To better understand world-class fantasizers like Tomascewski, we asked four of the elite to create a fantasy and take us along. The fantasizers below are as diverse a group as the people studied by Lynn and Rhue. They live everywhere from Oregon to Florida, and include a librarian, a writer, and two students. One is seven years old. All prize their fantasies highly and agree with Charlotte Brontë, literature's premier fantasizer, who said that life would be drearier without them.

GAIL JORDAN: CAIRED'S PEOPLE

"I'm in the eastern Oregon desert. It's night. There's no one around, and I'm trespassing. It's pretty desolate. The wind is cool, and I pull my sweater up around me. I've come to create my own anthropological site, a private art project. I kneel in the sand and begin burying primitive ceramic animals I've made myself, placing them in a predesignated pattern. As I pat down the earth over the last one, feeling very pleased with myself, I notice strange shapes in my peripheral vision. Then I black out.

This is the beginning of the latest incarnation of a fantasy that has been evolving all of Gail Jordan's adult life. Jordan is a thirty-one year-old Portland, Oregon, corporate librarian. She is also an artist. "I have a degree in anthropology, and I have an interest in high tech," she says. "So I construct primitive artifacts out of high-tech materials—Mylar, gypsum, broken parts of computers—and telephone wire, beautiful, beautiful telephone wire."

Like her art, Jordan's current fantasy is a preindustrial/postindustrial hybrid. "When I finally come to," she says, "I find that I'm walking through a forest. It's very warm, and it's daylight, and I have a throbbing headache. It seems like I have a direction, but I'm not sure.

"I'm trying to piece things together. I have a vague recollection of having seen a mangled alien body. It seemed very unnaturally contorted, even for it. It seemed humanoid but very fragile—too big in the head, very ugly, pale. It was very damaged, and I'm sure it was dead. I felt repulsed, but I was also sad, and I don't understand why.

"I have no idea where I am. I'm extremely disoriented. I walk into a clearing. There are people there. There's a big flurry of activity, and they're speaking a language that I don't recognize as *any*thing.

"It turns out that I've come across a farm field, and these are farm workers with overseers. For the most part, they look like us, but there's a golden quality to their skin and hair, and their eyes are bright orange.

"I'm given rest, and I'm fed some kind of a grainy meal that looks like poverty food to me. It seems that this group of people is at the bottom of the social scale. It looks like a forced-labor sort of social structure, almost like a slave society, and in fact it turns out to be.

"I do not know the language, and they treat me like an idiot. I'm made to labor with them, and they give me the simpler tasks to do. We're busy planting small bushes with shoots coming off them. It's not a rice paddy because there's no water.

"I'm trying to find things out. It's very difficult with the language problem and everyone being so busy. In the evening people have a little bit of social time. They play music on strange-looking instruments around the fire. It's eerie, but I like it. It's not like anything I've heard before.

"There's a woman in the group who starts helping me with the language. I'm not sure why she's taking an interest in me. She begins to teach me the language, and we start to talk over the planting season. After I have the rudiments of the language down, we can talk better. Her name is Meere.

"Meere has real dark brown hair with fiery highlights, and she has bright orange eyes. I appreciate her friendship, but I get the feeling that this isn't totally altruistic on her part. I ask her all kinds of questions, trying to figure out where I am, what's north of here, south of here, what her people are like. It turns out there's an ocean to the left.

"One day after I've been there several months, Meere comes up to me and says, 'When you go, I'll help you.' Then she tells me I'm not an idiot. 'But you don't belong here,' she says. 'You're not going to stay here long, and I want to go with you when you go.' 'Well, why don't you just go yourself?' I ask her, and she basically tells me that my differences are her ticket out of there. She says I need her because I don't know anything, and I could poison myself in the woods—it's obvious by some of the mistakes I've already made.

"Meere thinks that a group of people who live to the north would be interested in meeting me. She thinks we should go there and form an alliance—she has mapped out a whole plan. She's a diviner, a gypsy type, and she feels she could make her way reading people, telling them their futures. She wants to go north, make her fortune there, and then return and marry a landowner, maybe become the primary wife of one of the warlords. She feels she could buy into the upper classes if she goes away and comes back.

"I ask why she doesn't just go to the north and find a man there, and she laughs out loud. 'People in the north are very ugly,' she says. 'Not only that, but never, never has any match between her people and theirs been fruitful. Sometimes rulers will align themselves and exchange daughters and sons—but there have never been any children, which leads me to think that maybe they're not the same species.'

"I ask Meere why she considers them so ugly, and she says they have gray hair and they all seem old. And I ask her why I should go north, and she tells me that their social structure is different. 'You'll never make it here because you're ugly,' she says. 'And your quick learning will do you no good here. But the people in the north like to know things. They'll like you.' I gather that there are centers of learning or guilds there. They're traders and manufacturers. 'Poor ugly thing that you are,' Meere seems to be saying, 'you'll not be happy here so you might as well go north.' She says that I should let the people up north *think* that I know things that they want to know. 'Don't act stupid,' she says. 'When you don't understand something, act mysterious.'

"Finally we make our escape and start traveling north. Meere is right; I need her help. I don't know what fruits are poisonous. Some that she can eat make me mildly sick anyway. The good fruits tend to be red or purple, though there's one that I especially like that's sort of a golden orange. It has a few dark, hard seeds and five sections to it. It's very fleshy, kind of like a tomato, and it's very sweet—a bit like a melon but with just a slightly rancid taste to it.

'Some of the other things Meere finds are good. But one fruit in particular tastes absolutely rotten to me. The thought of it makes me sick to my stomach, and I won't touch it. Meere catches fish in one of the lakes we pass and cooks it over a fire. It looks like a dark gray carp, and when I try to eat it I get violently ill.

"But we manage. We're walking, moving up from the hot forest where Meere's people live. It's starting to become rolling hills with little lakes now. It looks very much like Earth, but it *feels* different.

"The weather has started to change. It seems to rain more now—in fact, it rains a lot. We're wet often. Once we're in the rainy area Meere says we're no longer in her people's region. She says we'll probably meet up with people from the northern group. We won't know their language. Just act like you know things," she says. 'Act like a deep thinker, act mysterious.'

'While we're walking, the area gets a little more rocky. The hills are a little more rugged. Finally we meet a party of these people. It looks like a scouting military party. They look like medieval warriors to me—without the armor. They're all men, and they're taller and thinner than Meere's

people. They have long gray hair, they're very pale, and they have gray eyes. But I don't think they're ugly, though I can see why Meere would think they were—her people are golden and warm, flashy looking, almost. These people are dull looking if you're comparing. They don't look old, they just have silvery gray hair. Their skin is pale, but it's kind of an iridescent shell color. It's very strange. Their eyes seem to be set wide apart to me. They're strange looking, but I don't find them ugly. Meere thinks everything different is ugly.

The leader of the group is named Caired. He knows Meere's language, so we can communicate with him. He's sympathetic to escapees from the slave plantations of the south. He thinks he can find work for us in his household. Caired is not overly interested in us, and he's moderately helpful. He asks me where I'm from. I say I don't know, before Meere shoots me a don't-act-like-an-idiot glance.

"We're going back to his home base, which is kind of a castle. Caired is like a gentleman farmer. As we're walking, I ask him about his society. It turns out to be somewhat how Meere described it. There are learning guilds. There are trades. I tell Caired I have some skills, and that my people are knowledgeable and have systems of manufacturing that I might be able to add to his people's base of knowledge.

"Fishing is very important to these northerners. They have a large shipbuilding industry—but that's a little bit farther toward the coast. They're agricultural, but the guilds have to do with building. It's a lot like medieval societies, when towns started flourishing. There are centers of learning. There are stoneworking guilds and weavers' guilds, and they do a lot of trading with other parts of their world.

"I still have no idea where I am. I just know that I'm on a western coast of some kind of continent, and that there are different kinds of people to the east. I get a broader view of this world from Caired than from Meere.

"Caired is part of the nobility. He asks me questions to try to figure out if he has come across any stories of my people in his travels, and I *know* he hasn't, but I'm being polite. One night I tell him I really don't think I'm from anywhere he's been. He's very thoughtful but doesn't say anything. I don't know how to tell him that my people know about practically every group in our world and his ain't one of them.

When we reach his homeland, Meere and I are both given some work in the kitchen. It's a communal kitchen, and it's large and stony. The workers and the ruling family all eat together in a large hall. There's a lot of potato peeling activity, though they're nothing like any potatoes we know—they're small and dark green and very bumpy, knobby almost. I'm learning things all along—of course, Meere and I both are trying to pick up the language.

"After being there for a while, Caired says that I'm to go with him to see their king because I am different—I am not from there, and I should have an audience with the king. I agree, and we go.

"The king and the queen are probably in their fifties—if that's comparable. We're in their court. There are a couple of people recording what's being said. They're writing on stiff, almost white cloth, and they're writing with a kind of ink pen. It looks like it's crafted out of a reed that has a point with some kind of ink in it. Their outer clothing seems to be like a belted cloak—a water-resistant wool, because it's so rainy.

"Both men and women are wearing robes and dresses and mantles that fall somewhere below the knee to the calf, and they're wearing boots made out of some kind of animal skin. Some of the outer mantles are quilted for warmth.

"The king and queen just seem to have finer-quality clothing. And they're wearing jewelry, which tends to be fat stones that may be rubies or sapphires or onyx. They're actually quite lovely, but nothing is extremely flashy. There are also a lot of pearls.

"Both the king and the queen seem to be intelligent rulers, and I can understand why they would want to see me. They understand that I'm not from their planet. They ask me if I'm associated with a group they call the wizards. They have their own wandering wise men, but there appears to be, within the last hundred years or so, a new group who claim to be from the stars. I ask what they look like, and the king describes basically the way I recall the dead alien looking, so I'm really interested.

"The king tells me that he has met one—probably about ten years ago—and the creature seemed to be very respectful of the king's position with his people. This alien wizard asked if he could gather information, and he portrayed himself as a combination merchant and ambassador. The king said he wasn't opposed but would think about it. The alien wizard left, and the king hadn't heard from him again.

"I tell the king that I think I was taken to this planet by one of these alien wizards, but I really didn't know exactly how, and I didn't know why. I said I knew I was going to have to fit into this new society, and the king gave me the option of checking out the centers of learning. I opt for learning the language more and becoming a scribe. Meanwhile, the king has regular audiences with me because—Meere was right—I do have a lot of ideas, and I know things can be done in different ways, and the king is very interested in expanding the centers of learning. That's how I spend my first year.

"One day in my audience with the king, there's an alien there. The alien says I was chosen—I say stolen—as one of the alien ambassadors. The alien wants me to go back to his planet for training, which is what was supposed to happen in the first place, but there was some sort of accident, and the alien who took me from the desert was killed. I was drugged, which accounts for the headache.

"The aliens have ambassador schools

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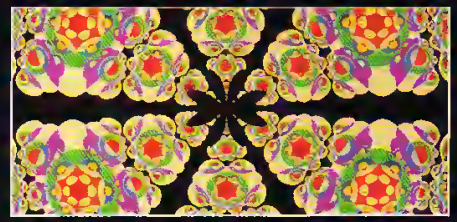
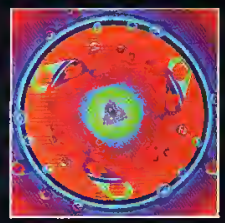
COMPUTER ART BY KEN AND BONNI EVANS





Tools of the trade: The computer is the artist's palette for the next century and the mathematician's device to set his fancy free. Whatever the medium, the art was created by man, not by machine.

Mystical or mathematical? Who knows what may be lurking in the thousands of untried mathematical equations, in dozens of untried computer techniques? Perhaps the answer lies in the work of Ken and Bonni Evans. This husband-and-wife team from Manotick, Ontario, unite two seemingly contradictory elements—mathematics and art—to produce the works shown on these pages.

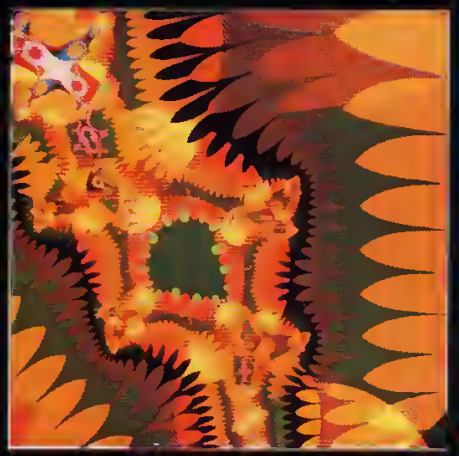
Ken Evans, a mathematician and computer scientist, toys with various algebraic equations with patience and perseverance, creating the images on his computer just as a traditional artist might make a rough charcoal sketch on his canvas. Like most artists, he's hesitant to reveal his secrets, saying only that his manipulations of the equations are unique but founded on a similar premise as fractals. Yet unlike fractals—the umbrella that math art has fallen under—these images have a greater variety than the self-replicating spiral tentacles (sounds like a date I once had) with which we're familiar. Put simply, it's like looking at an equation through a microscope, peering deeper and deeper and enlarging the image. A single mathematical formula is iterated—the output of the first equation is reentered as the input to form a new variable for the original equation. A little luck enters the picture, admits Ken Evans. "There's a considerable amount of trial and error. You can't predict what's going to happen before computation and examination." Once he finds an appealing section of the graph, he expands upon it, then "paints" with his computer

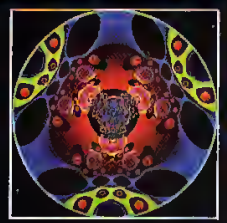
palette, which consists of some 16 million color variations. Evans has made more than 1,300 pictures, having spent in excess of 900 hours working with his computer

The computer is a new art medium, one for the twenty-first century, replacing the brush and palette Yet there's a reluctance to accept these pictures as art. New methods meet more often with resistance than acceptance Evans feels objections are bound to arise over the unorthodox marriage between the intuitive and the analytical. "My methods might bother artists It seems to me that if I spent a lot of time doing abstract art, and someone came along and said, 'I have a machine that can do that,' I'd be disturbed " (Thank God there's not yet a computer that can scan artwork and write accompanying text! No comments, please) Evans continues on the thought of computers entering the world of imagination. "Remember what happened to art as a consequence of photography? Artists had to rethink their role in the world A whole class of things they'd done, that of recording, was taken from them, mechanized The flowering of Impressionism, one of the most vital periods of art, I see as a consequence of photography ' He refers to the style of his own work as mathematical Art Nouveau. Through his work, math—usually considered a dry and abstract subject that most people avoid—is like an old soul born to a new body

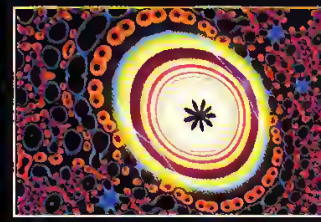
Math and numbers, however, have never been restricted solely to the realm of science In the Bible we have the Book of Numbers and other significant references, like the Devil's telltale 666 Lewis Carroll wove mathematics into his children's classic *Alice's Adventures in Wonderland* The field of numerology delves into the occult significance of numbers and the predictions of things to come, and most of us have a favorite number or a lucky series to wager a weekly dollar on (mine being Rodney s phone number). In many cultures and throughout the ages, these two factors in question have never really been far from each other. The offspring of the union (the artwork s, not mine) promises to be intriguing. With anything new, it takes more than a quick glimpse to fully understand the work's breadth

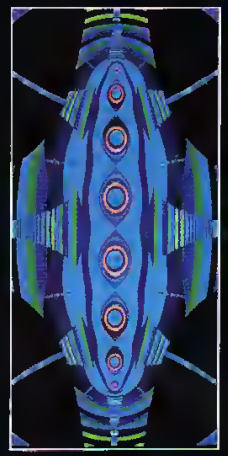
At first glance one can appre-

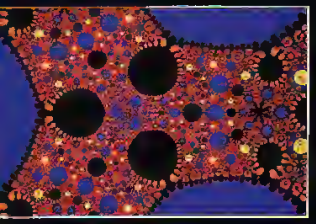




We ore discovering the scieoce of chaos—of the instabiiity inherent in simple formulas—and have begun applying our findiogs to physics. Many of the by-products of this research ore offecting the art world.

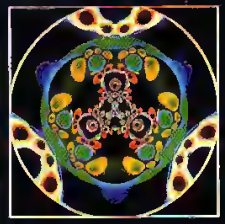




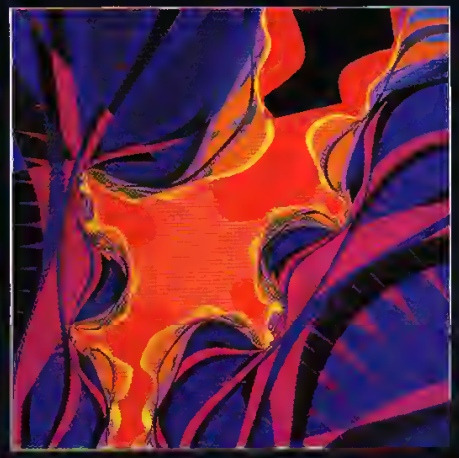


ciate the color and design, but upon reflection a mystical, magical element from within the pictures seems to call your attention back to them. This past February an Eskimo shaman in Canada recognized the art's unique quality. The Inuit Eskimo chief attended the signing of a contract to promote his people's art and culture. He became fascinated with the Evanses' business card that lay on the desk. Captured by the image, he was compelled to explain his interest. "There's something in this that shows the magic of our past. I see a story in it. This is what I'm trying to teach our children—it represents our old ways."

Further intrigued by the Evanses' company name, Imagiciens, the shaman expressed his feeling that the picture was



Mathematicians long ago sensed the complexity of basic equations, but these experts lacked the capability to explore them. The field took off in the early Sixties, with computers and sophisticated graphics.



magical, and additional proof that the gods, the spirits, are in everything—even technology (so be good for goodness' sake). An ecstatic Bonni Evans recalls, "Of all the original native art the committee and the chief could have chosen, they felt a piece of our computer-generated art best embodied their ancient culture!" The art captures a universal feeling, an enjoyment that's not limited to personal taste or age group. Nor is it limited to aesthetics.

The most important thing to the Evanses right now (besides money and national exposure) is producing a video as a teaching aid for students. "For years people have been treating computers and technology as a scary science thing that only nerds are interested in. Because so many kids have trouble relating to math, we feel our videos will help them overcome their anxiety by seeing something wonderful created by math. Perhaps it's a naive notion, but we would like to inspire kids to understand how objects of such great beauty can fall out of strictly mathematical procedures." Other projects that Ken and Bonni Evans are working on include a museum exhibit, where some of the pieces will be made into holograms and some will be animated (it takes some 1,440 frames to make one minute of animation). In addition to framing their pieces, which they sell, the Evanses are applying their art to logos, jewelry, and business cards. "The bizarre thing is, it has been there all along," says Ken Evans. "We just never tripped over it before."—Nina Guccione ☐☐

BRAIN

CONTINUED FROM PAGE 50

may not even recognize the characters as a language. Then you are given another batch of papers filled with Chinese writing and a set of rules (written in English) explaining how to match the first set of ideograms with the latter set. After learning the rules for correlating the two sets of formal symbols, you are able to answer any question in Chinese. In fact, you become so proficient that native Chinese speakers think you understand their language. In addition, you are asked to answer questions in English. Because this is *your* native language, you do so flawlessly.

"From the point of view of someone reading [your] answers," explains Searle, "the answers to the Chinese questions and the English questions are equally good. But in the Chinese case, unlike the English case, [you] produce the answers by manipulating uninterpreted formal symbols. As far as the Chinese is concerned, [you] simply behave like a computer. [You] perform computational operations on formally specific elements."

As long as you answer the Chinese questions using the formal set of rules, argues Searle, you cannot be said to truly understand the language. And that, says Searle, is the present and future of AI. As long as computers are unconscious of the "real world," depend on formal rules, and are unencumbered by intentions, they cannot be said to be truly intelligent.

As thought provoking as Searle's argument is, it hasn't stymied AI researchers. Indeed, Lenat believes AI systems can be truly intelligent and that CYC will be a bridge to getting there. "We have cracked to the level that we need to crack—most of the problems in representing time, space, shapes, structures, belief, causality, emotion, and goals," he says. His mission is not to express abstractions, just the things that humans deal with in their daily lives. If CYC can reach that level of intelligence, it will be the smartest machine out there.

"The formalists are trying to figure out the laws of physics," Lenat explains. "I'm trying to build a bridge. And there were a lot of bridges built before the laws of physics were understood."

Lenat understands the risks involved in attempting a project as difficult as CYC. But he believes that any career in science is "a series of bets. We're betting our professional lives, the few decades of useful research we have left in us, on this," he explains. "But the nature of human life will change dramatically if we win. Intelligent machines will touch every aspect of our lives—just as surely as if they were aliens from another planet. It's worth a bet on someone's career."—Michael Leibowitz

ENTER THE ROBOTS

Decades from now, after computers have attained—and exceeded—the level of intelligence of Lenat's CYC, a new kind of robot may come into our lives: a robot that is programmed to be our best friend. For some of us the robot will become our antidote to loneliness and perhaps our alternative to marriage.

"Let's look at what can be done with machine and biological combinations," says Arthur Harkins, a cultural anthropologist at the University of Minnesota. "We could build machines that make perpetually available to us the characteristics of lovemaking, intelligence, and sociability. Even if we made them as appliances, not as fully intelligent devices, they could still have a lot of these traits, including bubbling conversations."

Nelson Otto, formerly of Anticipatory Sciences, a consulting firm that specializes in technology trends, shares Harkins's vision of future human–robotic relationships. "A robot as a companion. A robot as a best friend. A robot as a lover. These are things that are in the backs of people's minds, even though they don't want an open discussion of them now. Most people in this country are so malnourished when it comes to personal attention that when they see the opportunity that a robot gives them, the luxury that it gives, I think they will be more than accepting."

In fact, when Otto has talked about these ideas on radio talk shows, he has tended to hear the same pattern of response from listeners. Initially, callers express skepticism and disbelief, then comes a tide of desperate pleas: "I'm lonely. Whara can I get one of them?"

John Carr, professor of psychiatry and behavioral sciences at the University of Washington, is not surprised by this kind of response. "Whoever finds a way to solve the problem of human loneliness, with or without machines, will go down in history as a great benefactor of humankind."

As a therapist, he knows that one of the most common problems people have is relating to others. "I think we tend to abstract about interpersonal relationships," he explains, "but what we are really talking about is the difficulty this individual has feeling accepted and cared for and valued by that individual over there."

A personalized robot, he admits, could give comfort to some individuals by being nonjudgmental and totally accepting them. But in so doing, robotic companions might reinforce attitudes and behavior that a human friend would challenge. "Realize that you would have a companion," explains Carr, "that listens devotedly to your story of the day and buys it without questioning your statement that your boss is an SOB and doesn't know what the hell he is talking about. A human companion might say, 'But look, dear,' on the other hand, 'your boss may have had a point.'

This sort of unconditional support does have its dangers. "I think we know enough about the development of intelligence to know that it evolves in response to demand and challenge," Carr says.

Perhaps, though, this challenging—this gentle pushing for growth—could be programmed into the robot. It would be an especially important quality for robots given to children. And Otto believes that children would be quick to fall in love with robotic pals. He has watched the way children interact with a simple robot at Disney's Epcot Center and found the robot had patience, kindness, warmth, the appearance of love—always sensitive, never angry. And it always had *time* for them. "You look at those characteristics and you say to yourself, 'How could this thing fail?'

By giving these intelligent toys security access codes, direct linkage to police, emergency call-in computers, and satellite reception (for navigation purposes), they could serve as mechanical good shepherds to protect against a child's getting lost or abducted.

Children might also bond with their robots instead of with humans, a possibility that does not worry Otto. "I think we would want to watch the bonding to the robot very carefully," he says, "but what's the alternative? Right now we are offering children no bonding opportunities, bad bonding opportunities, and some good ones. But only a small percentage of children are really getting good bonding. For most kids the best bonding opportunities they've ever had have been Big Bird or some other character from *Sesame Street*."

Psychologist Brian Sutton-Smith, who is program director for interdisciplinary studies in human development at the University of Pennsylvania, isn't worried about bonding either. "Kids bond to blankets, toys, and imaginary companions, so this could hardly be worse," he says. "I imagine though if you isolated a child with one of these robots and the child never saw anyone else there could be problems, but this is unlikely to happen. Despite the original hysteria about video games, we have found that most children aren't satisfied to stay with them all day long. We also know that in terms of bonding, children much prefer other children to anything else.

We all form bonds with a variety of people and things over the course of our lives, and a robotic companion would simply take its place among them. Otto foresees the robot being continually upgraded, growing intellectually to keep pace with us as we grow. It could also change appearance, teddy-bear-like when we're young and maybe pocket-size when we're older. "That way," says Otto, "it could always be with you."—Grant Fjermedal

FICTION

A strange encounter
in ancient Rome promises adventure and wonder
even to the most jaded citizen

WILD, WILD HORSES

BY HOWARD WALDROP

The hunting party had been out for two days—thirty men and slaves, twenty horses, two wagons full of impedimenta, fifty yelping, fighting dogs. As a scent they'd brought with them a skin that had hung on one wall of Horus Matutinus's atrium. During this second afternoon of the dogs milling around and biting each other in uncontained excitement, the slaves had bet among themselves that the hounds would soon strike a trail and follow it the twenty miles back to Matutinus's house. P. Renatus Vegetius shook his head sadly. The hunt had been for his benefit. It was turning into a fiasco. Three days before, he had been in the marketplace of Smyrnea, fifty miles from Constantinople. He had watched a fight between a Patripassianist who spoke only Latin and a Monophysite who spoke only Greek. It had drawn quite a crowd and was broken up by an aedile on his way to the newly reopened Temple of Mars and by two off-duty German military reservists. Then Decius Muccinus, the nomenclator of his friend Aurem Praebens, had hurried up to him.

"*Salve*, Vegetius," said the slave, who wore a beard in the Greek fashion and who was to be freed in six months. "I was sent by my master to fetch you. Astonishing news, if true, which I am forbidden to tell."

"Well, well," said Vegetius, hurrying with him. He took a look back at the crowd dispersing from the marketplace. Surely the new emperor Julian knew what would happen when he reinstated the old religion, took away state funds from the Christians and gave permission for all exiled heretic Christians and fragmented bishops to return. Ah, statecraft for the statesmen.

Vegetius had been on his way to Praebens's house anyway. He wanted to consult the copious notes his retired military friend had made while accompanying Emperor Constantine on one of his eastward journeys. Vegetius's work, *De re militaria*, a training manual to be read to officers of the army, was almost done and needed only a chapter on convoy duties and baggage-wagon guard.

"Great news! Great news!" Aurem Praebens had said as they

PAINTING BY MAXFIELD PARRISH

entered his house "One of your dreams come true! (and I'm not talking about that damned book of veterinary medicine you want to write) Sharpen up your javelins, you old fart! A lion's been seen in Thracia itself, less than twenty miles from here!" He waved a letter around, its ribbons flying. "Someone anonymous says I and my friends should know before the news becomes general."

There had supposedly been no lions this side of the Pontus Euxinus since the end of the Republic four hundred years before. One of P. Renatus Vegetius's desires was to hunt lions from a chariot in the old style and to write a treatise on the sport.

He had planned a trip to Libya year after next for just such a hunt (gods willing) once he had finished this book and the one on diseases of mules and horses. But here now, in Thracia!

"I've called on Horus Matutinus (who served in Africa) and Phoebus Siccus (who owns an old hunting chariot) and have sent for three teams of swift coursers for our use. How does that grab your testicles?" Praebens had been beaming. Vegetius had been beside himself. Sometimes the gods were kind.

Sometimes, as on this hunt, they weren't.

Phoebus Siccus—an old, old wrinkled man—was decked out in his armor from fifty years before. He could turn completely around in the worn leather and metal breastplate before it began to move with him. "Either these are the sorriest dogs I've ever seen or there's no lion closer than Mesopotamia! Who the Dis' idea was this anyway?" asked Siccus through lips which looked like two broken flints.

The dogs had run up a wisent, two scrawny deer and a wild ass in forty-eight hours. Each time the houndsmen would kick them howling away from the cornered animals and then stick their noses back in the lion's skin. Vegetius had had enough. "I'm going over to the brook yonder," he said. He mounted his horse.

"May I go with him, Master?" asked Decius Muccinus. "I should like a swim."

"The last thing I need out here," said Praebens, "is a nomenclator. The guys who own these hounds all answer to 'Hey, shithead!'" He turned to Vegetius. "Sorry. I wanted this hunt for you. We'll take the dogs back north, then home. Follow the wagon tracks. If you miss the lion, though, you'll hate yourself."

"If I don't cool off, I will die," said Vegetius. "Good hunting."

"Hah! I'm going to find out who sent that letter and then I'll turn the dogs on *his* butt," said Praebens.

It was a stream straight out of Hesiod—pure, pebbled and cold. Vegetius sat on a rock with his swollen feet in the gurgling water. Muccinus, who had stripped naked and swum back and forth a few times, was now asleep on the grass. Upstream, tall rushes grew to each side of the stream; banks lifted up and hung over, shading the western side of the waters in this early afternoon. Their two horses stopped their grazing. One backed up whinnying, its eyes growing wider.

"What is it?" he asked the horse, reaching out to calm it. Then his blood froze. *Oh gods,* he thought, looking upstream and scrambling for his javelin. *What if the lion's found us?*

He kicked Muccinus with his bare foot. "Mmnph?" asked the slave, rolling over. Then he jumped up, seeing Vegetius trying to put his sandals on over his head. He pulled a dagger from his lump of clothing on the ground.

"What? What?"

They looked upstream. Something moved along the tall rushes. The fronds parted. The oldest man they had ever seen stood at the edge of the reeds, naked from the waist up. He might as well have been clothed; his hair and beard were pure white and hung in waves down his back and chest. He looked like a white haystack from

"The oldest man they had ever seen was standing at the edge of the reeds, naked from the waist up. His hair and beard were pure white and hung in waves down his back and chest."

which a face stuck out. They couldn't tell if the hair reached the ground, as the reeds covered all below his waist.

In his hand he held a thin, tapered pole to which was attached a light line, gossamer in the sun, probably of plaited horsehair. At the end of the line was a hook with a tuft of red and white yarn tied to it. He waved the pole back and forth a few times and flipped the line into the water.

There was a splash as something rose to the lure. The line tightened, the pole bent, and the old man heaved up and back.

A two-pound grayling, blue and purple spotted in the sunlight, its dorsal fin like a battle flag, flew out of the water at the end of the line and landed flapping back in the reeds. The old man bent out of sight to pick it up.

"Well done, sir," said Vegetius. The old man looked up. "I'd be careful, though. There's supposed to be a lion about!"

The old man looked at them, his face breaking out into a smile. He flipped the line back out; soon he was fast to another grayling, this one larger, and pulled it in.

"I said, There's a lion about!" yelled Vegetius, cupping his hands.

"Nonchalant bastard," said Muccinus. "Or maybe deaf as a post."

The old man shouldered the pole and the brace of grayling and went through the reeds on his way upstream.

"I saw no houses about," said Muccinus. "Wonder where he came from?"

"Who knows?" said Vegetius.

The sun was still hot, so they followed the shady side of the brook upstream for a mile or so. They came upon the cave around a bend. Outside were hung drying wild onions, radishes, garlics. There was a rack out in the sun on which split fish curled. Fungi and mushrooms grew in the shady spots.

"It looks quite homey," said Muccinus. "Hello the cave!"

There was no answer.

"He has frequent visitors," said Renatus Vegetius, pointing to the ground outside the cave opening. It was churned with innumerable hoofprints. "Either he's a companionable old cuss or he's popular because those aren't regular mushrooms."

"Hello," Renatus continued, dismounting. He tied the horse's reins to a root which grew from the cliff wall. The horse was nervous again.

Inside, the cave was cluttered with thousands and thousands of scrolls, book boxes, clay tablets and slates.

"Muccinus," he said. "Look at *this*!"

They walked in. Amid the clutter was a chest-high table, at one corner of the room was a pile of mashed-down straw. There were no chairs, only piles and piles of scrolls and books in a dozen languages.

Decius Muccinus poked around in the stacks. "Greek. The curved writing of Ind. Latin. The old triangle writing. Who could read this stuff? What's it doing *here*?"

Renatus Vegetius went to the high table. There were several closed scroll tubes there. One was open. On the table by itself was a single page, cut evidently from a lengthy work, headed, as it was, Book 19 in Greek, and at the top, the title.

If Iupiter Ammon had pulled P. Renatus up to the top of Mount Olympus and said to him, *Go anywhere, mortal, and get your heart's content, anywhere in time and anywhere in the world. It is yours,* Vegetius would have, in the next instant, been back in this cave with his hand on this piece of paper. If was the *Hippiatrika*, the lost book of veterinary medicine. It was as old as time, older than Homer. When he had read Pelagonius's *Ars Veterinaria*, Vegetius remembered the author's railing at the fates which had lost the book to the ken of man since the Trojan War. Pelagonius wailed for the lost knowledge it was supposed to contain. And here Vegetius had in his hand a page of it. He read the first paragraph and knew, with all his mind and heart, that this was it.

Their horses whickered outside. Then their hooves clattered. The horses ran by, blurs. Vegetius had only his short sword with him—the javelin had been in the sad-

dle boot. Muccinus once again drew the dagger forbidden to slaves.

They heard another clatter of hooves. At least it wasn't the lion. "Hello! Hello!" they both shouted.

"I know you're in there. No need to yell," said a voice, an old man's voice, older even than that of Phoebus Siccus.

Then the old man came into the cave followed by the horse.

No.

The old man and the horse came into the cave together.

No.

The old man was the horse.

"Finding anything interesting to read?" he asked, looking from one to the other, then settling his gaze on Vegetius.

Somewhere down his back his hair turned into a brittle white mane. He was white from the top of his head to his hooves. A back leg lifted, clacked to the floor.

It was easier, thought Vegetius, if you only looked at the front half.

"The *Hippiatrika*?" he asked. "Where did you get it?"

The centaur looked toward the table. A mixture of warm animal and human body odor came to Vegetius's nose, like sweaty men on a wet horsehide triclinium. More than anything, it convinced him that the encounter he was having was real.

"I wrote it," said the centaur.

Vegetius nearly fainted.

"I think your master needs some water," said the centaur to Muccinus. "There's a cup outside. And please don't run away."

"He's ... he's not ... my master," said Muccinus. "And I need some, too."

Vegetius held on to a table leg until the slave returned with the cup. As he stood woozily, he noticed that the hooves of the centaur were in bad shape. One leg, the right front, was thinner than the others, with a knot on it as if it had been broken once. What chest Renatus could see through the drapery of white hair looked thin and mottled. Vegetius took the cup and drank.

"Chiron," he said to the centaur. Chiron, the teacher of Hercules and Asclepius, the only centaur able to read and write. The only one ever to be married to a human woman, the only centaur able to drink wine without becoming a raging animal. Chiron, author of the *Hippiatrika*.

"You must be P. Renatus Vegetius," said the horse-man.

"How did you know my name?"

The centaur laughed, his long hair flying. "How goes the lion hunt?"

"The letter was your doing?"

"Somewhat. I wanted to meet you. I read a copy of your *Histories*."

"And you knew that I would come to hunt a lion?"

"After your rhapsode on lion hunting in the chapter on Egypt? And in your argument you said you would someday write a treatise on warfare and a book amplifying Pelagonius's *Ars Veterinaria*? To read a man is sometimes to know all you need," said Chiron.

Vegetius, said Muccinus. "You're talking literature ... with a centaur."

"One with a purpose," said Chiron.

"What's that?" asked Vegetius.

"I have something you desire. The *Hippiatrika*. The whole manuscript." Vegetius looked wildly around. "It's in a safe place. Don't worry. Help me, and it, and all these other works, are yours."

"What do you wish?"

"I'm old. I want to return to my homeland to die. You can help me."

"Your homeland? Scythia? Ind? Africa?" asked Vegetius, following the best authorities as to the homeland of the centaurs.

"Take me to the Pillars of Hercules," said Chiron. "Then I can be home in a few days."

"The Pillars of Hercules! That's at the western edge of the Empire! That's where the Greeks once sent an expedition to see if the sun hissed as it went down in the ocean! We're in the East! How am I supposed to get a centaur from one end of the civilized world to the other?"

"You're an intelligent man," said Chiron. "If you can't conceive of getting me across the Empire, think what it would be like for me, alone. When I was young and strong, I might have done it. I could outrun any horse when I had to. But no longer. I wouldn't be gone fifty miles before some rich man would have me hunted down for his menagerie. The fact that I'm a rational being and can think and speak would appeal to him not at all. I'd end my days in a cage, in Thracia."

He looked at Vegetius.

"I can't believe this," said Muccinus.

"I'm the last one," said Chiron. "And you get the *Hippiatrika*. It *is* all you think it to be. Just get me home, Renatus Vegetius. I ask no more."

"I wouldn't know how to begin."

"Nemo Prorsus," said Muccinus.

"What?"

"Nemo Prorsus. A very clever man in Cyzicus. If you want to go through with this, I mean," said Muccinus. "He's done everything ... been everywhere. All it takes is money. Vast amounts."

Chiron turned his eyes to Vegetius. "Please?"

"Done," said Vegetius, crossing his wrists three times and spitting, "and done!"

In the week following, after he had sent for Prorsus, Vegetius went to Aurem Praebens. He found him dictating to Muccinus.

"I would like to buy Decius from you," said Vegetius.

"What?" screamed Muccinus. "After what I've gone through! I'm to be freed in—"

"Quiet, slave," said Aurem.

"I—"

"Just what did you have in mind?" asked Praebens.

"You're to free him in six months. Sell him to me now. I'll free him when I return from my—researches in Alexandria." (This was the cover story.) "You know everyone in this

"What do you mean, are we having any trouble?"

one-horse town, anyway. I'll need someone quick with me, a nomenclator, one who can read and write. And I trust no one more than your Decius Muccinus."

Decius was glowering at him.

"Besides," said Vegetius, "I sell him to *me*, and it won't be *you* who has to pay the five percent manumission tax!"

"Decius, you've been like a son to me, but business is business," said Praebens to the slave. Then to Vegetius, "Three thousand sesterces."

"Three thousand? I'm going to have him read to me, not sleep with me!"

"I'm worth four thousand if I'm worth a talent," said Decius, his feelings hurt.

"Thirty-five hundred," said Praebens.

"Thirty-five? Can he fly, too?"

"Thirty-eight hundred and not a denarius less!"

"What, does a whole family come with him, eight strong boys?" asked Vegetius.

"Four thousand," said Praebens.

"Done!"

"Done," said Praebens, crossing his wrists three times and spitting, "and done!"

Decius was smiling as they had him write up his own bill of sale.

They decided to move Chiron nearer town as they received word Nemo Prorsus was on his way across the Hellespont. Vegetius and Muccinus went out to help him close up his cave, stacking stones across the entrance all one afternoon.

He was to stay in one of the outbuildings in an olive grove owned by Vegetius's uncle, Verbius Mellanius the rhetorician.

"Excuse me," said Chiron. He backed up, lifting his tail and dropping a pile of road apples on the path. "I usually don't do that so close to home, but I'm leaving. And my stomach's not what it used to be."

After they sealed the cavern off fairly well, they began to ride downstream. Chiron took a long last look back.

"If these were the olden days," he said, "I'd ask one of the Cyclops to keep an eye on the place for me."

A few minutes later, Decius Muccinus looked at Chiron and began to laugh.

"So this is the famous Mr. Chiron, eh?" said Nemo Prorsus, a squat, thick man with a Greek beard. He wore trousers in the Eastern fashion and a leather tunic covered with brass spikes. He was bald as a melon. "Glad to meet a real centaur. I once fixed up a mermaid and sold it to the Prince of Parsi, but this is the closest I ever came to a real mythical creature."

"I'm no myth," said Chiron.

"Can you do it, Nemo?" asked Decius.

"That's *Mr.* Nemo to you, slave boy!" He studied a moment. "Yeah. But it's gonna take all your master's money. Have him give it all to me."

"Why are you talking about me in the third person?" asked Vegetius.

"I didn't start this," said Nemo Prorsus. "Yeah, gov, I can do it, but you'll have to give me near all your money and go along with everything I say. Whatever's left over we can split. Bargain?"

"Done," said Vegetius, sighing.

"Done," said Prorsus, crossing his wrists three times and spitting, "and done!"

"It'll take about three days to get everything cooking. I suggest we all lay pretty low," said Prorsus.

"There's one thing I'd like to do before we leave. If Renatus Vegetius is paying," said Chiron.

"I suppose I am," said Vegetius, sighing again.

"I'd like to visit a Lupercalia."

"Son of a bitch!" said Prorsus. "You're what, a million years old or somethin'? A Lupercalia, no less!"

"I used to go all five ways when I was young," said Chiron. "But that was long, long ago. I'd like to go just once, again."

"Son of a bitch!" said Nemo Prorsus again. "Come on, Mr. Vegetius! Let's give the old guy a real treat. I know a place way out in the sticks, where nobody cares what comes and goes. No offense, Mr. Chiron!"

"None taken."

"He found eight old men and asked them if they could ride a horse in a straight line. He promised them all the wine they could drink as long as they could still ride the next morning."

So in the early morning hours they took him to a brothel by the back ways, and then into a stable by the front door, then back to the brothel again. Several of the women had several rides. Everyone became drunk and agreeable, the night became a warm blur. The women covered Chiron with flowers and sequins, one a Greek girl named Chiote, poured libations of wine and perfumed oils on his hair and mane.

The next day no one at the Lupercalia remembered much of what had happened, or whether it had or that they only dreamed it—some illusion caused by the edicts of the new emperor, perhaps some psychic slippage to an earlier, simpler time.

Well," said Prorsus, when he woke up with matted eyebrows and a dry mouth in the olive grove the next evening. "Time to get to work. Shell out the loot."

First he bought sixteen horses.

Then he found eight old men, solitary worshippers of Bacchus, and asked them if they could ride a horse in a straight line. Then he made them prove it. He promised them all the wine they could drink each night as long as they could ride the next morning, and free passage back to Byzantium, if they chose it, or could remember where they were from, or why they should go back whenever they got wherever it was.

"But," said Vegetius, "The money!"

"An empty purse contains nothing but the seeds of failure," said Prorsus. "We made a bargain. Your centaur wants home. He's giving you something in return. You're giving me something—your complete trust and your cash. True?"

"Well, yes."

Then let me do my job," said Prorsus, and pulled more sesterces out of the bag.

Then he went out and bought an elephant with one tusk.

He had draped two white blankets over the pachyderm's sides, tied on with rope. Prorsus took a paintbrush and, in a fairly good hand, painted VIDE ELEPHANTOS HANNIBALENSIS on each side with an arrow pointing backwards.

"Not very good Latin," said Vegetius.

"Good enough for these garlic-eating yahoos!" said Prorsus. "The first rule is, when you're hiding a marvel, give them something else to gawk at!" He put down the paintbrush. "Besides," he said, "anyone who thinks he's going to see some six-hundred-year-old elephant deserves to miss a centaur or two."

He winked and left to see about the Imperial Post Road permits.

"Here goes nothing," said Muccinus, naked and sitting on the elephant's head. It was the first morning of the westward trip. They were nearing the first village on the road toward Philippi and Dyrrhachium.

"Put your lungs in it, you old farts!" yelled Prorsus from his blue-painted horse up ahead. The eight old men sat up as straight as they could on their horses. Two of them had bagpipes, two had trumpets, two had serpentines which curved around them to rest on the backs of their saddles, and the other two flailed away at drums.

It wasn't music; it was an atrocious noise. The elephant almost ran off the road. Muccinus steered it back by kicking it behind its right ear.

Vegetius, wincing, could imagine Apollo, Orpheus, Harmonia throwing themselves off Olympus in suicide at what was being done in their names.

All the people ran out of their houses, stood in the road, made way for them.

They began to cheer as the blatting entourage came even with them. Prorsus, wearing a headdress of purple ostrich feathers, gave them a sweeping blessing with his arms.

All eyes were on the elephant. It trumpeted, drowning out the cacophony ahead of it for a second or two. It drew even with the middle of the village. Heads turned back toward Byzantium, peering. Most of the villagers were still looking that way when the noisy column drew out of sight around a curve in the post road.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What do girls really want? According to Darwin, women are after the one best male But years of observing nonhuman primate females soliciting male after male suggests to this biologist some new rules to the sex and mating game

INTERVIEW

SARAH HRDY

The myth: Females of all species evolved to play the passive role when it comes to sex. The myth breaker: behavioral biologist Sarah Hrdy, whose research on primate sexuality reveals that far from being biologically fated to monogamy and sexual passivity, females may have a powerful sex drive and tend to seek out sex with a number of males.

The Langurs of Abu: Female & Male Strategies of Reproduction, Hrdy's classic study of the sacred hanuman monkeys of India, paints a picture of female primates as sexual strategists who astutely manipulate the males around them, not so much to get what they want but to make the best of a bad lot.

The fame Hrdy has won for her revolutionary ideas has carried quite a stiff price. "Sometimes I have the uncomfortable sensation that I am being set up by the media as spokeswoman for the naturalness of promiscuity, which, if you are talking about humans, I most definitely am not," she declares vehemently.

In scientific circles Hrdy is famous for her precise, yet revolutionary style. She likes to integrate field data with theory and then transform theory. Hrdy has reshaped the field of sociobiology, framing key hypotheses on female sexuality, female competition, and infanticide. Her undisguised aspirations as a novelist (she interjects herself into her research as a character and still manages to write with tremendous clarity and elegance) make her work that much more compelling.

Born in 1946, Hrdy wrote her first book, *The Black-Man of Zinacantan: A Central American Legend*, as her undergraduate thesis at Radcliffe College. The book offers an analysis of the Mayan myth of the bat demon, a fiendish figure who takes vengeance on misbehaving women. As a Harvard graduate student Hrdy switched from cultural anthropology to primate studies, so her

PHOTOGRAPH BY TOM ZIMBEROFF

analysis of the bat demon looks like the false start to a career not taken. But then one realizes that the social control of female sexuality is an issue central to her most important work.

When the twenty-five-year-old Hrdy went off to study langurs on sacred Mount Abu (where the Indian god Siva's big toe is said to be enshrined) in the Indian state of Rajasthan, two facts about these graceful, black-faced monkeys struck her immediately. One was the promiscuity of the females, which habitually drifted away from their harem masters to "steal" copulations with roving males. The second had to do with the violence of these males. After they succeeded in taking over a harem, they were likely to kill all the unweaned infants, thereby bringing the females back into heat and readying them to produce new offspring that they themselves would father.

Hrdy put these two observations together. What defense could the physically weaker females offer against males acting in their own biological self-interest? That's when she realized the importance of promiscuity. Female langurs were doing everything they could to confuse the issue of paternity, because no male would risk killing his own offspring. With every male a potential enemy, the females adopted fraternization as the best strategy for ensuring their infants' survival.

When first published in 1977, *The Langurs of Abu* was praised as a prime example of how field research could be used to generate novel theory. But Hrdy thought her critics had missed one critical point. Although her study evenhandedly detailed male and female sexual strategies, most reviewers focused only on the male half of the equation. Six years later, Hrdy forced the issue by publishing *The Woman That Never Evolved*. Here females, both primate and human, take center stage. A blend of sociobiology, primatology and feminism, the book closely scrutinizes primate sexuality and its relation to our own. Lest her critics misread her again, Hrdy wrote a disclaimer into her title. What makes us different from other animals, she says, is the ability we possess to change our lives. If we value freedom and equality for both sexes, we can choose to create a modern woman who might never have evolved through nature.

Omni interviewer Thomas Bass spoke to Hrdy at the University of California at Davis, where she teaches anthropology. In person, Hrdy is a dynamo. She is tall and lithe, with her blond hair swept up on the nape of her neck. Despite years in India, she still speaks with the drawl of a native Texan.

During this daylong conversation, Hrdy made several trips home to nurse her infant son (the youngest of three children) and later drove out of town to the Vaca hills where she and her husband, a medical specialist in infectious diseases, are building a house. Once there, she wanted to tell the bulldozer operator digging the reservoir for their orchard to make the sides *irregular*. "It will make a better habitat for wildlife," she said. "These hills look a lot like India, but the monkeys are missing."

Omni: Are you against promiscuity?

Hrdy: I'm not in the business of judging people's behavior. I'm describing the behavior of monkeys.

Omni: Is promiscuity in monkeys relevant to humans?

Hrdy: It seems to be an odd time to be asking that question. If we accept the argument given by Harvard's Max Essex that AIDS first evolved among monkeys, it would seem that promiscuity in monkeys is going to be affecting human behavior for many years to come. Let me explain. From my point of view it seems no accident that AIDS evolved in vervet monkeys, because of the promiscuous breeding system that characterizes vervets—males and females having numerous sexual partners. That system created an absolutely ideal niche for the virus, with a ready mode of transmission. AIDS-like viruses have probably existed among monkeys for a long time. Virus and host must have come to a modus vivendi. But human promiscuity on the scale that it's practiced in urban Africa and among some urban homosexuals is a fairly recent thing.

> *"It seems no accident that AIDS evolved in vervet monkeys, because of their promiscuous breeding system—males and females having numerous sexual partners."*

Omni: Were you always interested in studying animal behavior?

Hrdy: Getting into primatology was an accident. My early research had been on the structural analysis of myths. I worked with Mayan-speaking people in Guatemala and Honduras for my undergraduate honors thesis at Radcliffe. I finished school and thought, *This is a lot of fun, but I want to do something relevant to the world*. One thing I'd done in Central America was teach hygiene courses for adults, so I decided to go to Stanford and learn to make films for people in underdeveloped countries. But filmmaking has got to be the weakest program Stanford ever invented. Guys in it were on the phone to Hollywood all the time, and I was losing interest.

While I was at Stanford, Paul Ehrlich was giving a marvelous course on population biology. I audited it by cutting classes in communications school. Ehrlich kept talking about overpopulation, and I said to myself, *If you really want to do something useful, why don't you study the effects of crowding on behavior?* It was an incredibly naive dream. No one has ever done a successful study of crowding on humans. I had taken a course on primate behavior at Radcliffe, and although I didn't learn anything because I read the books the night before the exam, out of that haze I recalled that Yukimaru Sugiyama, a Japanese primatologist, had reported that males of a monkey species called hanuman langurs were thought to kill infants. And it happened only in areas where there was crowding. So I decided to go off to India and study his hypothesis—that crowding produced infanticide.

Omni: What made you reject his theory?

Hrdy: I chose to study a very high-density population of langurs at Mount Abu, but I soon realized the males there were actually quite tolerant of infants. You would see them swinging on a male's tail or jumping up and down on him like a trampoline. Aggression against infants came only from males entering the breeding system from outside. Langurs typically live in troops of one adult male and several females. But bands of up to sixty or more males circulate around the outskirts of these troops. Attacks on infants come from outsider males trying to take over a troop.

So I realized the "pathology hypothesis" was wrong—sexual selection provided a better explanation for what was happening. By eliminating unweaned infants and thereby inducing the females to ovulate, the new head of the troop was furthering his own genetic interests. He was compressing the females' reproductive careers into the brief span of time he could expect to survive as head of a troop, about twenty-seven months.

Omni: This is still looking at reproductive strategy from the male point of view. When did you focus on the females?

Hrdy: Watching these animals day after day, I began to identify with the females' problem. They were producing offspring, and then every twenty-seven months, on average, a new male would come along and kill the infants. Then the females would breed with the killer. Why would a female put up with this?

I saw that a female couldn't refuse to breed with an infanticidal male. She had to breed. If she didn't, she would fail to reproduce, producing fewer offspring than competing females that did breed. Female langurs couldn't achieve a level of solidarity sufficient to stamp out this detrimental male trait. Essentially what allowed infanticide to persist was competition among females for breeding success.

Seeing that that's what was keeping the vicious circle in motion, I then asked: What other options are open to the female to keep a male from killing her infant? Some very peculiar things were going on! Females were mating not only with the infanticidal

males but with many or all of the males that accompanied him when he took over the troop. Even pregnant females were out there mating. Then it occurred to me that if they couldn't win by force, perhaps the most feasible reproductive strategy for a female would be to confuse the issue of paternity. Any male that kills his own infant is going to be rapidly selected against, so no male could afford to kill an infant that might possibly be his.

Omni: What happened when you published your findings?

Hrdy: Some of the most eminent anthropologists in the country said my evidence was inadequate and that the animals I was studying must be crazy. Their concept of primate interaction was the old Radcliffe-Brownian model [developed by British anthropologist Alfred Radcliffe-Brown] of social organization. There, every individual in the group has a role to play that promotes integration and prosperity of the group. Within that paradigm, how can an individual do something counter to the group interest? And what is more counter than eliminating infants? Anthropologists couldn't believe it was happening, which brings us back to the idea that few of us are aware of how powerfully the assumptions or paradigms we posit shape the research questions we ask and the observations we make.

Omni: Your critics stuck with your earlier hypothesis, that infanticide is a pathological response to overcrowding. But you wound up showing that infanticide occurs even when there's no overcrowding.

Hrdy: That's abundantly clear now; it wasn't clear then. The langur case was sexually selective infanticide. Males were killing the offspring of females that had bred with other males. These males were unrelated to the infants they killed. There are five different kinds of infanticide, each with its own functional explanation. Evidence from a wide array of researchers is pulled together in a book Glenn Hausfater and I edited in 1984. The book was sufficiently convincing, I believe, so that the controversy is largely over. Very few serious biologists today are not convinced that infanticide can be adaptive behavior.

Omni: What are the five types?

Hrdy: The first would be exploitation of an infant as a resource. That's cannibalism. Fish and insects provide the classic instances. The second type is competition for resources. By eliminating the infant, the killer increases availability of resources for himself and kin. The work of Cornell's Paul Sherman on Belding's ground squirrels would be an example. Females eliminate another mother's offspring with the effect that she abandons her perilous burrow, making it available to the killer for her own brood. The third is Darwin's sexual selection—that is, competition between males for access to females as among the langurs. Occasionally it can be due to competition among females for males. This happens in some bird species like jicana, where the males tend the babies, and the females move from male nest site to male nest site laying eggs and occasionally destroying the eggs of other females. In either case the gain to the killer is additional opportunity to produce offspring.

The fourth class is parental manipulation, and humans are the parental-manipulator infanticides par excellence. Usually in primitive societies where it's practiced, infanticide occurs right after birth, and it's typically done with regret. A classic case in a hunter-gatherer society would be when the birth space is too short and a mother knows her four-year-old will die because she won't have enough to invest in both offspring at once. Number five is social pathology. For some animals that may involve total disruption and breakdown of the social system. Imagine the case of a captive mouse disturbed as she's giving birth, with the result that she eats her offspring. This is probably a haywire incident. There's no gain of any kind for the killer.

> *"By extending their periods of receptivity and concealing ovulation, females could mate with the resident male and at the same time mate opportunistically with other males as well."*

Omni: Isn't this a Hobbesian world you're describing—nasty and brutish?

Hrdy: Yes, and I wouldn't recommend to anyone that they use langurs as a template for living. In the last sentence of *The Langurs of Abu* I wrote, "For generations langur females have possessed the means to control their own destinies, [but] caught in an evolutionary trap, they have never been able to use them." That evolutionary trap, of course, is competition among females. My next book, *The Woman That Never Evolved*, was really an attempt to understand this female-female competition.

Omni: Anthropologist Donald Symons sees prostitution as the main female-female competitive strategy, with females soliciting favors in exchange for service to males. Does your theory differ from his?

Hrdy: In one of several scenarios he draws, Don suggested that females extended their periods of sexual receptivity in order to solicit favors from males. He imagined a chimplike ancestor. Male chimps do much of the hunting and share their prey with females. Don's argument is that a female in estrus could get more meat from the male when he's passing out tidbits. It's a plausible hypothesis, but there are plenty of other routes by which prolonged receptivity could have evolved. My own idea is that females, by extending their periods of receptivity and concealing ovulation, could mate with the resident male and at the same time mate opportunistically with other males as well. One female counterstrategy to infanticide is continuous sexual receptivity.

Omni: Isn't your idea really a variation on Symons's prostitution hypothesis—except in your scenario the prostitutes are now doing it to keep their children alive?

Hrdy: I've thought about this. Who is the object and who is the subject? In the prostitution hypothesis the male (subject) is offering the female (object) something in order to get what he wants. In the manipulation hypothesis the female (subject) has a good deal more control over the situation. See the distinction? But even if the hand that rocks the cradle rules the world, basically, from a sociobiological point of view it's bad luck to be born either sex. The kind of civilized world I try to construct for myself—in which I don't compete with other females, try to maintain a high degree of trust and loyalty within my family while raising my children to respect the rights of others, and live by egalitarian standards—that's a world that never evolved. It's an artificially constructed world. And living that way is a much more heroic endeavor than simply living as our ancestors did.

Omni: Symons says the female orgasm is nonadaptive, the clitoris is a vestigial organ serving no reproductive purpose. Your own view seems subtly different—that the female orgasm doesn't do what it was once designed to do.

Hrdy: We both agree that the female orgasm is currently not adaptive. If it were adaptive, the morphology [structure] of the female genitalia would be quite different. If the female orgasm evolved, as some people argue, to cement the pair-bond and enhance marital relations, you would expect it to be as reliable as the male orgasm, and it isn't. A male has an orgasm every time he ejaculates. The female, in the majority of cases, does not have an orgasm in response to copulation alone. If the female orgasm evolved in order to cement the pair-bond, one has to have a dismal view of evolution. Natural selection is often less than perfect, but this is substandard! The idea that somehow the orgasm makes it easier for the female to be satisfied by one male is nonsense. If we have learned anything about female sexuality, it is that only about thirty percent of women have orgasms from intercourse alone. Furthermore, there is a disconcerting mismatch between a female who is capable of multiple sequential orgasms paired with a single male who is typically capable of only one orgasm per copulatory bout. The female orgasm does not do what it's supposed to do if you're arguing that it evolved to cement pair-bonding. But it did evolve.

Omni: What is your feeling about Symons's

contention that the clitoris is a male trace left on the female body and that the female's capacity for multiple orgasms is compensation for failed ejaculation?

Hrdy: Symons and recently Stephen Jay Gould in *Natural History*, stress that developmentally the clitoris is nothing more than a vestigial homologue of the male's glans penis. Like a male nipple, it is present incidentally in one sex because it is essential to the reproductive system of the other. The simplicity of this argument is one of its strengths. But if the clitoris is nothing more than a homologue of the penis, we might expect that it would track [parallel] evolutionary changes in the penis and it doesn't always. What bothers me is that Gould, especially, claims the female orgasm is not adaptive period. I say that if could well have been adaptive *at one time*. Let's take a look at the evidence.

I agree that it is certainly not adaptive for human females now to run around behaving promiscuously. They have a lot more to lose than gain in our society and probably in societies for many thousands of years preceding ours. One of the most mortifying reviews I got for *The Woman That Never Evolved* said I believed human females are sexually insatiable and constantly going around looking for sexual partners. Anyone reading that review must have thought I was nuts, as I sure would have been had I said that. The reviewer had taken out of context something I said about female Barbary macaques [monkeys], which in fact appear to be sexually insatiable when they first come into heat. When she comes into estrus, a Barbary macaque solicits several males an hour. She's switching consorts every five minutes. I can assure you that in species like macaques, savanna baboons, or chimpanzees, females are doing anything but mating with just one male!

But the question is, How do you explain the contrast between a macaque and the more sedate and self-conscious sexuality of the human female? I argue that while the female orgasm is not currently adaptive, it probably once was. Probably it provided the motivational underpinnings for females to mate with a range of partners, thereby confusing the issue of paternity. This increases the likelihood that the female can extract investment [food and protection for young] from a number of different males or at least ensure their tolerance for her offspring. Remember, infanticide by males who couldn't possibly be the father is a very widespread threat for primates and has been for a long time.

Omni: If it's not adaptive now, why hasn't the female orgasm been lost?

Hrdy: One possibility is that it's on the way out. Maybe that's why it can be so erratic. Certainly things I'm suggesting are testable. For example, if natural selection has been operating on the clitoris, you'd expect it to be more pronounced in primates that have multimale breeding systems—where females mate with a number of males. Is this a fact or not? What sort of anatomical variation in the clitoris exists across species? Chimpanzees and orangutans have penises that are relatively and absolutely smaller than human penises. Yet the clitoris appears to have evolved in the other direction. It's much larger in chimps and orangutans than in humans.

I doubt we'll ever be so lucky as to find the reproductive equivalent of the fossil footprints [of the earliest hominids] found at Laetoli [Tanzania], so we may never know about the genitalia of our human ancestors. But we can systematically look at comparative evidence from other primates, although no one has done it yet. And if they did, there would be such a stigma attached to their research that they might never find a job. The only person who could safely study this taboo realm of female sexuality might be an emeritus woman professor of anatomy.

Omni: What evidence is there for orgasm in primates?

Hrdy: When Canadian anthropologist Frances Burton first proposed the idea in the late Sixties, she was scared to death. She didn't have tenure, and she feared it might hurt her reputation. But the idea has occurred to anyone who has watched animals mate. You see a female's intense response and wonder. Here's a photo of a female clutch response, with the female looking back at the male and grunting. This look precedes what some of us think may be indicative of female orgasm in primates. Orgasm itself is signaled by the round-mouth 'O' face. Here's a picture of it in stump-tailed macaques. See how the lips are pursed together in an oval shape? Now look at this: a picture of [Italian artist Gian] Bernini's sculpture of Saint Teresa in ecstasy. The same perfect 'O' face! The sociobiology of religious ecstasy—that should add to the controversy.

Omni: Haven't scientists argued that sexual encounters between animals are too brief to result in orgasm?

Hrdy: The old argument that orgasms can't occur in nature is clearly wrong once you realize that females solicit many different males. The stimulation needed to produce orgasms in females is cumulative. It requires more stimulation than is typical of the single mating bout in the wild. But the opportunity is there for it to occur—provided the female mates with a series of males within a short amount of time.

Omni: You sometimes use portraits of your children to illustrate primate facial expressions. How relevant is it to extrapolate from primate to human behavior?

Hrdy: The grimace of nonhuman primates relates to the human smile. So, too, do the openmouthed expression and the "O" face during orgasm. At some level I'm convinced that primate motivations are similar to ours. Something like sexual jealousy must be an old emotion. It's a human universal, and animals know it, too.

Omni: Wouldn't Charles Darwin find your ideas bizarre?

CONTINUED ON PAGE 127

"The brilliant, egg shaped object descended on the car, terrorizing the family for an hour and a half"

ANTI-MATTER

UFO UPDATE

During the Australian bicentennial Faye Knowles forty-eight and her three sons left their home in Perth for a holiday in Melbourne Last January 20, at three A M the foursome were driving along the Eyre Highway near Mundrabilla in the southern Australian desert when they noticed a strange light in the sky According to front-page newspaper stories published the next day the brilliant egg shaped object terrorized the family for an hour and a half It descended on their car hoisted it into the air then dropped it onto the road The family scrambled into some roadside bushes and hid [illegible] e object departed Then after changing a tire and driving to Ceduna they reported the incident to the police

The Australians had a field day with the story One cartoonist depicted the family running from their car as an alien in a UFO shouts 'Racists! A UFO buff wanted to hypnotize the Knowleses to uncover a possible abduction Charles Morgan of the Sydney Observatory believed the car had been hit by a large carbonous meteorite shower Peter Schwerdtfergger a professor of meteorology at Flinders University thought the family had run into a dry thunderstorm One tire company took out a full page ad in *The Australian* Above a humorous sketch of a UFO lifting the car were the words [illegible] H A [illegible] WI DUN P

Meanwhile representatives from Channel 7 a television station in Adelaide had met the Knowleses and negotiated an exclusive contract for their story But Keith Basterfield field investigator for UFO Research–Australia managed to sit in as the Knowleses told their story Family members he says were still so distressed 36 hours after the episode that they could recall only a string of details Sean twenty-one had been driving when a bright light approached the car The family heard a thump on the roof and thought the light had landed there No one remembered looking up and seeing anything protruding from the car top, nor did anyone remember looking out the window and seeing the road while the car was supposedly in the air The luggage that had been strapped to the roof was gone

Researchers from the Australian Mineral Development Laboratory examined the car for Channel 7 and concluded that the marks on the roof of the car were old and due to normal wear and tear Basterfield believes the Knowleses told the truth as they saw it but he thinks the facts point to a more mundane series of events The family had been driving nonstop and became mesmerized by a light in the sky A blowout occurred while Sean was driving The family heard a thump as the luggage jolted loose The right rear end of the car struck the ground and Sean hit the brakes hard The car vibrated as he tried to pull off the road The dogs barked The Knowleses rolled down their windows and smelled nasty smoke from the strained front brakes The frightened family headed for the bushes

The light remains a mystery admits Basterfield but this UFO probably did not pump iron People make mistakes just like the ad agency for the tire company It turns out that the Knowleses tires were Dunlops *PATRICK HUYGHE*

HAUNTED HOUSE

r Sam and Judy Haney the trouble began shortly after wo dead bodies were unearthed in their backyard during an excavation for a swimming p el Following thi discovery several odd things happened The TV glowed even when was turned off sparks flew from a np ugged clock and shoes disappeared later be found n top ne the graves

According to Hope Paasc who vered the story fo the Houston *Post* the Hane subdivision in Crosby Texas was built ver a nineteenth-century cemetery which disturbed som f their neighbors as well They re ported other odd events that included ups cracking apart on shelves appliances breaking down with ap parent cause and lights and water faucets mysteriously turning on An apparition known as Betty appeared an frightened som omc owners away laiming mental anguish and stress induced diabetes the Haneys finally took the developer t ourt and sued for $2 illion The r recommended a settlement of $142 000 but the judge disagreed

It was a complex case says Paasc wherein the jury was charged with decid ing n seventeen di erent questions cluding the questior of how much money would take to compensate the Haneys for their trouble They came up with the figure of one hundred forty two thousand dollars but the judge who had the final say

ioned judgment t f gave the nothi g

The udgment found that the developer had not been negligen d did o nten tionally mislead the Haneys about the presence o graves near their home The Haneys have since moved out of the use and there has been no mention of an ap peal Rick Boling

If I an come back in another life want to be Warren Beatty s fingertips

—*Woody Allen*

SNAKE PHOBIAS

They are snake pho people plagued by the fear of anythin re otely slim and reptilian These fears according o psyc ologist Sue Weidenfeld of Stanford University can be as para lyzing as they are baroque Some phobics are petrified of everything f mere p t res of snakes to curly telephone cords In fact reports Weidenfeld one pho bic was so terrified that she even d he volume of

he clopedia

B eidenfeld has prescription a therapy gram in which phobics are taught to confront their fears through a gradual exposure to snakes beginning with brief glances at them from a safe distance and often ending with the phobic actually holding a snake

One odd aspect of the treatment developed by Stanfo d s Albert Bandura occurs when the subjects' dreams begin to reflect

the loss of fear One phobic for example had suffered a recur ing dream which someone hit her with a snake After treatment she reported a similar dream but the snake s tail was trans- formed into the rear end of a poodle A subject who had dreamed of being chased by snakes had posttreatment dreams in which she tore out a reptile s mouth with her bare hands Another woman who had lived in terror of snakes since her brothers put three of them in her dresser

drawer when she was a child dreamed that a huge boa constrictor was washing her dishes and drying them with its tail

In other words says Wel denfeld in the course of treatment nightmares change to dreams And in the dreams these people are not petrified anymore They have become braver bolder and more competent

This is a quantum leap reported one satisfied ex- phobic I m not afraid of *any thing* anymore —Bill Lawren

Wall Street Psychics

It must have seemed like something of an early Octo- ber lark a cruise on New York s East River In which 120 stock market pros shared a boat with five flamboyant psychics Organized by clinical psychologist Judith Kurlansky and *Forbes* maga zine editor William Flanagan the three hour cruise was intended to help the marke- teers pick up on the vibra tions and energy levels coming from Wall Street says Flanagan

But the pleasant beer and pretzels ambience was dampened when the psy chics unanimously found Wall Street s vibrations bad One psychic who went only by the name of Wendy brought a chorus of groans from the brokers by predicting two years of econo ic turbu lence with the Dow Jones industrial average dropping as low as 1100 by the end o 1989 She was very stron ly convinced sums up Flanagan that the market was headed for disaster city Her negative attitude was out of sync with virtually every major market analyst a the time the overwhelming majority o whom were bull ish he says

So what happened? A week later came Black Mon day, in which the market dropped with a 500 point thud Spooky muses Flan agan Is his faith in psychic financial wizards now con firmed? Let s put it this way he says take them as seriously as ake some other analysts Bill Lawren

Elephant Rock

Does Michael Jackson a devotee o plastic surgery have anything in common with Joh Merrick better known as the Elephant Man Apparently so For the last year Jackson has be- trying to buy Merrick s skele- ton o display in a pathology lab at the London Hospital Medical college His latest offer $1 millio Acco rd g to Jackson s manager Frank Dileo the ock star has become a student o the Ele phant Man who died in 1890 from neurofibro matosis a rare disease characterized by abnormal growt s of skin and bone

While some observers view Jackson million dollar ffer as simply another gimmi k in is campaign to become Hollywoo s most noted eccentric Dileo be lieve s that Jackson s offer shows the seriousness of his intent to assume the respon- sibility of Mr Merrick s re mains It would be his privi lege and an honor he would not take lightly

But say hospital officials the Elephant Man s bones are no o sale at any price Mr Jackson offer was dismissed out of hand be cause he ollege has a firm ovenant with the family that when Merrick s remains are o longer required for teaching urposes he will be given a decent burial says college secretary James Walmsley The college is com tte totally an ne vocably to respecting the family s wishes he mat ter A J S Rayl

TUNNEL-VISIONED GIANTS

It may be true that the bigger they come the harder they fall But that does not explain how David the archetypical little guy slew Goliath with a slingshot Why didn t the giant simply duck? One man perplexed by the episode was Dr Michael Hermanussen of the Clinic of the Christian-Albrechts University in Kiel West Germany Giants he says have always fascinated those of us of normal size but true gigantism is very rare and we can t even be sure that Goliath was a giant in the medical sense but let's assume he was We know from the Bible that he was killed and we know how and by whom but I was puzzled Why didn t he use his eyes? Didn t he see David s preparations?

Hermanussen then thought back to the case of Charles Byrne the eighteenth-century Irish giant who at eight feet four inches was said to be the world s tallest man Byrne's skeleton is in the Hunterian Museum of England s Royal College of Surgeons in London A while back a curious surgeon opened Byrne s skull and found that the sella turcica (the deep hollow on the base of the skull) was large and eroded This was the clue Hermanussen was seeking True gigantism is often caused by a pituitary tumor Those afflicted suffer from acromegaly, a condition in which the bones of the hands feet and in particular the face grow out of all proportion to the rest of the body giving the impression of enormous stature

Around a quarter of acromegaly victims have eyesight problems causing them to lose their peripheral vision so that in effect they can see only straight ahead Goliath comments Hermanussen may have had one of these tumors If David loaded his sling while standing to Goliath s side the unfortunate Philistine may not have seen him A tough break

Ivor Smullen

He who invented Atlantis also destroyed it

Aristotle

"The true adventurer goes forth aimless and incalculating to meet and greet unknown fate"

O Henry

TOURISM FOR THE NEW AGE

Have you planned next year s vacation yet? You could sit home reading Or visit Machu Picchu the ancient Incaic fortress in Peru dive through underwater ruins in Micronesia trek to a lost city in the Gobi Desert Either way Adventures Unlimited of Stelle, Illinois will be happy to help

The firm is the creation of David Childress a self taught 'mavenck archaeologist who dropped out of the University of Montana to see the world It s a fascinating wonderful place that never ceases to amaze me ' Childress bubbles I ve spent years exploring the bush I ve seen more ancient sites than most archaeologists will in a lifetime

These days he uses that experience packaging visits to mystical "lost cities and ancient sites outside main stream archaeology A sideline business publishes books like Childress s own *Lost Cities of Ancient Lemuria and the Pacific*

Even if you doubt the existence of Lemuria Childress's destinations are the stuff of fantasy A tour last year explored Nan Modal a city of artificial islands off the coast of Micronesia "There have been reports of a stone castle in deeper water there Childress says, and we plan to search for it during our next trip

This past spring a tour went to Karakota in the center of Mongolias Gobi Desert Childress says it may have been the capital of 'the Uighur Empire which stretched across the then-fertile Gobi some eight hundred to thirteen hundred years ago

And this month he will guide tourists to Machu Picchu and a similar fortress called Yanantin Orco which he claims to have discovered last year in the jungle near Cuzco Peru "It may have been - satellite of Paititi the legendary city where the last Incas found refuge from the conquistadores

Jungle and desert notwithstanding the two-week tours are far from Spartan ' We like to eat the best food and stay at the best hotels, Childress says Prices range from $2 000 to $3 000 including airfare.

For further information, write to Adventures Unlimited, 127 Sun Street Stelle Illinois 60919 Owen Davies

DOMINO

CONTINUED FROM PAGE 57

one. Then she handed me her hat. Before I knew it, she was pulling clothes off as fast as she had put them on. They flew into the hall, and as fast as they landed, Arsenio picked them up and folded them. She got down to her undies and took those off, too. Then she ran down the hall, squealing.

"Oh, no," Arsenio said. "We've got to catch her."

He ran after her and I ran, too. He caught her, but she slipped away. He started after her again but stopped when he got to the orange room. "Too late," he groaned.

Judith was already across the room. She was jumping up and down on the pillows, laughing and giggling with Jake. He was having fun, too, and I wondered why Arsenio was so glum.

"Fun now," he said, "but he can only take it for a while. Then we have to go back."

I shrugged and wandered over. Pretty soon the three of us were rolling in the pillows, having a great time. But in a little while Jake's breathing got hard. He stopped playing, and then he told me and Judith to stop, too. Neither of us wanted to, and Judith kept bouncing, which made me do it, too. Jake said stop again, not loud but so you knew he meant it. He told Judith it was time for her to go.

"No, no, no," she begged. "Please don't make me."

"We just got here," Arsenio said.

"Please," I joined in, "can't we stay just a little longer?"

He looked at each of us, and then he sighed. It was three against one. When he looked back, his eyes were twinkling.

"All right. A little longer. Time enough for a game of dominoes."

We all cheered, even though I didn't know what that meant. Jake told Arsenio to fetch the dominoes. Arsenio went to the table with the blue box on it, the one that flashed on and off and rattled when you shook it. He picked it up with both hands and brought it over. This time it reminded me of waves of water when the sun hits. I still couldn't see a lid.

From somewhere behind his back Jake brought out a cup of water. At first I thought he was thirsty, but he didn't drink it. Instead he lifted it up in the air, turned it over and poured it on top of the box. That seemed like a silly thing to do because he'd just have to clean up the mess. But when I looked, there wasn't any mess.

Instead of spilling on the floor, the water fell right into the top of the box. Into the wavy blue light. Suddenly a tower of spray shot out, like steam from a teakettle, only cool. It misted the air, making it hard to see. I had to wipe my eyes, and when I looked again, the box was open.

It was a great trick. I wanted to ask Jake how he did it, but Judith and Arsenio had already started taking the things out. The dominoes. I'd never seen one before. They were all white except for the dots on top, which were black. Some of them had a lot of dots, and some had only a few. Judith and Arsenio took them all out and put them together with the dots facing up. Already it looked like a fun game, and I waited to see what was next.

"We all get to choose a game," said Jake. "One game each, and then everyone goes home."

Judith was the first to shout out. "Trains!" Right away she and Arsenio started picking up the dominoes and lining them up on their edges, one in front of the other. By the time I joined in, they had already used up most of the pieces. In the end Judith had the longest line, and I had the shortest. Mine wasn't so straight, either, it kind of curved, but no one said anything.

"You go first," Judith told me.

"Okay," I said, and I sat there waiting for something to happen.

"Go on," she said. "Push it."

"Huh?"

> *"He opened his mouth. The bird leapt into the air, flew once more around the room, then dived between Jake's lips. That scared me, but nothing happened. The bird just disappeared."*

Like this. She touched the domino at the end of her line, tilting it forward and making it hit against the one in front of it. That one fell down and hit the next one, and then all of a sudden, faster than I could see, the whole line fell down. Judith let out a whoop, and Arsenio laughed. I just stared. It seemed like magic.

Arsenio did the same thing with his, and it happened just like before. This time we all laughed. Then I pushed mine, and the line went down like theirs, only in a curve. I loved the way it fell, and especially I loved the clacking sound when it did. We all clapped, Jake too, and then Arsenio said, "Now it's my game."

He took the dominoes out of the piles and started putting one on top of the other. Soon he had a tower that was almost as big as he was. He tried one more on the very top, but it was too many. The tower fell over with a crash.

Judith built hers, but before it got too tall she stopped. She built another right next to it. When the second one was as tall as the first, she sat back. The corners of her mouth curled up, and I got ready for something. Quick as a mouse her hand jerked out, knocking the bottom dominoes out. For a second the towers leaned, and then the whole thing came crashing down. I laughed. Then it was my turn.

I built three towers next to each other, and when I was done I looked for something to balance on top. Something special. The first thing I thought of was the black box. It was back on the table, looking even blacker than before. It seemed to suck at me, and I couldn't keep still. I went to it. I was afraid to touch it, afraid not to. I reached out. Then Jake began to whistle.

It was a low, cold sound, like the wind in winter. I stopped and listened. He cupped his hands in front of his mouth, and the sound changed. It got higher, prettier, like sometimes you hear in the park. It filled the room, and then he separated his hands. In his palm was a tiny, blue bird. Its beak was open, and it was singing.

Jake held it to his lips and blew on it. The bird flew into the air. It circled the room, singing its pretty song, then landed on my towers. Its tiny beak opened, and it sang its song to me. It turned to Arsenio, then to Judith, singing to each of them. Last of all it turned to Jake. It sang to him, and Jake sang the same song back. Then he opened his mouth. The bird leapt into the air, flew once more around the room, then dived between Jake's lips. That scared me, but nothing happened. The bird just disappeared. Jake closed his mouth, and then we all started clapping.

"No need for that," he said. "It's really not difficult. And now it's time for John's game."

They all looked at me, and I looked down in my lap. I shrugged.

"Make one up," Judith said.

"Yeah," said Arsenio.

I shook my head. "You."

The two of them looked at Jake.

"Fine," he said. "I'll be the last. We'll play the matching game."

"Matches?" I said, thinking of the one he lit with his fingers. He hushed me.

"Listen, and I'll tell you. Each domino has one or more than one dot on it, except for the one that has no dots. That one is called the double blank, and also it's called the soul. Every other one has a name, too. There are twenty-eight in all, and every person in the world has one that is special to him. After the soul comes the sun, the one that has a blank on one side of the black line and one dot on the other. It's called the moon, too, sometimes, and the eye. After that comes the double one with one dot on each side of the line. Its name is moon eyes and snake eyes, and in some places it's called the scream. The next one has one dot on one side and two on the other—the funny man or the cripple. Then there's the double two."

"That's ours," said Arsenio and Judith.

"The twin." Jake nodded. "The mirror. The dots go all the way up to six, the domino with the most dots has six on one side and six on the other, twelve in all. It's called double six, tracks, the journey, and sometimes it's called grief."

I looked at the dominoes trying to get what he was talking about But after a while all the dots started floating and mixing together I had to blink to make them stop I liked hearing the names, but building the tower was more fun I didn't want to hurt Jake's feelings but I told him anyway

'More fun now," he said "But I have to think of the future I'm the one who has to think of that.'

He lined up the dominoes in a different way, so that the dots were matched up

"You don't have to remember the names" he said 'All we're going to do is match them Like this"

He put the soul in the middle of the floor and on one end he put the one with a blank and one dot, and on the other end he put the one with a blank and two dots

"Judith's turn now."

She snatched up her own special domino, the twin, and matched it with the one on the floor. Then Arsenio picked up one with two dots on one side and six dots on the other.

"What's this called?"

"The goof," Jake said "Slippery luck"

'Goof," repeated Arsenio, and matched it to the domino on the floor

I looked around for a good one and spotted the one with six dots on one side and nothing on the other I picked it up

"Tracks through snow," said Jake "Soul in ice Home"

I matched it with the other one with six dots Then Jake put one next to it then Judith and pretty soon all the dominoes were laid out in a line It looked neat like a long snake with spots Then Judith messed it up I gave her a look and so did Arsenio Then I looked at Jake

"Again ' I said

He smiled "Of course Another time Now it's time to put them away'

None of us liked that, but we didn't argue We helped put the dominoes back in the box When they were all in the top turned blue like before Then it started flashing

"Now it's time to go home," Jake said

I know two different ways to be sad One is when someone hurts you or you're afraid they might. The other is when you're having fun and it has to stop I was sad the second way which is better than the first I knew there'd be fun again

I said good-bye to everyone and walked to the front door Just as I got there I remembered something I forgot to say and I turned back But when I got to the edge of the room I stopped Jake and Arsenio and Judith were in the middle of something that looked important It looked private too and I didn't want to butt in But I didn't want to leave, either I couldn't

Arsenio and Judith were standing in the middle of the room with their backs touching. Their eyes were closed and Jake was whispering to them He bent down and kissed them on their heads Then he went to the table with the black box on it He did something which I couldn't see, then stepped back The box was open In his hand was a domino The twin.

It was white and bright as a cloud So bright that I had to squint to see it He held it above Judith and Arsenio, then took his hand away By some trick the domino stayed It hung in the air shining like a cloud floating Slowly it began to turn

Each time the domino turned Judith and Arsenio got smaller I don't know how but little by little they shrank until they weren't much bigger than mice And they kept shrinking until they were as tiny as bugs

Then Jake took the domino and put it on the floor next to them They walked apart, and each grabbed an edge Pulling hard, they climbed on top One of them stood on one side of the line the other on the other The domino got brighter And brighter still Finally it got so bright I had to look away There was a flash and when I looked back, they were gone

Jake put the domino back in the box and I decided it wasn't so important after all what I was going to say I turned around and tiptoed away When I got to the door I ran as fast as I could home

I wasn't so lucky when I got there Mom and Dad weren't in the bedroom anymore They yelled at me and asked where I'd

been I said on the stairs, and they told me not to lie Then Dad took off his belt I tried not to cry because that just makes it worse Instead I thought of Jake and his dominoes of Arsenio and Judith and the box And thinking of them made the whipping not so bad The hurt seemed farther away

Things changed for a while after that Dad lost his job, and Mom got laid off for a few weeks Everyone was home a lot, which was actually pretty nice Dad fixed the TV, and Mom cooked and talked about what a nice family we were Sometimes she worried about money but that would make Dad leave He'd come back with beer and they'd make up Then they'd get drunk together I watched TV and played a lot with GI Joe and the other guys, except that I gave them new names, like Jake and Judith and Snake Eyes and Cripple It was fun being home Everyone was happy Then there was a fight

It started out small and Dad left I thought he was going for beer but he didn't come back for a long time Mom got madder and madder I turned off the TV and put away my toys I stayed as quiet as I could Finally he came home as drunk as I'd ever seen him The two of them yelled at each other then Mom took off her shoe and threw it Dad just laughed, and she threw the other one That one hit him in the face, and he stopped laughing He took off his belt Then Mom was the one who laughed She said he was too drunk to do anything but she was wrong He slapped her across the neck She tried to grab the belt but he yanked it back and slapped her again She screamed, and I got scared I begged them to stop

'Go to your room' they said but I couldn't I just stood there while they kept on fighting It was awful worse than ever and I almost started crying But crying was the last thing I wanted to do so I did what they said I went to my room Only I never made it inside When I got to my door, something happened I don't know what but suddenly everything changed, like when a noise you've been listening to for so long you've forgotten about it suddenly stops Like that I stopped hearing my mom and dad Everything got as quiet as could be and then real soft I heard the ant song It was up to four

"The ants go marching four by four hurrah, hurrah The ants go marching four by four, the little one marches out the door, and they all go marching down to the ground to get out of the rain boom boom, boom ' And I walked to the front door and marched out Jake's door was open and I went in He was lying on the pillows smoking his pipe, blowing little clouds in the air He smiled when he saw me and waved me over In his lap was the cat the black-and-white one with the long fur He was petting it, and the cat was purring

'Sit down' he said and I did All of a sudden I started to cry

The tears busted out like rain and I tried to stop, but that only made me cry harder Jake wiped my nose with a hankie He said that the tear lakes had to get dried up, which wasn't easy It was spring, and all the snow up above was melting I guess he knew what he was talking about because it did take a long time But finally the lakes dried My throat and chest were sore, but I felt better The first thing I wanted to know was where were Judith and Arsenio

'Home,' he said

'Can I go there?

He puffed on his pipe and looked at me 'There's always room'

'I want to go'

'Patience, my boy There are many homes you know'

'I want to see Judith and Arsenio'

'There are others Thousands Lost children, sad children, crippled and sickly children From any war you choose Any famine any plague From Sumer, Saxony, Bombay Peru Any place Any age'

'Huh?'

'Each person has a stone John'

'A stone?'

'A domino One that is his own I told you that before'

'I want to see'

'You shall If you're going to live here you need a place'

"Aha aha aha "

He pushed himself slowly to his feet. The cat hung on to him as long as it could, then scrambled to the floor. Jake went across the room and got the black box, brought it back, and sat down. He said some words which I didn't understand. He said them again, and the black hole that was the box got even blacker. Like it was swallowing itself with more and more blackness. There was a hiss, and suddenly it was open. Inside were the dominoes.

On top was a long row all of them matchers, starting with the soul and ending with the tracks. They were white as snow when it's falling, before the ground makes it dirty. White as new teeth. The dots were like coal. One by one Jake took the dominoes out and laid them on the floor.

"Now you must choose," he said.

"Huh?"

"Pick one."

Well, that was easy. I knew which one I wanted, and I reached for the twin. But when I picked it up, I saw that it wasn't the twin at all. It was the one with six dots on one side and nothing on the other.

"Big ice," Jake said. "The palace."

"I don't want this one," I told him. "I want the other."

"Indeed." His eyebrows came down, and he gave me a sideways look.

"I want the twin," I pointed. "That one."

He rubbed his chin. "Hmm," he mumbled, playing with his hair. Finally he took the domino out of my hand and put it back on the floor. Then he mixed them all up.

"Pick the one you want," he said. "Last chance."

Before they made me dizzy like before. I found the one I wanted. I said to myself, *Okay, this is it*, and took a deep breath. Then I reached down and picked it up.

It was the same one as before. The six and the blank. That got me scared. I glanced at Jake, who didn't seem to be looking, and tried to put it back. Only it didn't go back. It kept sticking to my hand. I didn't know what was happening, if it was magic or what, but I didn't like it. I felt like crying again.

"Help me," I said.

Jake looked up and smiled. He took the domino out of my hand. With his fingers he touched each dot, then he nodded.

"It's yours, John."

I shook my head. "I don't want it."

"Nevertheless."

"I want to go home."

"Of course."

I got up and started moving my legs, only instead of going forward, I stayed in the same place. When I looked around, it seemed like the room was getting bigger. The chairs, the tables, the pillows were all growing. The dominoes, too. Instead of being flat on the floor, they had turned into little boxes, then big boxes, then bigger ones. And high above me, something was twirling in the air. It sparkled like a mirror in the sun, sending light down on my body. I wondered what it was, then suddenly something grabbed it from the air and put it on the floor next to me. Then I knew.

It was as big as the other dominoes, and I remembered what had happened to Arsenio and Judith.

I had become tiny like them, but I didn't feel scared. Just the opposite. I felt brave and ready for an adventure.

I grabbed the edge of the domino, pulled hard with my arms, and kicked with my legs. I scrambled on top, then nearly fell in one of the holes. It looked safer on the other side, but to get there I had to jump over the line in the middle. I nearly fell in that, too. Then the domino started to glow.

It got brighter and brighter, so bright that I had to cover my eyes. There was a flash, and then the brightness was gone. I opened my eyes, expecting to see Jake or the cat, or even my mom and dad. But what I saw was a big field of snow, and far away, a building. There were footprints in the snow and lots of kids, but I'm not supposed to tell even that much. If you lived in the dominoes, I could, but then I wouldn't have to, because you'd know. And anyway, everybody has his own domino. That's what Jake says. It means that everybody already knows, or they could. And I like that, because then I don't have to tell. No matter what, I don't have to.

FANTASIA

CONTINUED FROM PAGE 69

They want to gather information from other planets, but because of their physical limitations they prefer that other people do it for them, so they recruit ambassadors.

"The aliens don't really use language—it's more of a kind of telepathy. What they want to convey, you simply understand. But it's not like mind reading because you do feel that some part of your mind is private. They just automatically know your language. That's one of the reasons why their braincases are so much larger.

"The alien gives me a choice. And I think about it, and finally I decide to go. The alien implies that since I've already learned a couple of the languages here, there is a good possibility that I could be assigned back—but there are no guarantees."

LISA HONEYCUTT
THE FUNERAL FLOWERS

A graduate student at the University of Florida and the mother of two young children, Lisa Honeycutt (not her real name) hardly has time for idle play. In college she graduated first in her class with a 4.0 grade point average. Today she maintains a 3.9 and manages to present papers at conferences and write chapters and articles for academic books and journals. Yet according to her estimate, she spends 95 percent of her time in fantasy and always has.

"I'm almost *always* away. I mean, I just *can't help it*. . . . Just a word or a song or a smell or a sound or *just a thought*, and I'm gone." Honeycutt's fantasies are, to her, utterly real.

"It's *not* fantasy," she insists. "It's *reality*. When I go away, I'm very definitely *there* and not here. I touch other people, other things, hear them, laugh, dance, talk, cry, scream, get scared, see and know everything that's going on, eat, drink—I mean, it almost seems too silly to talk about. While you're listening to this, are you breathing? Feeling? Thinking? Seeing? Hearing? Well, there's *no difference whatsoever*."

One of Honeycutt's greatest challenges is going to movies with her family.

"Every time we go, my husband says that's the last time because I embarrass him. To me it's *not* a movie—it's *real*. If there are scary parts, I scream. Or I hyperventilate. *I can't help it*. When I saw *Rambo*, I ended up hiding under my seat!"

Honeycutt admits she is a "worrier," and many of her fantasies play on her private anxieties. After attending her uncle's funeral a few months ago, she experienced a fantasy so terrifying, talking about it still makes her break out in a cold sweat.

"I was sitting in class when it happened. It was a couple of days after the funeral. All of a sudden I was *there* again in the funeral home, talking with my relatives. In class, I could even smell the funeral flowers. They smelled sickening. There weren't any bright lights in the room, and soft music was playing in the background.

"It was an open-coffin funeral, and I was standing with my back to the coffin. Suddenly I heard this horrible scream. It was this high-pitched, horrifying . . . I can't even describe it. I whirled around to see where it was coming from and realized it was coming from my uncle. His body didn't change at all, I just heard him screaming. He screamed, 'Lisa, get me out of here! They're going to bury me! Lisa, help me! Get me out!'

"I can't even describe the feeling in the pit of my stomach—a cold dread. I felt sick. I turned back to my relatives to see what we should do about it, but they were just talking among themselves. So I didn't say anything about it to them—I didn't want them to think I was crazy.

"Then suddenly I was back in class, and I realized everybody was staring at me. I know I had this terrible, horrified expression on my face, and I was getting ready to scream. My professor was saying, 'Lisa, what's wrong?' I shook my head and looked down and started faking notes. I'm just glad I didn't actually scream.

When Lisa drove home from class that day, another fantasy completely overtook her. "I'm driving home on the highway. I'm almost to my house. All of a sudden there's an accident ahead. I'm the first person to reach it. It's an overturned school bus. At first I think, *My God, this is terrible!*—then I realize it's *my* kids' school bus.

"I pull over. The bus is laying on its left side. There are kids screaming and hanging out the windows trying to climb out. Some can't get their windows open. I see my daughter, and I get hysterical. She's reaching for me, screaming, 'Mommy, please help me, please help me!' Then there's a big billow of smoke, and a fire breaks out in the back of the bus. I'm just hysterical, and I can't see a way to get in because the bus is on its side. I can't see the door. I start screaming for my son. 'Where's Billy?! Where's Billy!?' My daughter, Ann, screams that she can't see Billy. Some kids are really hurt.

"I try to get Ann out of the bus. She's leaning out the window. I can pull her up and out of the bus, but I can't get to Billy. I know the bus is about to explode.

"At that point I pull into my driveway and realize I have driven several miles down the road and don't remember any of it. My heart is racing. I'm scared to death, and I can't wait for my kids to get home. In fact, I almost turn around and drive out to the school to meet them, because I don't want them to ride the bus, but it's too late. They're going to be home in a few minutes, so I wait in the driveway for them. It's such a relief to pull into my driveway and realize it isn't real. Even though it was *so* real. To me they're real, not fantasies.

"I don't want it to sound like all my fantasies are that horrible," she says. "I mean, I scuba dive, but I don't have much time to

"You've set up a very elaborate psychological defense mechanism for denying that you're a horse."

do that anymore, so I often take myself under the sea. I'm really *there*. And that lets me go diving without going diving. It's wonderful, and it's real.

JOE JESZECK: SUPER SQUID

For a small percentage of fantasizers, fantasy acts as a sort of creativity hot line. They are our fantasy-prone artists and writers, our musicians, our theoretical mathematicians. The link between fantasizing and its tangible creative product is the professional passion of Harriet Farwell Adams, associate professor of English at the University of Toledo. "To me," she says, "the really mysterious part is the process between this vague play of images, as Einstein calls it, and the actual forging of an actual book or painting or symphony or mathematical theorem. This is what I consider the creative process." To that end, Adams has made it her business to try to track the path of fantasy in some of our greatest literary works.

"Once in a while there's a glimpse of how an artist courts and woos that fantasized image into material for art," Adams says. "John Fowles's famous description of trying to get the woman he kept seeing at the end of the quay to turn around so he could take a look at her face was the genesis of his novel *The French Lieutenant's Woman*. George Eliot's novels begin with a picture, and then voices are heard."

Fantasy-prone Seattle screenwriter Joe Jeszeck exemplifies the creative process at work. He credits his fantasy life with having gotten him through the "sexual confusion of adolescence." Now thirty-six, he has fashioned those early fantasies into a screenplay, an anxious erotic comedy that he calls *Super Squid*.

Exterior outer space. Credits roll. Space Cruiser moves across frame. It is a flimsy, cardboard mock-up, easily recognized for what it is—a tacky, cheeseball, low-tech contraption. The strings suspending it are fully visible. It is clearly designed by the Japanese guys who did Godzilla. Interior Space Cruiser. It's a small compartment. There is slime on the walls, an oozing cotton-candy slime that doubles as food padding, and packing material. It smells like home ec after the boys try to make soufflés. Credits continue to roll. Nick, our handsome-but-dorky hero, is in a room with other captured spacemen. The men vary in look and style of space suit. Some look like pirates. Some are green. Some are mauve with chrome heads. They all look worried. Nick looks around. He is locked inside this small compartment with these extraterrestrials and his dog Blinky, who has several dozen eyes. They are all sitting on cheap folding chairs covered in fake fur that's full of cotton candy slime. The prisoners converse.

FIRST PRISONER: I heard that they do horrible experiments on you. *(Men gasp.)*

SECOND PRISONER: No, no. I heard that they're a bunch of cannibals, they need us for food. *(Men groan and move around nervously.)*

THIRD PRISONER *(a pirate)*: I heared that they just wants us fer breedin'. Ya know they ain't a bad-lookin' lot o' space wenches, they ain't. I wouldn't mind gettin' me nose baked by one o' them, if ya know what I means. Arg. Arg. Arg. *(The men brighten.)*

NICK: Really? *(Door slides open. In walk three beautiful women dressed in sadomasochistic space ensembles.)*

FIRST WOMAN: That one!!

NICK: Me?

FIRST WOMAN: Take him. *(Nick is grabbed and dragged off.)*

Interior Space Cruiser corridor. Nick is thrown into a room. It's all black-and-white and stainless steel—Italian Design Hell. There's not a soft surface in sight, except the voluptuous, beautiful spacewoman who is scantily clad in black-and-white. They observe one another. Both are slowly becoming aroused. They move closer. They are tentative. Finally they embrace.

NICK *(passionately)*: You are so beautiful.

WOMAN: And so are you.

NICK: I want you.

WOMAN: But they are watching.

"Nice picture, but how do you change the channel?"

NICK Let's give 'em a show *(They embrace passionately.)*
WOMAN *(turning head to side, presenting ear to Nick)* Take me! Take me! *(Nick is confused.)*
WOMAN *(demanding)* Take me. What is wrong? *(Nick is even more confused.)*
WOMAN Aren't you ready?
NICK *(beyond confusion)* Yes, of course I ... *(Woman with ear still presented feels for Nick's nose with her hands. Groping wildly, she finally finds it.)*
WOMAN *(hurt and angered, she whirls to face Nick, still holding his nose)* But it's not even warm!
NICK Excuse me?
WOMAN *(hurt and perplexed)* Don't you find me attractive?
NICK Of course I do, but ...
WOMAN *(with resolve)* I hate to debase myself like this. ... *(Woman turning away in disgust begins to quickly pull up and down on Nick's nose.)*
NICK *(in rhythm with her hand)* Wait a minute! Wait a minute! Wait a minute! *(Sirens go off. Electronic voices are heard on either side of Nick.)*
FIRST VOICE Dr. Veep, this is *not* a Venusian. This is an Earthling.
SECOND VOICE Sorry, Dr. Goop. My mistake. They look so much alike.
FIRST VOICE Get another subject for the female.
SECOND VOICE Right away, Doctor. What about the Earthling?
FIRST VOICE He must be jettisoned before he contaminates the entire ship. *(Nick and the woman have been following the conversation back and forth across the room.)*
NICK *(in a James Stewart voice)* Now just a darn minute. ... *(Before Nick is through saying "minute," he is cast into space. Blinky, watching the proceedings from the open portal, is weeping from all his eyes. Nick is struggling. We see him holding his breath, then turning red. Finally he must breathe, and to his surprise he can. Suddenly he sees the starship Enterprise approaching. Then he hears the Star Trek theme music.)*

Interior college administration building—day. Nick comes out of his fantasy to find himself standing in a long registration line at an upstate New York college. He notices someone behind him humming the Star Trek *theme song. The line has moved ahead. Nick is holding the others back.*
FIRST VOICE *(from behind)* Space. The final frontier.
ANOTHER VOICE *(Scotty)* But Captain, the dilithium crystals in his brain are gone.
ANOTHER VOICE *(Spock)* Perhaps he is functioning on a deeper, more logical level, Mr. Scott.
ANOTHER VOICE *(the doctor)* Spock, you pointy-eared Vulcan, can't you see that if this man doesn't take a step forward we will all die. ... *(pause)* In the administration building.

Nick wakes up in the middle of their conversation. He is embarrassed and moves up. Applause from behind.

ELIJAH ZUPANCIC
A ROBOT NAMED JOHN

Children who seem to be wandering around in their own ozone aren't often celebrated for their originality. They are forever "forgetting" to follow instructions. Things have to be repeated to them several times. And often what they say doesn't make sense to anyone else. This gets them labeled difficult by adults and weird by other kids. Such is life for seven-year-old first-grader Elijah Zupancic.

It's bad enough that his name looks like the bottom line of an eye chart, but Elijah is clearly *not* here. Happily, his mother is an artist who understands these things. She channels his consciousness into as many creative sojourns as possible. One is the story of John.

As Elijah tells it, there was "a robot named John. Instead of gas, he ran on tea, iced tea with lemon. His creator got captured. The guys who captured him threatened him. 'We'll launch this missile if you don't give us the robot.'

"John heard what they said, so he took the missile and ate it. He chewed it up into little parts, and then he spit it into a junk yard. As a reward, his creator made him ten times bigger than the earth.

"John's switch is in his foot. His creator keeps him inside this shed with laser-barbed wire all around it, because his creator is sort of crazy. There's a big bullet-proof wall and tons of rocks. John's work is to think up plans.

"One day the creator went to the junk yard and saw a big pile of junk. Then the pile moved right up into the air and created itself into a new robot named Rocky.

"John and Rocky began to fight. John's creator made weapons for him so Rocky wouldn't win. One was a laser beam that could burn holes right through whatever there was. The beam never turned—it kept going until it all went into space and nobody saw it again.

"John's creator made a magical whistle that would stop Rocky for fifteen seconds. When John wanted to fight, his creator gave him a big bunch of iced tea—with lemon.

"John found another robot. It was a girl. Sylvestia was her name. John really liked her. They got married with microchip rings. They didn't need a car, you see, because they just had to take one step and they were *there*—wherever they wanted to go.

"They went to a robot warehouse for a honeymoon and watched robots being made. They went back to the house John's creator had made for them—a big steel house—and they had some baby robots. One was born sick. It ran on batteries, so the creator had to make a battery for it, and then it lived."

Like all good fantasizers of any age, Elijah maintains that his account isn't a story. All of it's true.

EARTH

CONTINUED FROM PAGE 32

bit through everything we tried to catch it with" and finally escaped.

Finally, after days of paddling, wading and hiking in the eerie darkness, the Styx delivered them to the light on the other side of the massif. Turning back by another route, the team eventually found itself in an isolated forest, surrounded and completely cut off from the outside world by steep canyon walls. Here the going was a good deal tougher than it had been in the caves. The forest was so tangled with lianas and other vines that even dedicated "jungle bashing" with machetes allowed the group to progress only about 50 feet an hour. To make matters worse, the undergrowth was salted with venomous scorpions. Two scientists were stung and spent two days suffering from delirium and dangerously high fevers.

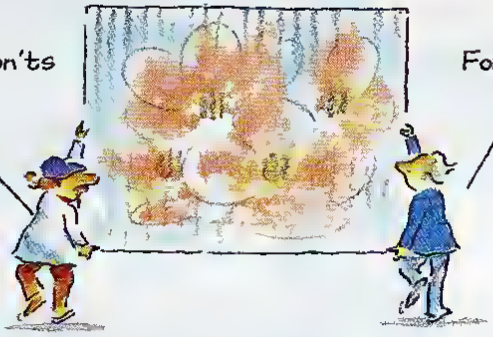
Even so, the forests turned out to be a biologists' haven. Because the underlying water table is high, the scientists found evergreen trees grow in this otherwise deciduous forest, and the foliage in turn creates homes for a wide variety of animals. Given the extreme inaccessibility of the isolated sunken forests, says Chapman, "the most surprising thing was finding troops of lemurs sitting up in the trees shrieking at us." The sounds of primate territorial squabbles filled the air, providing a symphonic backdrop for a "memorable experience. We were seeing something," as Chapman puts it, "that we knew few human beings had ever seen before."

The scientists ultimately spent six weeks in Ankarana, mapping its caves, its forbidding limestone plateaus, and its dozen virgin canyon forests. Equally important, as far as the scientists were concerned, was cataloging the area's unique and extensive fauna: 8 species of lemurs, 7 species of bats, 65 birds, 10 snails, 51 butterflies, and vast numbers of other insects. One of the butterflies, *Apaturopsis kilosa*, turned out to be so rare that the expedition's two captured specimens went straight to the British Museum. The cave fauna was also "so weird that it'll take a long time to classify it," explains Chapman. "A lot of the invertebrates," says entomologist Fowler, "will be entirely new to science."

Most important, though, the scientists' exhaustive survey has allowed them to begin drawing up a management plan for the area. That plan, says Chapman, has already drawn the favorable attention of the Madagascar government, which is now cooperating with the World Wildlife Fund to create in Ankarana what could become a protected international preserve. If that happens, then those six weeks that the scientists spent struggling against desert, jungle, scorpions, crocodiles, darkness and hungry eels will have a payoff in perpetuity, and a unique patch of the planet will have been saved.

The Artist

It's amazing how fast you learn the dos and don'ts of art by working large



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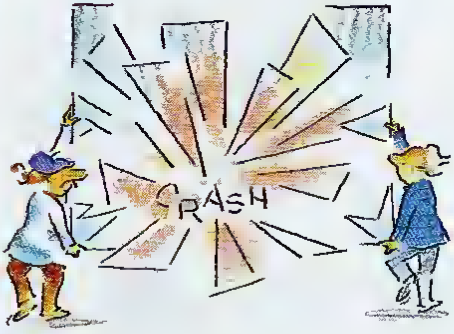

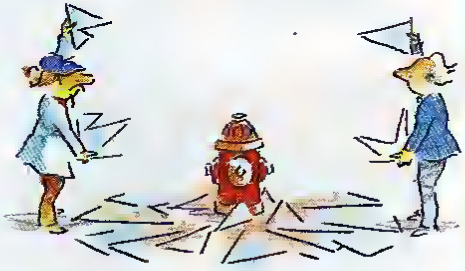

Never paint on glass

ARTS

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frequency ones used in discotheques.

Tsai was further inspired by strobe light inventor Harold Edgerton at the Center for Advanced Visual Studies. "Using a strobe light Edgerton made a string of water droplets appear to be moving upward," Tsai says. "I thought, *Wouldn't it be wonderful to create a large column of water with millions of droplets in various formations?* So I began to experiment, trying to turn a scientific phenomenon into art. I wanted the viewer to see an endless supply of individual drops of water rising and falling in response to sounds in its environment."

He experimented for eight years, trying to create the realization of his vision. The result was his design for *Upward Falling Fountain* for which he now holds a patent. Tsai opposes mass production, which, he says, would "abuse and degrade the work."

Today Tsai operates with a staff of six or seven assistants on a major architectural fountain project. He subcontracts commercial electricians to construct circuit breakers, wiring, and other systems. Although IBM has contributed computer equipment, all the other components of each work are usually made in Tsai's studio with the help of an assistant. No matter what its size, each work is fully constructed, then taken apart and shipped to its destination, where it is reassembled and installed.

"Many artists who combine art and technology must collaborate with a computer programmer or an engineer," says Cynthia Goodman, program director of the IBM Gallery of Science and Art and curator of the "Computers and Art" exhibit. "Tsai is able to implement his own ideas, designing the technical systems to complement his exquisite artistic ability. Tsai is at the forefront of high-tech art, she adds, "and I am convinced that the futures of art and technology are intertwined." ∞

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ARTIFICIAL INTELLIGENCE

Editors note: Last year Apple Computer invited students to compete in designing the personal computer of the future. Entries would be screened by Apple's engineering directors, the winner would then be chosen by a panel of judges that included Apple cofounder Steve Wozniak, personal computing pioneer Alan Kay and Future Shock *author Alvin Toffler.*

The most intriguing vision of the future personal computer came from a University of Illinois (UI) team that included graduate students Bartlett W. Mel, Arch D. Robison, Steven S. Skiena, Kurt H. Thearling, and Luke T. Young. They were supported by two faculty advisers—UI Center for Complex Systems Research cofounder Stephen M. Omohundro and director Stephen Wolfram.

Shortly after the UI team claimed victory last January 28, Wolfram called Omni. *Several publications, he said, had expressed interest in describing the UI design. The team, however, wanted to share its vision with as wide an audience as possible. Was* Omni *interested? Yes, we replied.*

The following excerpt is from the UI team's paper for the personal computer they've christened Tablet.

We seek to design something that will fit comfortably into people's lives and yet dramatically change them. To achieve this, we want to take something that is already a part of everyone's life and improve it.

Consider the humble paper notebook. It's light. It's portable. No one thinks twice about bringing a notepad into a meeting, the library, even the bathroom. It's as accessible to a child as to an octogenarian and as useful to the engineer as to the artist. A notepad is ideal for uniting text and graphics, perfect for creative doodling and drawing. We want to design a computer that provides all of the benefits of the notebook—and more.

Targeted toward the lawyer, the teacher, the engineer, and other twenty-first-century professionals, the computer we envision in the year 2000 will be a portable machine with the same dimensions as a standard notebook. It will look like an 8- by 11-inch version of the monolith in the movie *2001: A Space Odyssey* but will weigh only a few pounds and have no buttons or knobs.

The front surface of our computer will possess a high-resolution display screen sensitive to the touch of a stylus, a fine-tipped pen-shaped instrument. After turning on our machine, icons [images] representing a typewriter keyboard, a ballpoint pen, a telephone, a calendar, a TV, and a host of other applications will appear. By moving the stylus, we will be able to manipulate the icons.

We can move rapidly through a series of menus by using the stylus to check off which ones we want to see. Pressing the typewriter icon, for example, will cause a keyboard pattern to appear on the screen. This pattern can be redrawn and customized to the user's preferences.

Press the pen icon, and a lined notebook page will appear on the screen. The page could even include simulated loose-leaf holes. With the stylus, we'll be able to write or draw directly on the screen, leaving behind a simulated ink trail. If we wish, handwriting-recognition software will convert our scrawled words to type.

Liquid crystal display (LCD) technology will be a perfect foundation for the computer's screen. An LCD is sensitive to touch, so it can easily detect the tip of a stylus and even how much pressure is applied with it. Given the resolution of our display, we will have no difficulty mimicking the finest ballpoint.

Today we are building computer systems that can recognize 97 percent of all words written neatly by hand. Combined with spelling correction, such systems are almost 100 percent accurate. Deciphering a range of handwriting styles will be a trivial task for our computer. Of course, no system can be 100 percent accurate, but what isn't immediately recognized by the computer will be highlighted in a different color and reentered by the user.

A high-resolution color display will do more than merely imitate a notebook page. The computer's entertainment possibilities are enormous. It will be able to display—simultaneously—the action taking place on 36 different television channels. We'll be able to watch the bad guy being rubbed out on channel 30 while the passion heats up on channel 6.

To store data in the Tablet, we will employ convenient and inexpensive credit card–size RAMs [random-access memories]. People will carry them in their shirt pockets and trade them like baseball cards. Customized cards, called LaserCards, will be available through electronic catalogs, offering the user a wide variety of books, video, and data.

The vast storage capacity of these cards, which will be inserted into a slit on one side of the Tablet, will also alter our conception of how much information can be stored in a computer. Through data-compression techniques, a single card will hold four hours of video or 2,000 books from a personal library.

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Designing students. Their computer works.

HORSES

CONTINUED FROM PAGE 89

the middle though they charged an arm and a leg for a porf call '

During the last week they had lightened the load as much as possible Now there was nothing left but food water the money bags and some extra canvas onboard Still the hours of flat calm dragged by

Vegetius Prorsus, and Muccinus took turns at the oars and Chiron stood helm though there was very little need to steer

The sun came up abaft them every morning and set before them each evening and it seemed that they had moved not at all

They awoke to find themselves the captain and bosun at one end of the vessel and the crew at the other No one was rowing The oars were shipped

'Well' said the captain 'what is it?'

One of the men stepped forward 'We've been without wind for seventeen days now We row all day and night We get nowhere

"There's nothing for it but to put our backs in it and hope for wind, said the captain

'We could turn back' There were grumbles behind him from the others

There was a consultation with the passengers "Out of the question" said the captain "We're more than halfway there

"Says who?" yelled someone

'Say I and I'm captain"

"Well then said the crew's leader "We could lighten the load '

"What's that?" asked Prorsus, suddenly taking an interest in the proceedings

"You know what I mean, governor" said the crewman nodding his head sideways "Why not put the horsey over the side?"

Quite right!" said Prorsus He grabbed the sailor by crotch and tunic and pitched him over the railing The man coughed and floundered in the glassy water

"Next!" said Prorsus "I figure three more make up for my friend Chiron here" He opened his arms in a wrestler's invitation "Weight's weight"

No one came forward.

'Toss him a line,' said Prorsus

They pulled the wet and strangling sailor back aboard

"Do we understand each other?" Prorsus asked the assembled sailors

"Aye aye!" they said in one voice

As if by some propitiatory magic a dancing line of water moved toward them from the east It caught up to and passed the ship The frill of mane on Chiron's back fluttered, and a cool breeze blew into Vegetius's right ear

"Well hell and damn!' yelled the captain to the crew "Don't you know wind when you feel it? Unfurl the fonkin sail!'

The canvas came down and filled the ship groaned and jerked ahead, bearing them away from the morning sun The sailors among them the wet one joined in "Old Neptune's Song"

They lowered the gangplank, and Chiron went down into the surf and onto the sandbar in the river estuary

The shoreline was broken by trees and clearings Here and there shaggy humped shapes grazed some few stopping to watch then returning to their forage They looked like wisents only had smaller horns.

Chiron turned to the ship

"Fishing should be good all up the shore" he said "Won't take long to replenish your stores Good water too Follow the warm water north then follow east when it turns. You'll end up in Britannia or Hibernia You know them Capfain?'

"I'm half tin digger" he said "I paint myself blue once a year when the mood overcomes me"

Chiron laughed then coughed—a hard, racking series of them He leaned the upper half of his body against a tree, steadying himself with his right hand Then he straightened and turned to walk away

"Good-bye Good-bye horsey So long, Mr Chiron," they all yelled from the ship

"Wait! Wait! What about the *Hippiatrika*?" yelled Vegetius

Chiron turned "In the cave On the table The two unopened scroll tubes Thank you, Renatus Vegetius I will remember you always' He turned then lifted his tail—his regrown hair and beard streaming in the wind like a white banner—and broke for a few paces, into a canter and disappeared through the nearest stand of trees heading westward

A yell of exultation and homecoming of surrender and defiance rose up startling some of the browsing creatures Then it, too, like the drumming hoofbeats echoed and died away westward

"Back water and up sail you sea hogs!' hollered the captain

In the three years of life remaining to him, P Renatus Vegetius returned home retrieved the books in the cave and incorporated the *Hippiatrika* into his great work on the diseases of mules, horses and cattle, the *Mulomedicina*

Decius Muccinus, free and married had twin sons whom they named Aurem and Renatus

Nemo Prorsus became the Christian bishop of Sardis

On his deathbed, Renatus Vegetius looked around his room at his sisters and their husbands and children at his newly freed slaves and at what few friends as had not preceded him in death

About the only thing he regretted was never getting to hunt lions from a chariot in the wet marshlands of Libya

He remembered one sunny day on a far shore half a world away and the cry of happiness that had drifted back to him out of those woods

What was killing a few old lions compared to what he had done? He had helped a tired old friend get home

Vegetius was still smiling when they put the coins on his eyes

CONTINUED FROM PAGE 118

We will be able to connect our machine to a wide variety of other appliances, including printers, projectors, stereo headsets, video cameras, toasters and just about everything else—by means of an infrared interfacing device.

We believe that a lap-size video camera will be an extremely popular accessory to the Tablet. Useful for recording meetings in the year 2000, the video camera will also digitize and be able to display a computer representation of printed documents like old books and new contracts. Imagine being able to stick a photocopying machine into your portfolio—one that will be able to call up documents after you enter a keyword.

It takes only a little more courage to predict a global positioning system (GPS), either as a clip-on or a built-in component. Using satellite signals, GPS will be able to tell you where you are—anywhere in the world, within a few meters—and provide directions to get you where you want to go. Just insert the *Rand McNally Atlas LaserCard*, for example, and the computer will inform you of the ideal route to a particular destination by considering the time of day and the current traffic patterns. We will also store information on all the parking spaces in the state, and through a speech synthesizer, the computer will tell you the best parking spots near that French restaurant in the city.

We will be able to communicate with other computers, each broadcasting what its owner wants the world to know about him or her—name, interests, and marital status, etc. Our computer will display the location of all other computers in the vicinity. While sitting onboard an airplane, for example, you'll be able to scope the passengers and perhaps find someone interesting to get to know during the flight. Imagine its usefulness in a singles bar.

A growing number of people will be opting to work at home, avoiding the inconvenience of commuting to work in the city. Our machine will push the trend in a new direction. A truly portable computer Tablet will allow you to work anywhere. On a sunny day, you'll be able to take your work to the park, for instance, without the worry of missing an important message. Instead of moving people to where the work is, we'll take the work to the people.

Through our national telephone network we will be able to contact any person or machine within seconds. Historically, such a hookup has depended on a direct physical connection with the phone grid. Cellular telephone technology has changed all that, and the cellular link will be used chiefly to talk to other computers and the people using them. We will be able to combine video, graphics, and text in our electronic mail documents.

The Tablet will be steel hardened. Our design is simple and sturdy enough to survive a healthy jolt. As for theft, we'll track down a stolen computer by calling up its unique identification number. The GPS receiver will then determine exactly where it is. Try and fence merchandise *this* hot!

Data security is even more important. To safeguard all the personal information stored on these machines, digital signatures [personal codes] will be used in all data transfers. By the year 2000, the general public will be familiar enough with the notion of digital signatures to trust them more than handwritten signatures.

There is no major aspect of our machine that is not sitting in a laboratory today. We do not need a breakthrough in artificial intelligence, superconductivity, or any other exotic technology to proceed with Tablet. Nor do we rely on the construction of a new national infrastructure like a fiberoptic link to each home. That would require at least a generation to complete.

Our vision of the computer in the year 2000 is both realizable and desirable. We have considered what is possible and taken it from there. In our design we will unite disparate elements into a clean and satisfying whole. We all want this little machine, and 12 years of engineering can make it a reality. ∞

INTERVIEW

CONTINUED FROM PAGE 97

Hrdy Darwin was a classic Victorian in his attitudes toward women. As brilliant as he was, and as heroic he was clearly a sexist who educated his sons differently than his daughters. He couldn't imagine that females would typically solicit more than one male. His theory of sexual selection posits the idea that males compete among themselves for access to females and that the females choose the best male. It's a great theory, and we've gotten a lot of mileage out of it in behavioral biology. But its central assumption has led to all kinds of false premises. I've often wondered what would have happened if Darwin had lived not in the nineteenth but the seventeenth century, when females were seen as sexually assertive, bawdy creatures, not coy and sexually passive.

Omni How does a sociobiologist talk about jealousy? It seems to run counter to your ideas about multimale solicitation.

Hrdy Certainly if *any* human behavior has an evolutionary basis, jealousy is going to be it. Even in multimale breeding systems the male does not like to see a female breeding with other males. In chimpanzees, several males mate with a female. But even a male not currently breeding with her is, first, sexually excited and second, upset at seeing the female with other males, though he may tolerate it. *Upset* is an anthropomorphic word, but that's the only way to describe it. Primate males do not enjoy watching other males copulate with females they're interested in.

Omni Is the absence of rape among primates one reason you say in *The Woman That Never Evolved* that human females are worse off than other female animals?

Hrdy That wasn't what I was thinking of. I agree with the early social philosophers like [Friedrich] Engels that men in patriarchal societies try to control the sexuality of women, a sexuality perceived as dangerous. Human females are much more likely to be cloistered than other primate females. Female baboons may be beaten up by males, and you have beatings occurring among chimps and gorillas. Nevertheless, females of these species have a lot more freedom of movement than humans. In agricultural societies, where property was inherited through the male line, the threat of female sexuality caused a lot of anxiety, and people tried to control females. There are several ways to do this. One is to indoctrinate women with puritanical views. More extreme and crueler forms include female circumcision, where you excise the portions of the female anatomy that might permit sexual pleasure.

Omni The controlling of women's sexuality has even infected scientific objectivity. How has the male view of primatology affected your research?

Hrdy One big influence on my own work was the obvious bias of many of my pre-

decessors in anthropology, who looked only at the males. They counted up the number of copulations a male had and called that his reproductive success. I probably reacted to all that by overstressing the importance of females in primate social organization. So now it's time to look at the interrelationship, at how male reproductive strategies evolve in response to female reproductive strategies, and back and forth. It's time for a synthesis by a younger generation less polarized than my own. One thing's for sure. The days are gone when females were looked at as passive objects in a landscape defined by active male protagonists. The amazing thing is how quickly it happened. Professors famous for androcentric bias are rushing to organize symposia on female strategies.

Previously, for example, you'd have a book like Don Symons's *The Evolution of Human Sexuality*. It's a fine book, but it isn't about the evolution of human sexuality. It's about the evolution of male sexuality and of one kind of male sexuality at that—what I call the "promiscuous Walter male." Remember Walter, the hero of *My Secret Life*, the Victorian novel that chronicles the sexual experiences of an upper-class man who goes from chambermaid to chambermaid? I'm convinced, although I can't prove with any scientific data, that male personalities exist along a continuum of male types. You have some males who are incapable of long-term relationships and are not interested in having and rearing children. One of the fascinating things about Don's book is that it barely mentions offspring, or children, or factors that contribute to their survival. It's all about achieving copulations. I'm much more interested in reproduction as the production of children who survive than I am in reproduction as a sexual act—a moment in time.

Omni: You have said that competition among women, and their lack of solidarity, prevent them from assuming power.

Hrdy: Women make up more than half the population. So why have they traditionally been politically powerless? It's partly because they identify with their families, husbands, and children, and not with other women. We are crippled by the feelings of competitiveness and jealousy we feel for each other. Put women in a group that might be competitive, and they will compete not with the men in the group, but with each other. Then you realize you can decide to run your life differently. I have made a point of being supportive to women colleagues and suppressed a lot of the feelings of competition, because I'm aware of the unpleasant alternatives and also because I remember with gratitude the support I received from older women colleagues early in my career. There were no women professors at Harvard when I graduated from Radcliffe in 1969. I mean zero, but as I started to look around, I found these wonderful women mentors in my field—like ecologist Alison Jolly and anthropologist Jane Lancaster.

Omni: Hasn't there been a "feminization" of primatology?

Hrdy: Women like Jane Goodall, Biruté Galdikas and [the late] Dian Fossey have spent years in the field without permanent positions, while men were back home tending their power bases. Women distinguished themselves in this field because they were willing to do something that many men were not. But these women have had a hard row to hoe, a fact that gets eclipsed by their fame. Normal sources of funding for scientific fieldwork, like the National Science Foundation, have not been available to them, although this too is beginning to change. Until recently they had to take to fund-raising on the stump. When Fossey came back to the United States she had no home or permanent position, and her Virunga volcanoes site was being wrested from her. She was living from hand to mouth, taking teaching jobs where she could. Her health was failing. When she returned to Africa, I had the feeling she was going back to die. It would have been nice if some of the [illegible] after her death could have been changed into support during her lifetime.

It may also be true that in the particular area of primatology that has attracted so much public attention, women are better at studying behavior than men. If you can't recognize individual primates and follow them over the long-term, you're not going to learn that much about them. What kept me out under the Indian sun watching hanuman langurs for hours at a time is that I want to know what's going to happen next in the soap opera. Some men are able to memorize the traits that distinguish one primate from another, but by and large, women have done it better.

Omni: You're certainly a primatologist and an anthropologist, so why do you call yourself a sociobiologist?

Hrdy: Because I think evolutionary theory is valuable for analyzing behavior—primate or human. I have certainly not lost any of my earlier interest in history and culture. But evolutionary theory causes me to ask different questions about why beliefs, for example, get constructed as they do. Look at my structural analysis of the *H'ik'al* myth in my first book, *The Black-Man of Zinacantan*. *H'ik'al* is a little supersexed bat demon, also represented as a black man, who zips down and slices off peoples' heads and does other wild things. In the contemporary version, which is still told around campfires in southern Mexico, he punishes women who have not properly fulfilled their sex roles. If the black man catches a woman who has transgressed sexual norms, like going out at night without a chaperon, he rapes her and she gives birth night after night until she finally swells up and dies. That's everyone's worst fantasy who has ever given birth by natural childbirth. My book showed how history was important in shaping the contemporary view of the myth. But I didn't focus on the issue of why sex roles were defined the

way they were in the first place. Why had the Mayans built up this whole mythology to keep women in line? Consciously or subconsciously, that's the question I was drawn to in my later research. It just took me a long time to put it all together.

Omni: What are you working on now?

Hrdy: Some years ago I became interested in a very widespread phenomenon in nature: biased investment by parents in sons versus daughters. In some creatures and populations, sons are favored. In others, daughters are. The nutria—imagine an aquatic guinea pig with a particularly lush and attractive fur—provides one example. Zoologist Morris Gosling of Britain discovered that mothers pregnant with small litters reabsorb them if the litter is mostly male. In monkeys, mothers respond to one set of conditions by producing mostly daughters and to another by producing mostly sons. This is a new area of research and poorly understood. Together with Meredith Small, I have been studying factors that affect the production and survival of sons and daughters among several species of macaques.

As a kind of tangent on this research, Debra Judge and I have also begun a much more sociological and historical study looking at how parents have divided their estates among male and female offspring. We are examining this question mostly by focusing on three thousand wills made by a sample of Californians. We want to see how patterns have been changing over the last one hundred years.

I am also writing a book on motherhood that pulls together a lot of the research I've been doing over the last five years. All of it revolves in one way or another around the issue of parental investment. The will research, for example, is really a study of how parents are investing in their kids after death and the kinds of family strategies people devise to pass on resources.

Omni: Your work has endowed human females with cunning and duplicity and the ability to manipulate situations.

Hrdy: Ah, but the way you're saying these words! As if they're bad. Cunning and duplicity—these are the strategies of a creature that can't win a fight that depends on muscle mass. To criticize a creature for taking the only route available to it—given the limitations, the constraints, the oppression—is not quite fair. I worry that somebody could read misogyny, a hatred of women, into my work. What they should see instead is an effort to expand the range of attributes encompassed by a term like *female nature*. We've tried so hard to change stereotypes about females and say, Look, females are not just passive; they are also competitive and assertive creatures. But that is not to say they are *only* competitive, vicious and cunning. They are in fact cooperative, nurturing, competitive, cunning, intelligent, destructive and creative. Rather than reducing female nature to any single set of stereotypes, we talk about a whole range of potentialities. ∞

STAR TECH

ACCESSING THE FUTURE

At New York's eighty-fifth Annual Toy Fair, two of the new buzzwords were *interactive* and *user friendly*. Here's a look at some of the show's microchip marvels, as reported by *Omni* contributor MarjorieCostello.

GET SMARTS

ComputerSmarts from Coleco Toy (below) uses video action and music to teach kids math and English. It can be hooked up to a TV and VCR or used alone. Cost: $90 to $100. Available in September.

LAPTOP DRAWING

After selling about 55 million Etch A Sketches, Ohio Art now produces the electronic Animator 2000 (right). A stylus and a touch pad let children create moving cartoons, which can be saved in the toy's microprocessor memory or stored on cartridge. Price: about $150.

GOING INTERACTIVE

The View-Master Video System is a learning toy from Ideal. The system (right) hooks up to a TV and VHS VCR and uses special video-cassettes, featuring Muppet, *Sesame Street*, and Disney characters. Kids use a remote control and a joystick to choose from different scenarios and story lines to guide the action on the screen. Cost: $120. Available in September.

TV TUTOR

A TV set can now be turned into a one-on-one electronic tutor. Video Technology's Secrotes (right) uses a keyboard and any TV screen to teach kids math, spelling, and grammar at their own pace. Secrotes also functions as a high-tech coloring book, offering full-color graphics without the need for a VCR or cassette. Other built-in modes include word and musical games. Secrotes costs $150. Mouse, touch pad, and voice cartridge are extra.

KIDDIE SCANNER

Attention shoppers! Fisher-Price offers the Magic Scan Checkout Counter to pint-size

consumers. Groceries move along a motorized conveyor belt, and when an item passes over a scanner, there's a beep and a flashing light. There's even a gooseneck mike for in-store announcements or make-believe price checks. Available this summer for $39.

CHOO-CHOO CAM

Lionel's Rail Scope is a tiny video camera that gives small "engineers" a view from the locomotive as it races down the track. The black-and-white camera sends images to a TV or a VCR. Three models ($375 to $475) will be available in September.

FORUM

CONTINUED FROM PAGE 19

volcano? Look at what we frail humans can do. Would an alien anthropologist in 3010, upon digging up my bones, believe that I could have sat in the lotus position for 12 Earth minutes? Nah, probably not.

Jeannette Garagan
Nova Scotia

Things that go hump in the night might very well be the advance team for paleontological porn. Or so one might surmise after peeking at your February issue. Methinks this smacks of Mesozoic madness. Could it be that good doctors Bill Ball and L. R. Cocks are trafficking X-rated flicks starring Tyro-Rex? All I ask is that Bev Halstead keep his sexy stegos and wanton dinos off my box of Silly Savage cereal, and that he and his performing mate Helen stay out of our preschools.

Andrea Lee Bearden
Oceanside, CA

Your recent article (a very clever trifle, by the way) caught me off guard. I was so misled by the accompanying artwork that I wasn't going to read the article. But as I skimmed through it, I found it to be interesting and informative. I think though that it was interesting enough to stand on its own journalistic merit, and it was not necessary for you to stoop to such an absurd attempt to attract attention with illustrations of dinosaurs copulating. In the future I hope you will exhibit more confidence in the intelligence of those who write this fine magazine as well as those who read it.

Margaret Schorr
Miami

Oh, my goodness. I do believe you could have put those pages to better use. The pictures should have been much smaller. Then you could have given us a picture of the naked scientist in the tree. May I suggest an article on the strange but "charming" behavior of certain scientists? Your article has given me a mental picture of a most amazing man of science who has somehow managed to juggle his attention until it has settled below his belt.

Douglas Davis
Paradise, CA

Who are you trying to kid? Our fifteen year old son called our attention to your article, accusing us of subscribing to a tasteless, tacky rag. With journalism like that, how could we defend *Omni*? On the other hand, maybe Sandy Fritz was duped by this Bev Halstead. In which case, would he be interested in a bridge I happen to be selling for a very reasonable price? Or perhaps a large parcel of swampland? In the meantime, we are so embarrassed for you. The article was an insult to our intelligence, and it violated your integrity as a science magazine. Shame on you!

Mr. and Mrs. B. E. Pugh
Salt Lake City

I found your article particularly distasteful. Are the lovemaking positions of the *Tyrannosaurus* any more difficult or interesting than those of modern-day pachyderms? What's more, does anyone really care? I am squirming with boyhood anticipation of a follow-up article—Did dinosaurs have runny noses?—complete with illustrations, I would hope.

Richard A. Blankenship
Oklahoma City

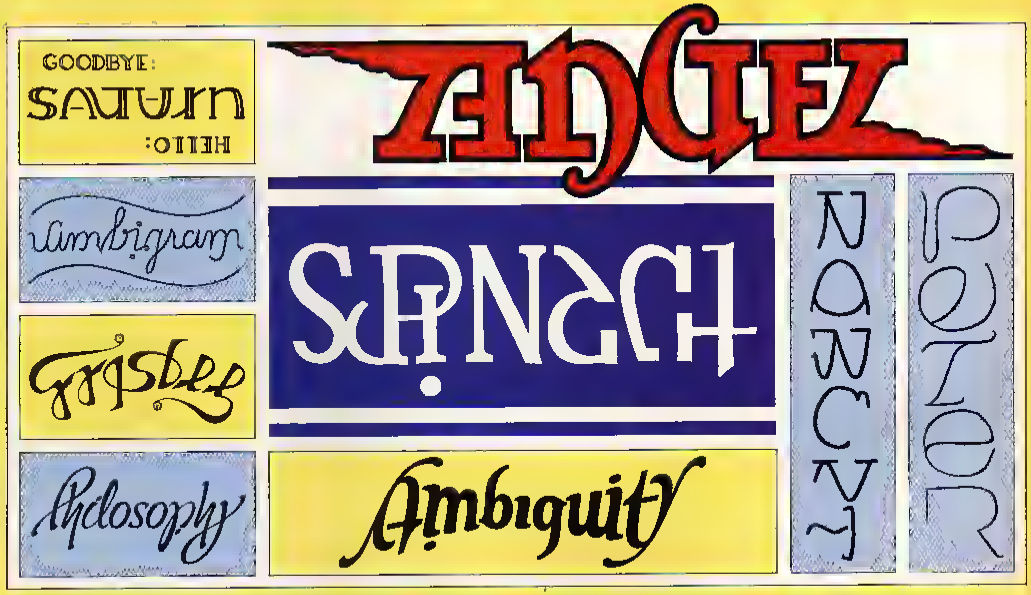
With the world facing the epidemic of AIDS, ozone depletion, nuclear holocaust, and other travesties, *Omni* should inform its readers about. you tell us how dinosaurs tornicated. I'm sure those six pages could have been put to better use. *Omni* used to be informative to me as a science publication, but as with the dinosaur, your intelligence has become extinct! I will say this much: *Omni* is enjoyable reading and one of my favorites, so I won't let some of your recent articles deplete my enthusiasm for informative journalism.

Jay Brotherton
Oklahoma City

Ambigrams: Inversion, symmetry, oscillation, and other visual wordplay

GAMES

By Scot Morris



To commemorate *Voyager*'s successful 1981 encounter with Saturn, Ernest Franzgrote designed an unusual button that read GOOD-BYE SATURN (above, upper left). Then an engineer at NASA's Jet Propulsion Laboratory (JPL), Franzgrote produced copies of the button and gave them to his fellow engineers and scientists. As the spacecraft left the planet's orbit and continued onward, JPL workers turned their buttons upside down. They now read HELLO URANUS.

Franzgrote was inspired by a September 1979 column in which we introduced Scott Kim's creative calligraphy. In this visual wordplay, when signatures and words were turned upside down, they either read the same or were transposed into different words. Still other designs had a mirror-image symmetry. Readers responded with their own wordplays in Competition #9. We displayed these in the April 1980 issue and followed up with more designs in November 1980.

Intrigued by the calligraphy and pleased with his own design, Franzgrote later noticed that the shape of his button resembled a Frisbee. He wondered if that trade name could be designed to read the same when turned upside down. The central letter *S* was helpful, but the word had to start with an *F* and end in two *E*'s that looked identical. It was like trying to solve several complex puzzles at the same time.

In his solution to the problem (above), however, the top of the *F* when turned around becomes a flourish under the double *E*'s. It terminates over the *I* with a dot that resembles a disc in flight. His customized design is repeated five times around a new Frisbee.

A typographic designer and lettering artist in Wenonah, New Jersey, John Langdon has also created some elegant inverted words. Two of his best—AMBIGUITY and PHILOSOPHY—are shown above (bottom).

The musical group Angel's invertible logo (above, top) was created by Robert Petrick, a New York designer of graphic TV titles and spot announcements.

His tossed salad is an example of invertible lettering that yields two different words. Turn SPINACH (above, center) upside down and it reads TURNIPS.

Langdon's and Petrick's designs were featured in our earlier pieces on this subject. At the time, we dubbed the art designatures. Although the term combines *design* and *signature* to describe this visual wordplay, it's really applicable only to people's names. It also has an ambiguous pronunciation, conceptually appropriate but otherwise impractical.

Kim calls the style *inversions* and has also created a design that combines the word with his own name.

(above, lower center). Such symmetrical designs as Kim's SHALOM and Petrick's CHINA (above), however, aren't strictly inversion.

Other terms have also been suggested and include *twinonyms, symmetricks, abrapalabra* (*palabra* being Spanish for the English 'word') and even *polygroks*, which, in science-fiction circles, suggests multiple understandings.

Although we'd like to call them Omnigrams, we have a perfect word for them: *ambigram* (previous page, left), coined by Douglas R. Hofstadter, author of *Ambigrams: An Ideal Microworld for the Study of Creativity*. Unfortunately, the book is so far available only in Italian!

According to Hofstadter, there are 16 possible symmetry operations that can be performed on words. These include the quarter turn that re-creates, for example, JOHANN SEBASTIAN BACH (above) rotated clockwise.

A counterclockwise 90° turn also transforms PETER into JONES (previous page). For a gift to his parents, he was able to design his mother's name, Nancy, so it becomes his father's, Robert, when rotated clockwise (previous page).

Hofstadter's term *oscillation* refers to designs like the one above (lower left) of Scott Kim's name. With a shift in visual perception, the two names seem to flicker back and forth, depending on how you break the letters.

All this is complicated enough as it is, but try creating a bilingual ambigram, like the *sinosign* by David Moser, a graduate student in Chinese at the University of Michigan. To a native in Beijing, perhaps, the symbols in the design above (left) represent *China*. A clockwise quarter turn translates it into English. There's only one minor distortion: the extra zigzag between the upper and lower characters (the *N* in the English word *China* means *zhong guo*, or 'middle country.')

Another Moser sinosign turns *England* into the equivalent Chinese characters representing *England*.

An example in Japanese (above, right), with the characters being the same in Chinese, turns (when horizontal) into the English word *Tokyo*. It's a rather unique design that reads the same in *three* languages.

Now it's your turn—again. The ambigram possibilities are endless. To find out how many variations our readers can design, we're offering $500 as the grand prize in Competition #46, *Omni* Ambigrams. Ten runners-up will each receive $25.

Please send one entry only to *Omni* Ambigrams, 1965 Broadway, New York, NY 10023-5965.

All entries must be received by July 1, 1988, and become the property of *Omni*. None will be returned.

LAST WORD

By Terry Runté

"I believe in using people like common garden vegetables to achieve my own immediate, sordid needs. I'd gladly lay their souls to waste to get in a shorter line at the market."

EVERYONE!" Stand on your tippy-toes, commands Shelley McFaine from her podium. The crowd of 1,700, mostly women, obeys. Behind McFaine looms a huge photo of her face.

"Now stay on your tippy toes and look at the person next to you."

They look. Each person has paid $800 to attend the seminar.

"Imagine that that person is someone from a past life who has hurt you deeply. Try to imagine the hurt. Feel all that unresolved pain."

The now-exhausted people stare at each other, turning red from anger and from the strain of standing like ballerinas. Some of them cry.

"Look at that person. Look deep into her eyes, and say, 'I know you've hurt me. I know you've made me sad. But you are a living, breathing, sensitive being, and as long as you live, there's no place on this planet where you'll be safe.' Everyone repeats the words dutifully.

"Now, reach over to your neighbor and knock the bitch over! IT'S EASY!! She's on her TIPPY TOES! Knock her down. Ball up your fist and hit her upside the head. Strangle her a little! Feel the hate. Enjoy the hate!"

Fifteen minutes later, after the melee subsides, they lie on the floor in heaps, many of them unconscious. An elderly woman staggers to McFaine and throws her arms around her. "That was beautiful," she tells her messiah. "I've just had an orgasm for the first time in thirty years!"

Shelley McFaine embraces her, then throws her to the floor. "Great. You owe me an extra fifty dollars."

Shelley McFaine isn't shy about her purpose. She's traveling around the country, giving seminars for a single holy purpose. Well, two, actually. The first purpose of her "Lower Self" tour is to help her disciples get in tune with their "negative waveforms for Maximum Nasty Potentiality." Her second purpose is to put the screws to those pathetic little wussies and ream them for every cent they have. Shelley McFaine has taken the nation by storm since she released her latest best seller, *Raping the Cosmos*. But her plan involves far more than fraud.

"*Raping* was a radical departure for me," says McFaine. "It's far more political. While my first three books dealt with positive energy forces like love and sharing and crap like that, *Raping the Cosmos* deals with my personal quest to harness that mystical tripe and use it to reduce dim-witted suburbanite salesmen and emotionally damaged urban women into my own little army of mindless slaves. Slaves who vote."

Indeed, *Raping the Cosmos* has been McFaine's best seller ever, selling 6 million copies its first few weeks in print. Strangely, most of the copies have been purchased by the very same people whom the book openly ridicules—namely, anyone who fell for the first three books.

"Ordinary people—go figure 'em," says McFaine. "This book tells everyone who bought *Out on a Lame Premise* that they are spineless creeps. And you know what? They're the ones applauding me for my sincerity and openness. I've got one particularly twisted group in California that wants to pay me to kick them in the teeth. We're still negotiating the fee."

McFaine says she channeled her outlook on mysticism when she discovered that some of her past lives were far less glamorous than she had originally believed. "My guru put me in a hypnotic trance, and I was able to view my past lives. But instead of discovering I was an Indian princess or Joan of Arc, I kept remembering lives where I was a whore, a horse thief, or a common garden slug. Now granted, the slug was fairly harmless, but these other people were really scum. I had to face the fact that I, Shelley McFaine, am a cosmic receptacle for dozens of low-rent souls from hell. At first I was pretty depressed, but then I realized each of these souls was telling me the same message: 'Hey! Enjoy your life! Turn a few tricks, steal a few horses, leave some slime on a lettuce leaf. Because the next thing you know, you're dead and your soul is stuck in the body of some ditsy actress from California. Life is a ripoff, so the best way to celebrate life is to rip off your fellow man!'"

And so McFaine preaches her gospel of backstabbing and treachery to the same people who months ago were joining hands to "send out a white light of love to touch every continent." Now her message is one of greed, blind lust, and misanthropy, with a wild plan to achieve world domination thrown in to boot.

"Look," McFaine says, "I'll be honest. The White House is starting to look like small potatoes from where I'm sitting. But once I'm in, we can lean on Congress until they disband. Then I'll have a little chat with Gorbachev, man to man. I figure I'll achieve world supremacy by the year 1996, when Jupiter aligns with Mars."

A farfetched plan? Perhaps. But McFaine points out that while her political plans are as evil and corrupt as any in the world, unlike traditional politicians, at least she's honest about it.

"I believe in people," Shelley tells the crowd gathered outside Milwaukee's MECCA Convention Center. "And I believe in using them like common garden vegetables to achieve my own immediate, sordid needs. I would gladly lay your souls to waste if I thought it would get me in a shorter line at the supermarket."

"We love you, Shelley!" the crowd cheers. The huge poster of her face flaps ominously in the wind. ∞

Terry Runté hopes that Shelley McFaine has a sense of humor and won't have him put to death after she comes to power.