

# Omni

FEBRUARY 1989

**MIND EXERCISES  
THAT BOOST YOUR IMMUNE SYSTEM**



\$3.50



# OMNI<sup>®</sup>

VOL. 11 NO. 5

FEBRUARY 1989

**EDITOR IN CHIEF & DESIGN DIRECTOR: BOB GUCCIONE**

PRESIDENT: KATHY KEETON  
EDITOR: PATRICE ADCROFT  
GRAPHICS DIRECTOR: FRANK DEVINO  
MANAGING EDITOR: STEVE FOX  
ART DIRECTOR: DWAYNE FLINCHUM

| CONTENTS                     |  | PAGE |
|------------------------------|--|------|
| FIRST WORD                   | Science in the Soviet Union David Goldfarb   | 8    |
| OMNIBUS                      | Data Bank  | 9    |
| COMMUNICATIONS               | Correspondence   | 12   |
| FORUM                        | Alien Abduction Survey Results Pamela Weintraub  | 18   |
| SPACE                        | Orbital Eavesdropping Anthony R. Curtis  | 22   |
| BODY                         | Organ Transplanting in the Twenty-first Century Mark Dowie   | 26   |
| EXPLORATIONS                 | The Importance of Hugging Howard Bloom   | 30   |
| EARTH                        | North America's Dying Great Lakes Justine Kaplan   | 32   |
| CONTINUUM                    | Bicycles and the Future of the World, etc.   | 33   |
| A QUESTION OF TASTE          | The First Nationwide Taste Test Murray Cox   | 42   |
| SOLACE                       | Fiction Gardner Dozois   | 48   |
| SLIDE SHOW                   | Pictorial: Microscopic Photography Nina Guccione   | 58   |
| INTERVIEW                    | Walter Stewart: Fighting Fraud in Science Doug Stewart   | 64   |
| MR. FIDDLEHEAD               | Fiction Jonathan Carroll   | 68   |
| ANTIMATTER                   | UFOs and Cancer, etc.  | 73   |
| BOOKS                        | Medical Research Library A.J.S. Rayl   | 100  |
| PICTURES OF HEALTH           | The Mind-Body Connection: Exercises to Boost Your Immune System Anees A. Sheikh and Justine Kaplan | 104  |
| STAR TECH                    | Sports Equipment for the Year 2000 Jennifer Reek Gilliland   | 118  |
| THE GREAT OMNI TREASURE HUNT | Contest: An Expedition in Search of Rich Rewards   | 121  |
| GAMES                        | Visual Illusions, plus Intergalactic Morons Scot Morris and Bob Lindstrom                          | 128  |
| LAST WORD                    | Humor: Flipper at 25 Terry Runté   | 132  |



*"It is supposed to represent the hard work it takes to be creative," says artist Nicholas Gaetano of his airbrushed watercolor. Thus, Gaetano's "sort of heroic, God-like" rower navigates with pencils rather than oars.*

OMNI (ISSN 0149-8711) is published monthly in the United States and Canada by Omni Publications International Ltd., 1965 Broadway, New York, NY 10023-5965. Second-class postage paid at New York, NY, and at additional mailing offices. POSTMASTER: Send address changes to Omni Magazine, Post Office Box 3041, Haverhill, MA 01830-0341. Volume 11, Number 5. Copyright © 1989 by Omni Publications International Ltd. All rights reserved. Tel. (212) 456-6100. OMNI is a registered trademark of Omni Publications International Ltd. Printed in the USA by Meredith-Buntis Corp. and distributed in the USA, Canada, United States territorial possessions, and the world (except the U.K.) by Curtis Circulation Company, 21 Henderson Drive, West Caldwell, NJ 07066. Distributed in the U.K. by COMAG, Tavistock Road, West Drayton, London, UB7 7OE, England. Entire contents copyrighted. Nothing may be reproduced in whole or in part without written permission from the publisher. Any similarity between places or persons mentioned in the fiction or nonfiction and real places or persons living or dead is coincidental. Subscriptions: U.S., APO—\$24 one year; Canada and elsewhere—\$28 one year. Single copies \$3.50 in U.S., APO, and Canada. Telephone: 1-800-289-6664. The publisher disclaims all responsibility to return unsolicited matter, and all rights in portions published thereof remain the sole property of Omni Publications International Ltd. Letters sent to Omni or its editors become the property of the magazine.



## FIRST WORD

By David Goldfarb

*By showcasing a few successes in areas such as space development and laser technology, the Soviets had managed to fool the world into believing that Soviet science was effective on many fronts.*

The Soviet government was designed as a giant bureaucratic management machine, and its Academy of Sciences has been the part of that machine that regulates and insures most of the basic research—from physics to genetics to astronomy. Under the current distribution of power, the head of the academy controls the behavior of every employee. No academic freedom is permitted, and the upper echelons reject any initiative or creativity from scientists.

When Soviet leader Mikhail Gorbachev first stirred the sludge waters of Russian life with his policies of reform—glasnost ("openness") and perestroika ("restructuring")—the Academy of Sciences was taken by surprise. Now, two years later, the academy is in a state of turmoil.

For decades conservatives controlled all aspects of Soviet government, including economic policy, trade, and scientific research, and they're reluctant to step aside for reform-minded Gorbachev supporters to take over.

By showcasing a few successes in areas such as space development and laser technology, the Soviet government had managed to fool the rest of the world into believing that Soviet science was effective on many fronts. The truth, however, is that the majority of research laboratories perform on a level comparable to what the United States did in the Forties and Fifties.

Billions of rubles have supported the annual budget for scientific research, but the institutions are clogged with political appointees who know very little about science. For instance, in 1992 the bureaucracy decided to cancel the once decision of the academy that was responsible for the development of computer technology, says Yeghory R. Yelkhov, a current vice-president of the academy. As a result, today there are only 200,000 personal computers in the entire Russian republic. Gorbachev himself admits that Soviet sciences have remained poor for decades.

One of the first incentives used to stir up the academy has forced academy board members older than seventy-five to retire. New guidelines also instruct directors of laboratories to leave their posts at the age of sixty-five. Currently more than half of the academy's 250 members are older than seventy. Without new blood stimulating new ideas, progress will never occur. Before glasnost no one dared talk about the problems that existed within the system out of fear of being severely reprimanded by the bureaucracy. Speaking out against government policies often meant unemployment, harassment, imprisonment, or even banishment.

In 1990, for example, strong political pressure forced many members of the academy to condemn Andrei Sakharov when he criticized the Soviet invasion

of Afghanistan. As a result, Sakharov and his wife, Yelena Bonner, were exiled to Gorki. If academy members had refused to criticize Sakharov, they would have been stripped of their positions.

In the spirit of glasnost, however, Sakharov has been pardoned, invited back to Moscow by Gorbachev, and elected to the governing board of the academy by the same scientists who not long ago had branded him a traitor.

Unfortunately, there are Russians (in the general political arena) branded as dissidents for their views who will never be pardoned and whose work will always be banned in Russia. The writings of Aleksandr Solzhenitsyn are still forbidden works. Glasnost does not mean a future where the Soviet government will allow the same free speech that is a fundamental right in America. I suspect that only a limited amount of democracy will be tolerated.

With Sakharov's involvement, the academy promises to make more progress than in the last two years. One area that particularly needs attention is medicine. Like so many other disciplines in Russia, medicine has lagged far behind the rest of the industrial world. Part of the problem is due to years of neglect. Some hospitals have neither running water nor nursing care. Antibiotics are difficult to obtain, and disposable needles don't exist. If restructuring is a success, then medical professionals such as doctors, nurses, and hospital administrators may be given the power and the funding to improve the standards of medical care in Russia.

What can we expect for the future of the scientific community? I believe that if all goes as planned, Gorbachev's reform strategy can establish a level of science that will allow the Soviet Union to compete with other countries in the next century.

In order to create a productive scientific community for the future, the entire academy should be dismantled and each institution made independent of the central government. Competitive bidding for research grants should then be established in which individual scientists must apply for grants to support their research. A peer review board would decide (by secret ballot) which programs are most promising and award the funds to those scientists.

Despite the innumerable policies that have smothered Russian science for decades, the principles of glasnost and perestroika have managed to cause an upheaval of old ideology and have spawned much debate within the Soviet Academy of Sciences. Open discussion and constructive changes can renew life in the Soviet Union and move the entire nation toward a better future. **DD**

David Goldfarb is a Russian microbiologist, imprisoned in the United States in 1990.

# CONTRIBUTORS

## OMNIBUS



COX



STEWART



KAPLAN



KUNES



CARROLL



STEWART

Remember sitting in science class as the teacher droned on and on about the law of gravity or the theory of relativity? Did you sit there doodling in your notebook, waiting for the bell to ring? If you were lucky, of course, you had a teacher who devised experiments and exercises that demonstrated, say, the laws of thermodynamics. Participation, after all, makes science more interesting, and we've kept that in mind while putting together this month's issue.

Science was definitely not research editor Justine Kaplan's best subject at the University of Vermont. "I just couldn't understand it," she says. "Maybe I just had to live it a little bit to see how it actually works." The chance to experience it unfortunately occurred when she developed Hodgkin's disease and subsequently underwent chemotherapy. As part of Anneke A. Sheikh's "Pictures of Health" (page 104), Kaplan describes how she used mental imagery to reinforce her medical treatment and gain a sense of control over her body.

Author Bernie Siegel (*Love, Medicine and Miracles*) and other physicians have shown clinically (though not in controlled studies) that the health of some people improves when they use imagery exercises. But what about those of us who are currently healthy? Can imaging help us stay that way? Yes, according to Sheikh, chairperson of Marquette University's department of

psychology and one of the foremost experts on mental imaging. He offers imagery exercises he developed for *Omn* and that you can perform at home.

Our nationwide taste test will also get you involved in science. Developed by Yale University psychophysicist Linda Bartoshuk and others, "Oral Exam" (page 45) requires saccharin, sugar, MSG, and other ingredients that are easily and cheaply obtainable.

Take the *Omn* taste test before reading "A Question of Taste" (page 42) by senior editor Murray Cox. With the assistance of Kaplan, Melanie Menagh, Joan Goldberg, and contributing editor Ellen Kunes, Cox reports on taste research and asks if there's a genetic basis for lovers of hot peppers, for example. Find out how scientists might stimulate our taste buds in the twenty-first century. And if you'd like a listing of the country's taste disorder clinics, send a self-addressed, stamped envelope to *Omn* Taste Disorders, 1965 Broadway New York, NY 10023-5965.

After writing his tasteful article, Cox has become more aware of what he eats. "I don't care about the taste signals sent to the cerebral cortex," he says. "I'm chewing them on in the limbic system, to that old, primitive brain and its hedonistic response."

Public participation in science might cause some researchers to be more scrupulous in their work, knowing they can't get away with errors—or even

outright fraud. When a scientist attempts to replicate another's published research results, writer Doug Stewart thought, bad results will be found out and corrected. But, he has learned, that's not always the case. There are thousands of reports published every year. If scientists find a flaw in another researcher's experiments, the mistake is usually ignored because most people pursue whatever works and forget about what doesn't. Biophysicist Walter Stewart, however, is a bloodhound for scientific malfeasance who relentlessly tracks down faulty research. And in this month's interview (page 64), Doug Stewart gets Walter Stewart to discuss his encounters with the unethical.

In "Solace" (page 48) by Gardner Dozois, multinational corporations try to thwart a guilt-ridden man who embraces his own form of punishment. Dozois' "Morning Child" (January 1984) won a Nebula award.

Jonathan Carroll recently won the World Fantasy Award for his story "Friend's Best Man" in his story for *Omn* ("Mr. Fiddlehead," page 68), a woman tells for her best friend's odd companion and finds herself willing to do anything to keep him at her side.

The pictorial "Slide Show" (page 58) features the work of photographers who got involved in science by depicting the microscopic worlds of aspen muscle cells, even mold exploding on an orange peel. **OO**



# TRUE CONFESSIONS

## FORUM

By Pamela Weintraub

I have often dreamed of meeting my brothers on the ramp of a large, disc-shaped ship.

"The beings from space were light-skinned and light-skinned, and there were subtle differences between their biology and our own."

"I have lots of memory gaps from my entire life. I think it's just my way."

The anecdotes above come from more than 2,000 *Omni* readers who filled out a December 1987 questionnaire. Its purpose: to uncover repressed encounters with aliens and UFOs. Developed in conjunction with UFOlogist Budd Hopkins, the questionnaire was designed to help researchers study the mysterious phenomenon of alien abductions, in which otherwise ordinary individuals claim they have been kidnapped by extraterrestrials. According to reports from hundreds of abductees, Hopkins says, victims are often taken aboard a craft, where large-eyed, gray-skinned, four-limbed aliens give them medical exams and confiscate their eggs and sperm. But what do these

claims imply? Are they merely hallucinations, or could they possibly be real? And whether or not the aliens are real, is the "abduction experience" widespread in our culture today?

To help him find out, Hopkins sent about 450 completed questionnaires to the Fund for UFO Research in Mount Ranier, Maryland. Upon receiving the forms, Don Berliner, a member of the fund's executive committee, coded answers on a computer-ready form. Physicist Bruce McCabee, another member of the fund, then entered all the data into his computer. Finally the data were sent to Robert Switek, the fund's "abduction czar," who analyzed the numbers to see what they might mean.

Of the people whose responses were analyzed, Switek explains, 75 percent had seen a UFO; 42 percent had experienced missing time (a period of amnesia during which abductions supposedly occur); and 33 percent reported unexplained wounds or scars. Other results were as follows: 39 percent reported strong but seemingly

unexplained fear of particular places; 31 percent said they'd experienced an odd displacement in which they'd found themselves in a different location than the one they'd been in only seconds before; 41 percent reported recurring dreams about UFOs; and 85 percent said they felt UFOs might well be extraterrestrial in origin. Few fell for a trick question about the word *bondant*: only 5 percent claimed familiarity with the word, which Hopkins had invented.

Perhaps most interesting to the UFO investigators was that many people attached typed or handwritten notes describing the abduction experience itself. How many of those claiming they'd been abducted might be for real?

The book showed some evidence of what UFOlogists characterize as an abduction encounter, Switek says. Four percent of the male respondents and eleven percent of the female respondents gave answers close enough to accepted abduction lore—including oddly placed scars, spatial displacement, or periods of missing time—to qualify as probable abductees.

To his select group, Switek sent a note along with a copy of a personal "primer"—a guide to anyone planning to embark upon the difficult process of investigating abduction experiences of his or her own.

The decision as to whether or not you should investigate the origin of bothersome UFO dreams, memories and experiences is of crucial importance, the primer (written by Budd Hopkins and fellow UFOlogist David Jacobs) warned *Omni* readers. "In fact, it could be the most important decision you will ever make. It represents one of those rare times when a single conscious choice can permanently alter the course of your life. If you learn that you actually have undergone UFO abduction experiences, there will be no turning back. Your relationship to friends and relatives and, indeed, to the world, will all have changed."

The primer also gave *Omni* readers some tips on choosing the right



Abductees: Are they remembering actual experiences or creating sci-fi-type myths?

# E-Z LISTENING

## SPACE

By Anthony R. Curtis

**Y**ou are tweaking the dial of your VHF radio one night, when through the whine and whistle of the static you pick up the following conversation—a radio exchange between two cosmonauts in the Mir space station high overhead and the people back at Soviet mission control (MC). (Obviously, we've translated it for you.)

**MC:** Let us work with Canopus. The star will enter the telescope's field of vision for a long time. It must be kept in a small ring. There is no lens hood on the objective, so try to let less light pass. [Yuri Romanenko worked with a flashlight. Rule out all illumination inside the station. According to calculations, Canopus must now be entering the telescope's field of vision.]  
**Musa Manarov:** We don't see it. Wait. Here it is. [Vladimir records it.]  
**MC:** Musa, don't forget to switch on the gas analyzer at 1010. In the next communication session, I'll try to record the star for a longer time. Did the tape on the tape recorder move?  
**Vladimir Titov:** It was too dark to tell.

Eavesdropping on such space talk is easy and fun. There are two basic frequency ranges used for communicating with spacecraft: shortwave (SW) and very high frequency (VHF). SW signals skip around the globe, reflecting off the ionosphere, which lets you receive them from great distances. VHF transmissions are line of sight—that is, the transmitter and receiver must be in a direct, unobstructed line. You can pick up these signals only while the space object is in view of your listening post as they pass overhead and until they are out of sight over the horizon. Here's what you need to listen.

### GEARING UP

Voice transmissions from space usually are clear FM quality—but you won't be able to hear them on a stereo. You need a programmable high-band police scanner, two-meter amateur radio receiver, or VHF communications

receiver tunable to 143.625 and 145.550 MHz (megahertz).

General coverage receivers tune in frequencies from below 1 MHz up to 30 MHz. You'll want to be able to hear a range from 18,500 MHz to 20,100 MHz. Your receiver should tune in both Morse code (CW) and single-sideband (SSB) voice transmissions. If your radio splits the SSB range in two—upper and lower sidebands (USB and LSB)—you'll find the space channels on USB.

Inexpensive (\$100 to \$300) SW sets are at department stores, ham radio suppliers, Radio Shacks, and other electronics outlets. Expect to pay as much as \$900, however, for a sensitive, selective receiver to tune in SSB and CW. For VHF listening, as with shortwave, expect to pay \$100 to \$900.

### TUNING IN

Because of the Doppler effect, a satellite's shortwave frequency will seem higher approaching your location and lower as it moves away from your listening post. Rather than constantly retuning,

simply adjust the dial to the listed frequency and listen to the pitch of the broadcast become lower as the spacecraft approaches and passes. If your SW receiver controls band width, choose the widest available for best reception.

You may be able to hear using only the pull-up "whip" aerial built into some SW and VHF receivers. If not, try a length of wire (any type will do) outside your home for an antenna. This will make your radio more sensitive to weak signals.

VHF antennas are smaller than those used for shortwave. Place yours outside, high, and in the clear. An aerial on your roof will receive Mir better than one in your house. Remember, for VHF listening, there must be an unobstructed straight-line view with no mountains, tall buildings, or the horizon between your antenna and the satellite.

### LISTENING TO MIR

On VHF, you can hear voice communications between mission control and both cosmonauts and astronauts. The Soviets broadcast conversations primarily at 143.625 MHz. They have stationed a radio ship in the North Atlantic to relay signals from Mir to the Moscow control center. (This increases the likelihood that cosmonauts will transmit while orbiting over North America.) A casual listener might overhear chatter in Russian about supplies, engineering, or a current science experiment.

Recently Mir cosmonauts started using amateur radio gear to chat in English with hams around the globe. During quiet periods they use the call sign U2MIR on 145.550 MHz. Amateur radio buffs on the ground transmit to Mir between 145.5 and 145.8 MHz.

What else to hear? AMSAT, a worldwide club of hams who build satellites, launched OSCAR 13 last June. The digitized data from instruments controlling the satellite sound like the trill of a modem or a Touch-Tone phone dialer. This information—called telemetry—is transmitted on 145.812 MHz.

Some signals are easier to hear than others. While telemetry is loud and



International channels: Tune in the astronaut.

# ORGAN MASTERS

## BODY

By Mark Dowle

**I**n January 23, 2008, and Dr. Nicholas Feduska, dean of American organ transplanting, is assessing his latest patient at the University of California at San Francisco (UCSF) Medical Center. Francine Brown, a twelve-year-old girl, has presented with Budd-Chiari syndrome, a rare liver disease that causes blood clots to form in the three veins that normally carry blood away from the liver. Feduska's preliminary examination indicates that she has but a few hours to live. For Brown to survive, Feduska must find some way to reproduce the 500 different functions a human liver performs each day.

Feduska can offer Francine Brown several options. He may decide to recommend xenotransferring—transplanting an animal organ into a human—or a cell transplant from one of Francine's blood relatives. Although a bionic liver exists, it is far more unwieldy than its counterparts for other organs, so Feduska would choose it only as a temporary measure. Great strides have been made in organogenesis—cloning a living organ from human tissue—but advances with human livers have not kept pace with those for other organs. Finally, while the surgeon is eager to try genetic engineering or nanotechnology techniques he has read about, both remain in a developmental stage. As in 1969, Francine's best option remains a total liver transplant from a compatible human—if the UCSF liver unit can locate a suitable organ.

If Francine Brown were referred to Feduska today, only a transplant could save her life. And before her doctors scheduled surgery, they would have to surmount some mind-boggling logistical problems. Twenty years ago Dr. Thomas E. Starzl performed the first "successful" liver transplant, prolonging the life of an eighteen-month-old girl by just 13 months, but even in 1969 doctors can't preserve livers outside the human body for more than eight hours. Feduska would have to locate a brain-dead human about the same weight and with the same blood type as Francine within

2,000 miles of San Francisco.

After locating a suitable liver, Feduska would have to fly a surgeon out to "harvest" it and bring it back to UCSF for transplanting into Francine. The twelve-year-old would then have to take drugs daily for the rest of her life to suppress her immune system's inclination to attack the foreign tissue. Despite these efforts, Francine would have only a 70 percent chance of surviving longer than one year, and only a 40 percent chance of living five years.

While transplant surgeons have perfected their techniques and improved survival odds for kidney and heart transplants, they haven't found a way to ensure a supply of donor organs. Only 1,160 livers became available for transplant last year, while 50,000 Americans died of liver failure. The organ shortage some physicians call a "crisis of scarcity" became evident in the last decade as transplants became the treatment of choice for a variety of terminal organ diseases. By 1999, a scant four years after its founding, the

Virginia-based United Network for Organ Sharing (UNOS) had registered more than 14,000 Americans on waiting lists for a new heart, kidney, liver, or other organ. Of the country's 226 transplant centers, more than 25,000 healthy young people suffered brain death last year alone. If all of them had left instructions to make their major organs available to those in need of transplants, there would have been enough hearts and livers—and almost enough kidneys—to meet the year's demand.

Only 10 percent—a mere 2,500—gave up their organs. Despite well-funded campaigns for more donations, now laws requiring hospitals to ask the families of dying patients for their loved ones' organs, and statutes in 42 states making brain death legal death, the scarcity persists. The problem, curiously enough, is not an unwillingness among the public to donate organs. Gallup polls show 73 percent of Americans are willing to donate their loved ones' organs, and more than 50 percent are ready to part with their own. The bottleneck is in the medical profession, where those close to brain-dead patients prove reluctant to approach family members to ask for organs. Long before the crisis of scarcity is resolved, therefore, medicine will find better ways to remedy kidney, heart, liver, lung, and pancreas disorders than replacing the damaged organ with a new one.

Scientists expect xenotransferring to become routine by the end of this century. While some of the earliest clinical transplant experiments involved chimpanzee-to-man and baboon-to-man transplants, they were stopped in the late Sixties when a supply of human organs became available. Transplant researchers never stopped trying to find ways to cross the species barrier, and an occasional primate-to-human transplant still takes place. Perhaps the best-known recent example occurred in 1984, when Dr. Leonard Bailey transplanted the heart of a baby baboon into a human infant, Baby Fae, at Loma Linda University Medical Center in



Heart beat: A transplant revolution

# THE IMPORTANCE OF HUGGING

## EXPLORATIONS

By Howard Bloom

**W**hy are some cultures bloodier than others? Why do some societies seem to revel in violence? One possible answer comes from the patriarch of American psychology, William James. Civilized life makes it possible, said James, "for large numbers of people to pass from the cradle to grave without ever having had a pang of genuine fear." Some folks have never endured the sense that at any moment they may lose their lives. James implied that without this terror, the benevolence of civilization feel far less savage and costly.

A second answer may be found in a survey of 48 primitive cultures conducted by James W. Prescott, founder of the National Institute of Child Health and Human Development's Developmental Biology Program. Some of the cultures Prescott studied took great pleasure in "killing, torturing, or mutilating the enemy." Others did not. What was the difference? "Physical affection—touching, holding, and carrying," says Prescott. The societies that hugged

their kids were radically peaceful. The cultures that treated their children coldly produced brutal adults.

Prescott's observations apply to Islamic cultures, which treat their children harshly. They despise open displays of affection. The result: violent adults. For an indirect glimpse of how the principle works, let's meander into the world of the Bedouin.

Bedouin culture is the mother of all Islam. Bedouin are desert wanderers. Until recently they traveled with tent and camel through the Middle East and across northern Africa, driving their flocks of sheep and goats and organizing caravans. The city children of Mecca, Muhammad's birthplace, were given out to Bedouin nurses to be suckled.

The Bedouin made up the bulk of the armies with which Muhammad's followers went out to conquer the world. Fourteenth-century Islamic historian Ibn-Khaldun even proposed a theory of Islamic culture in which the Bedouin became the indispensable keepers of the Muhammadan flame: Islam periodi-

cally grows too effiled, complaisant, and corrupt, said Ibn-Khaldun. But the Bedouin in their austere tents keep the true spirit of Islam alive. When the desert dwellers can no longer take the degeneration of the city sophisticates, they sweep in from the sands, thrust the fatened leaders from their seats of power, and take over. The Bedouin reassert the ascetic values of the Prophet's true word and cleanse society of its rot. But within a few generations the stain of the desert, too, are seduced by the city's luxuries. Gradually they soften and become corrupt.

The old Bedouin ways have by no means disappeared. In 1978 an Amori can graduate student in anthropology went to study "interpersonal relationships" among the Bedouin of the western Egyptian desert. Her name was Lila Abu-Lughod. And she had a unique advantage in penetrating the most intimate aspects of Bedouin life: Abu-Lughod's father was an Arab. In fact, he accompanied his daughter to Egypt and introduced her to the head of the family she would study. Why? Had Abu-Lughod appeared outside the harem's tent's pads in hand, explaining that she was a scientific researcher, her quest would have been over before it began. The Bedouin would have noted that she was a woman alone. That could mean only one of two things. Either her family cared nothing about her, or she had committed a deed so immoral that her family had thrown her out. In either case any man who ran across her could do with her as he wished.

With her father to make the introductions, however, Abu-Lughod was accepted as a good Arab girl. She was taken into the family as a stepdaughter.

Abu-Lughod did not report on the relations between the Bedouin and their children. But she did focus on an aspect of physical affection that is equally revealing: the relationships between Bedouin husbands and wives.

According to Abu-Lughod, Bedouin society cultivates close, warm relationships between men and women. Kissing or



Males protect, not war. Societies that keep one another at arm's length may be prone to violence.

# THE NOT-SO-GREAT LAKES

## EARTH

By Justine Kaplan

**C**rowded beaches once separated Lake Michigan from the sparkling glass-and-steel skyscrapers that line Chicago's waterfront. Luxury condominiums possessed expansive views of lush public parks and yacht-filled harbors. The beaches are gone now, replaced by miles of reeking, mosquito-infested mud flats. Dead fish float at the water's edge where boats were once moored.

This is Chicago in 2088, a scenario recently generated by researchers at the National Oceanic and Atmospheric Administration's (NOAA) Great Lakes Environmental Research Laboratory in Ann Arbor, Michigan. Through computer models, scientists have concluded that the greenhouse effect—the global warming trend caused by a buildup of carbon dioxide and man-made gases in the atmosphere—could, over the next century, not only severely impact water levels in the Great Lakes but also imperil shipping, industrial and commercial operations, and agriculture.

The scientists have determined how things such as watershed runoff, precipitation, lake heat storage, evaporation, and other parameters would be affected by a doubling of carbon dioxide (CO<sub>2</sub>) in the atmosphere—from 350 parts per million in 1988 to possibly 700 parts per million in 2084.

Just two years ago last month, water levels along Lake Michigan's scenic North Shore had risen so high that when a severe winter storm sent ten-foot waves crashing into expensive lakefront apartments, living rooms were submerged in as much as nine feet of water, and flooding forced the shutdown of all 28 miles of the heavily traveled Lake Shore Drive. Last summer those same residents enjoyed views that resembled the coast of Florida, when the lake dropped three feet, uncovering miles of sandy beaches.

Water levels in the Great Lakes Basin, the largest body of fresh water in the world, have been rising and falling since the North American glaciers retreated 18,000 years ago and have proved un-

predictable for scientists. In October 1986 the five lakes (Erie, Michigan; Huron, Ontario; and Superior) and their six quadrillion gallons of water were at their highest levels since record keeping began after the Civil War. Furthermore, levels have risen five feet just since 1965 but have dropped three and a half feet since October 1986.

The rising waters were caused by high precipitation and by a cooling trend, which has decreased evaporation over the past 15 years—a direction forecasters believe is readily reversing. But results from the NOAA study, which was drafted for the Environmental Protection Agency (EPA), should be received with caution, says Thomas E. Croley II, a member of the lake's lake hydrology group, "because the computer model has large uncertainties" and the results "are only possibilities for a future with increased CO<sub>2</sub> content."

According to the report, if the predicted climate change does occur, lowered lake levels could reduce wetland areas, the shallow marshes that serve

as breeding grounds and nursery areas for fish and wildlife. "Salmon" says Frank H. Quinn, head of the lake's lake hydrology group, "would be forced to move to deeper waters," brook trout "would migrate to cooler streams where they would have to compete for habitat" and whitefish populations "would die off because they require an ice cover to keep their eggs alive in winter."

Lowered water levels would also affect commercial fishing because as channels become shallower, extensive dredging would be required to maintain navigation depths of 27 feet from one lake to the next. Bottom sediments in channels and harbors are highly contaminated with toxins, causing the added problems of dredge spoil disposal and poisoning of fish.

Less water would also result in decreased hydropower production used extensively along the lakes and important because it is cleaner and less expensive than fossil fuel or nuclear power alternatives. And while warmer air could mean a longer growing season, soil moisture shortages could curtail agricultural operations. Conditions such as last summer's drought cause an increase in evapotranspiration—when plants grow faster, use more water and deplete soil moisture.

And with even a 3° Celsius warming, commerce that depends on reliable snow cover may collapse, although a reduced ice cover could lengthen the shipping season. But lower lake levels could increase shipping costs and cause traffic backups because during low periods more time has to be made to move the same amount of cargo.

To come up with the computer model, information was compared with EPA data from the Goddard Institute for Space Studies, the Geophysical Fluid Dynamics Laboratory and Oregon State University. Each group had a general model that compared the present climate with future possibilities. While the separate models disagreed on precipitation, wind speed, and humidity, they all agreed on climate warming. **CO**



He'll on Wif Chicago become a dry lake?



# CONTINUUM

## CAN BICYCLES SAVE THE WORLD?

**G**reat Britain isn't as advanced as we are," wrote an American student in 1967. "Probably half the people still ride bicycles." The student was wrong about bicycle ridership in Britain—only about one in four Brits owns a bike, and most ride for leisure, not as alternative transport. But the American student's observation reflects the prevailing attitude in industrial nations that bicycles are somehow second-class vehicles, defeated by the power and convenience of automobiles. A bike, of course, won't win any contests of speed or long-distance commuting, but in an age when the implications of pollution threaten the health of the world, human power is looking better and better.

Bicycle lovers have longed for the day when their machines would regain the respectability lost after senseless campaigns took over the streets. They have procrastinated about the joys of bike riding, the closeness one feels to nature when pedaling through the countryside, the exhilaration one feels at making it up a long hill or skillfully maneuvering through a busy intersection. Biking, they contend, is the one exercise suitable for just about everyone. When you ride a bike, the bike bears the weight of your body, allowing you to exercise your muscles without taxing your joints. Many an individual suffering from arthritis or knee trouble has turned to the bicycle for relief.

Bicycle activists have mobilized in most North American and European cities, lobbying transportation departments for bike lanes and trying to rattle up support from nonbicycle riders. Despite these efforts, however, transportation planners have remained notoriously unsympathetic to the needs of bikers. It is a stance we may all come to regret. Consider these facts published in a recent article by the Worldwatch Institute: a major think tank for environmental conservation.

•Gasoline and diesel fuel emissions are major contributors to acid rain and the depletion of the ozone layer. They are also linked to about 30,000 deaths each year in the United States alone. Interestingly, the worst pollution comes from short car trips, because a cold engine is particularly inefficient, releasing a high percentage of unburned hydrocarbons into the atmosphere. Many of these short trips could easily be done on a bike. If just 10 percent of the Americans who commute to work by car rode their bikes to work or to a train or bus that would take

them to work, more than \$1.3 billion could be cut from the U.S. oil import bill. (Oil imports account for nearly a quarter of the country's \$171 billion trade deficit.)

•Most cities devote at least one-third of their land to parking lots and roads. In the United States this comprises more land than the entire state of Georgia.

"In their enthusiasm for engine power," writes Marcia O. Lowe, author of the Worldwatch article, "transport planners have overlooked the value of human power. With congestion, pollution, and debt threatening both the industrial and developing worlds, the vehicle of the future clearly rides on two wheels."

Although there are more than twice as many bicycles (600 million) as cars in the world, most of them are used for transportation only in countries like China and India. A few industrial nations have embraced the bicycle as a workhorse. The Netherlands, for example, has more than 9,000 miles of bicycle paths, and one city in Japan has actually built a 12-story bicycle parking lot, using cranes to lift and park up to 1,500 bikes at a time. In the United States, however, bicycles are viewed essentially as pleasure machines, to be dusted off during the summer months for Sunday rides in the park.

But what would happen if we began to use bicycles more frequently? If, say, we hopped on a bike to go get a gallon of milk or to visit friends on the other side of town? What if we saved the car for big hauls and long trips? Before this can happen, of course, much must be done to make bicycle riding safe and plausible. Biking may be wonderful exercise and environmentally sound, but few individuals will be willing to pedal down roads where cars and trucks zoom past them with inches to spare, leaving the biker to wobble in a blast of air. Until roads are built with bike lanes or at least wide shoulders, few people are likely to get in the habit of biking. Even with these improvements, it will take a shifting of attitudes to get most people to take up two-wheel travel. People will need to believe that even one less trip in the car adds up to something, that riding a bicycle is, like recycling paper or conserving electricity, an endeavor worth pursuing. Deciding to ride a bike is taking on responsibility. Not everyone will choose to do so, but for everyone who does, the world, well assured, will be at least a little better off. — JANE BOSEVELD



## CONTINUUM



Here in the cockpit, the right logical way to use wings, a new booster is scheduled to be launched from a B-52 bomber (photo right) sometime this coming summer.

### B-52 SATELLITE LAUNCHER

Mention the word bomber and most people automatically think B-52. But now this airplane of infamy (it was originally designed to drop nuclear bombs on the Soviet Union) will carry an entirely different sort of payload—a satellite launcher.

Two private companies—Orbital Sciences Corporation and Hercules, Incorporated—have teamed up to develop the Pegasus air-launched space booster, as they call it. Pegasus will have wings and three stages powerful enough

to carry a 600-pound satellite into a polar orbit. Unlike ordinary boosters, however, Pegasus will be air-launched—that is, released from a plane at 40,000 feet. Once it's dropped, an onboard computer will guide it into orbit. So far, the plane of choice is a B-52 belonging to NASA—in fact, the same B-52 that launched the X-15 rocket plane in the 1950s. Pegasus can also be launched from other transport aircraft, company officials haven't yet officially decided which plane they will use.)

The advantage to the Pegasus system, according

to Scott Webster, a company spokesperson, is that it can carry into orbit twice as much payload as a comparable ground-launched booster, an "unprecedented performance." The first launch is slated for this summer.

—Devara Pina

"How old would you be if you didn't know how old you were?"

—Satchel Paige

"We will worry about the population explosion—but we don't worry about it at the right time."

—Arthur Hays

### KOKO'S KID

Koko want gorilla baby. That's what Koko, the famous gorilla that's been taught to "speak" in sign language, has been saying lately. And Penny Patterson, the California psychologist who has been Koko's trainer and friend for the past 15 years, is trying to oblige the mountain gorilla.

There are big problems, however. First of all, Michael, the gorilla who has been sharing Koko's home at the Gorilla Foundation in Woodside, California, since 1978, has only once shown any signs of sexual interest in his roommate. A more serious obstacle is Koko's age. She is 17, which gives her only a few more years of fertility.

Patterson plans to overcome these problems by artificially inseminating Koko with semen taken from a gorilla by the name of Ken that lives in Tacoma.

—Bill Lawren

### GETTING RID OF MR. WHIPPLE

If the sight and sound of Ed McMahon's promotional babbling or Rose and her quipster pick-up-artist are more than you can bear, take heart. Albert P. Novak may have just the thing for you—a television commercial killer.

The Golden's Bridge, New York, man has come up with a way to electronically block TV commercials on private sets. Using microchips and a microprocessor, his commercial blocker works by digitizing—and assigning a number to—each picture or

frame of a television broadcast. When a picture appears that you want to block out, you push a button and hold it down until the offensive segment is over. Nowak's machine, which is hooked up via a special jack to the television, records the numbers of the frames you wish to escape in its memory banks. When the numbers reappear, the frames are automatically blocked.

Nowak is trying to sell his device to cable companies which now carry free ads when they pick up network programming. Nowak says they could use his device to delete the commercials from a central location. They could also use it to sell a monthly service that would cheaply block offending commercials in accordance with the desires of individual subscribers. —George Nisbete

"Another drink and I'll be under the hood."

—Gordy Parker

## THE ADAPTABLE GENE

The eighteenth-century French biologist Jean Baptiste Lamarck thought that giraffes got their long necks by stretching to reach juicy leaves at the tops of trees; then passed the biological tendency for lengthened necks along to their offspring. This concept called inheritance of acquired characteristics was thoroughly pum-pooed by Darwinists who held that genes mutate only as a result of "accidents" like radiation or internal chemical "mistakes," and not as a response to challenges in the environment. But a group of researchers at Harvard's School of Public Health seems to have found a case in which genes actually do change in response to an environmental stimulus.

John Cairns and his colleagues began with a population of *Escherichia coli* bacteria that could not



Giraffes stick their necks out with a gene study that shows some organisms do change genetically in response to their environment.

metabolize lactose sugar. When the researchers introduced that population to an environment in which lactose was the only sugar, just a small number survived.

Analysis showed that many of the survivors had mutated at random to a subvariety that could metabolize lactose before being introduced to the lactose environment. This is in accordance with conventional theories of genetic change. But statistical analyses then turned up a surprise: A majority of surviving bacteria had mutated to lactose eaters after being introduced to the

lactose environment. In other words, the lactose genes in those bacteria seemed to have changed in a purposeful way in response to environmental challenge.

Cairns is now embarking on experiments designed to reveal the mechanism for these unconventional mutations. In the meantime, he is not yet ready to dust off Lamarck. "We're not talking about giraffes stretching their necks to reach twigs," he says. "We're talking only about how populations of cells may be able to invent useful, novel versions of existing genes." —Bill Linnert



"I want to do it myself, the old-fashioned conventional way!" With Alton, Nowak's other home, bumper, you won't have to.

# CONTINUUM

## SUPERWOOD

With rising costs, labor troubles, and Japanese competition, the past few years have been tough on U.S. Steel. Now there's more bad news: A pair of Canadians have developed a new type of superwood that's cheaper than steel but will do the same job.

The new wood, called Paralam, was "designed" by Derek Barnes and Mark Churchland, who work for the Canadian company MacMillan Bloedel. Paralam is made by peeling a conventional log into sheets, then cutting the sheets into strands two to three meters long and one and a half centimeters wide. The strands are lined up and glued together with resin, then cured by microwave. The secret of Paralam's strength is due in part to the number of strands employed. There are more than 1,000 of them in a 3.5- by 14-inch cross section.

MacMillan Bloedel is already building Paralam



*It's already here!* Wood that is as strong as steel.



The Swiss are doing everything they can think of to survive a nuclear war, including building one of the world's best stocked pharmacies inside the granite mountains of Einsiedeln.

plants in Georgia and in British Columbia in the hopes that the superwood will compete with steel and concrete as a construction material in commercial and residential buildings. The new wood may be especially useful in areas prone to earthquakes. "It has the resilience of wood," Churchland says, "which tolerates seismic activity very well. It is also predictable and consistent, so we can design into a structure what's needed to survive an earthquake."

—Bill Lawson

## APOCALYPSE Rx

More than 6,000 feet above sea level in the granite mountains of Einsiedeln, Switzerland, is one of the world's most unusual—and best protected—pharmacies. Part of a hospital complex, the pharmacy, designed to treat victims of a nuclear war, is Switzerland's swiftest response to the proliferation of nuclear weapons.

The bombed pharmacy has nine rooms for treating hospital staff and local civilians suffering from radi-

ation exposure. Amply stocked with fresh infusion fluids, surgical supplies, diagnostic test materials, and inhalation anesthetics, the facility is also equipped to manufacture certain medications often needed in large volume during an emergency.

The hospital is fortified with heavily reinforced concrete, engineered to endure the shock of first impact from the bombs and also the inevitable toxic fallout in their wake. Even partitions between rooms are lead-lined. Water reserves and

fuel supplies for the diesel engines that provide energy would last long enough to heat or air-condition the complex for two weeks.

Information about underground pharmacies is a military secret in most countries. Several Scandinavian nations and China have built underground hospitals and pharmacies as a safeguard against nuclear attack. What about the country? Russia's Clanshan, a spokesman for the Federal Emergency Management Agency, says, "We are unaware of any such facilities in the United States."

—Robert Brody



Viktor's Day came when he kept Fokan, a Lithuanian whose back muscle was wrapped around his heart to keep it pump blood.

## PIGGYBACK HEART

A few years ago Vytautas Fokan was in bad shape. Because of a weakened heart, the fifty-eight-year-old Lithuanian's legs had swelled so badly that he could barely walk. But today Soviet doctors say Fokan is leading a normal life, walking comfortably on normal legs. What did the trick? An on-going coronary beef-up from an auxiliary "piggyback heart" made out of muscle from Fokan's own back.

Surgeons from the Kaunas Medical Institute in Lithuania attached an electronic stimulator to a muscle in Fokan's back, then, over a period of about a month, gave it electronic stimulation at increasingly higher frequencies. The treatment changed the structure of the back muscle so that it closely resembled the muscle of the heart, and it also caused the muscle to contract in a

regular, heartlike rhythm. In a dramatic operation, surgeons then folded the back muscle to form a bag, attached it to Fokan's own blood vessels and nerves, and wrapped the muscle around his heart.

Group leader Yungis Brodus thinks that because the piggyback heart is made from the patient's own tissue, it may ultimately prove a better treatment for some forms of heart disease than transplants or artificial hearts, which require strong drugs to suppress the immune system's natural tendency to reject all foreign tissue.

Apparently the idea is being taken seriously. Similar research is already under way in France, Britain, and the United States. —Bill Lawren

"The world is made of people who never quite get onto the first team and who just mess the press at the flower show."  
—Jacob Bronowski

## COURT CALLS

It's match point at the U.S. Open 1991. John McEnroe hits his famous backhand serve and dances onto the court as the ball flies across the net and smashes very near the centerline. Looks like an ace, and McEnroe is ready to celebrate. But an electronic voice issues a loud, "Out!" McEnroe stops, turns, looks at the umpire, and smiles. With a meek shrug he trudges back to the service line for his second serve.

Say what? The Prince of Pipes taking a close call like a lamb? Must be deep therapy or hypnosis, or megahertzphonics. In fact, it's Accu-Call, a new electronic line-calling system devised by Nova Scotia inventor John van Aukon.

Basically, Accu-Call consists of a mesh laid with electronic circuits that's laid out over the lines on a tennis court, as well as along the top

of the net. A special ball has conductive fibers in its covering, and when it lands on or inside a critical circuit along the outside of the line, it sends a signal to a computer, which in turn whispers "in" through an earphone worn by the umpire. If the ball's outside the line, the signal activates an electronic voice that yells "Out!" for all to hear.

Accu-Call works on any playing surface except grass (the lines are sprayed on grass surfaces), so it can't be used at Wimbledon, but the system has already been installed permanently at the Ontario Racquet Club in suburban Toronto, and it has been tested by such top tennis pros as Mats Wilander, Andre Agassi, Jimmy Connors, and McEnroe. Mac's critique? "The only thing wrong with it," he reportedly said, "is that it came ten years too late." —Bill Lawren

Show me a hero and I will write you a tragedy."  
—F. Scott Fitzgerald



An electronic line-calling system may silence even McEnroe.



## CONTINUUM



It's a long way from Dante's 14th-century Hell, especially if you're a Dante scholar. But a new virtual database will make getting there a whole lot easier.

### WHY WAS BOETHIUS LEFT IN HELL?

In Dante Alighieri's classic *The Divine Comedy*, the Roman poet Virgil takes the author on a guided tour through Hell and Purgatory. But until recently, Virgil seemed to have left Dante scholars behind, stranded in an inferno of 15,000 lines, more than 500 characters, and 200 published interpretations of the poem.

To solve this problem Dartmouth College recently unveiled the Dante scholar's

salvation: a computer database called the Dante Project devoted exclusively to the poem and its Italian, Latin, and English-language interpretations. Anyone with a computer and modem can use the database, which is located on the school's Hanover, New Hampshire, campus. Dante scholar and project founder Robert Hollander describes his optimism: "Instead of searching through hundreds of references to find how the character Boethius relates to the concept of fortune, for

example, you just type in 'Fortune-Boethius' and the computer displays the references you need. It can also give you several interpretations of any line or verse in the poem."

"We have 23 commentators in the database now," says database manager Jonathan Altman. "After we finish entering the others, we expect to offer the data on compact disk."

In case you're wondering, Dante encountered seven popes on his journey through Hell. —Brent Buttsworth

### YOU SAY POTATO, I SAY POTATO ICE CREAM

In Idaho Falls, Idaho, no one ever tires of dreaming up new potato products, which helps to explain the latest potato delicacy from Reed's Dairy Inc.—potato ice cream.

Made from dehydrated potato flakes, milk, and cream, the dessert, according to company president Alan Reed, began as an off-the-wall idea of my father's. But it's selling well with health-conscious customers who want fewer calories [about half those of ordinary ice cream] and no sugar. Reed says his frozen dessert, which comes in 15 flavors, is as smooth as any other ice cream, and "you don't taste the potatoes."

Reed won't reveal precisely how the new ice cream is made, except to say that the potatoes are cooked, dried, and flaked by a process that converts most of their starch into a natural sweetener. —George Nobile



Here's the scoop: At Reed's Dairy, you get a lot.

## GURGLE, GURGLE, THINK

In the movie *Ferris Bueller's Day Off*, the ingenious hero convinces school authorities that he's too ill to go to class by programming his digital sampler to cough realistically into the telephone. Now an equally ingenious grad student, William Gaver of the University of California at San Diego, has used a similar technique to program sound effects into his Macintosh computer, sounds that match the chore that the machine is performing.

"We get lots of information about the world from sound," Gaver explains. "I wanted to impart that information to a computer interface." Thus when Gaver's Mac is copying a file, for example, the computer emits a sound like water pouring into a glass: the pitch of the pouring sound rising as the copying proceeds. If he's making a file for deletion, he hears the sound of a heavy object

dropping into a wastebasket.

Gaver developed his *SoundFinder* program while working as a summer intern for Apple, where he's now a part-time engineer. He says that Apple has shown some interest in releasing the program commercially, though no definite decision has been made.

Whether *SoundFinder* ever sees the light of day, Gaver thinks that the system presents obvious advantages for computer users who are visually impaired. And he says "It makes the computer world more real." —Bill Lawton

## BAD NEWS FOR SOUTHPAWS

Lefties have known it all along. It's tough living in a right-handed world. And now there's a study to prove it. Stanley Coran, a psychologist at the University of British Columbia (UBC) and Dan Halpern of the University of California, studied the medical records of approximately 2,800 deceased major-



Could Babe Ruth's early death at age fifty-three have had anything to do with his being left-handed? Two scientists think it might.

league baseball players and found that left-handed players had more serious accidents and died earlier than right-handed players.

"What we found," says Coran, "was that after the age of thirty-five, left-handed people were about two percent more likely to die than right-handed people of the same age. And in samples of eighty-five- to ninety-year-olds, it's almost impossible to find a left-handed person."

In addition, the researchers found that left-handers are two to three times more likely than righties to suffer from autoimmune diseases, allergies, sleep disorders, and asthma. Coran suggests that babies who suffer from breathing difficulty, prema-

ture birth, prolonged labor, and low birth weight are twice as likely to be southpaws, and that neurological damage at birth may have switched them from being righties to lefties.

A study of UBC students revealed that 44 percent of lefties had suffered one or more accidents that required medical attention in the last two years, compared with 36 percent of righties. Here Coran sees cultural factors coming into play: traffic patterns, shop machinery, and many other areas of life are set up for right-handers. "If left-handers have more accidents," Coran says, "chances are some will be fatal and others will cause serious health problems."

—Paul Koonan



What is the sound of one file being saved? Use computer whiz William Gaver's new Macintosh program and find out.

# CONTINUUM



To the left: Bill Loeffel, president of the Los Angeles Golf Association, and to the right: Neil Lawton, a professional golfer, on a golf course.

## CAN GOLF COURSES KEEP YOU COOL?

As much of America sweated through one of the hottest summers on record last year, the newspapers were full of alarm-sounding articles about a buildup of carbon dioxide in the atmosphere and the consequent possibility of a catastrophic global warming trend. Well, geographers Robert Balling and Nina Loh of Arizona State University have discovered that in at least one spot the trend is not warmer but cooler, and that the cooler air is being

generated by an unexpected "engine": a burgeoning series of local golf courses.

Balling and Loh looked at several decades of temperature records for the desert community of Palm Springs, California. Since the early Seventies, they discovered the city, unlike the towns surrounding it, has cooled down by an average of more than three degrees Fahrenheit. More than coincidentally, that same period saw a huge boom in the construction of new golf courses—at least 60 of them, comprising in excess of 8,000 acres. This is significant, Balling explains,

because when the sun's rays hit irrigated golf courses, part of their energy is used up evaporating water from the grass and soil, leaving substantially less energy to create heat.

For those communities that might be thinking about putting the golf course effect to work for them, Balling has a couple of cautions. First of all, he says, the phenomenon operates only in areas where there is "a stark contrast between dry desert and golf course grasslands. It wouldn't work in Tucson or New York, where there is high humidity." And he reminds us that while golf courses may cool things down a bit, they also increase humidity "so the amount of discomfort," he says, "is just about the same."

—Bill Lawton

"Most of the time I don't have much fun. The rest of the time I don't have any fun at all."

—Woody Allen

## HEADS-UP DASHBOARD

Ever had a close call on the highway? Because you momentarily took your eyes off the road to look at the speedometer or fuel gauge? Well, the folks at Hughes Aircraft in Los Angeles have come up with a remedy for that problem: a "heads-up" system that actually projects an image of a portion of the dashboard on the windshield in front of you.

The device consists of a simple projector that throws an image of dashboard readouts onto a standard

glass windshield. The result, says Hughes marketing manager Peter Lefort, is "an optical illusion that the readouts are out in front of the car, on the road itself. The heads-up dash debuted in 60 Oldsmobiles at last year's Indianapolis 500 and is standard equipment on tens of thousands of this year's Oldies and Pontacs.

Even at that, the new heads-up dashboard is just a beginning. The next generation, which could be available as early as next year, will employ dashboard readouts in the form of a hologram contained in a sheet of special transparent material that will be embedded in the windshield. The hologram can be illuminated by a projector or by light piped to it by optical fibers. Once lit, the holographic readouts will appear to hover in space in front of the driver.

But won't these high-tech displays tend to divert drivers? "I haven't found it distracting," responds Lefort, who has tested the heads-up dash himself. "After the first few minutes you find yourself watching the road and not concentrating on the display. It's like playing music," he concludes. "You watch the street music and look at the conductor out of the corner of your eye." —Bill Lawton

"Remember when atmospheric contaminants were occasionally called standstuffs?"

—Lane Olinghouse

"Some things have to be believed to be seen."

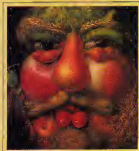
—Ralph Hodgson



ARTICLE

## A QUESTION OF TASTE

BY MURRAY COX



As soon as an edible body has been put into the mouth, it is seized upon—gases, moisture, and all—without possibility of retreat. Lips stop whatever might try to escape; the teeth bite and break it; saliva drenches it; the tongue mashes and

PAINTING BY GIUSEPPE ARCIMBOLDO

chunks it, a breathlike sucking pushes it toward the gullet, the tongue lifts up to make it slide and slip. The sense of smell appreciates it as it passes the nasal channel and it is pulled down into the stomach to be submitted to sundry lesser transformations without. In this whole metamorphosis, a single atom or drop or particle having been missed by the power of appreciation of the taste sense."

This passage, written by ecruise Antoinette Brillat-Savarin in 1826, evokes a simple, almost involuntarily. But until we're stopped, most of us probably don't savor generosity at least, the "mere appreciation" of taste. Not the way Brillat-Savarin did or the way professor Linda Bartoshuk does today. "In the realm of the senses," says the Yale psychophysicist and one of the leading taste researchers in the country, "taste is queen." No other sensory system is fully developed at birth, except pain. A newborn baby likes sweets and dislikes bitter substances immediately, without prior experience. "That's what we call hardwired in the brain," she adds. "Basic elements of taste are built in, not learned."

"Taste is extremely robust," says Bartoshuk. Kill off the nerves on one side of your tongue, even anesthetize one of the three taste nerves that service the front of the tongue, the back of the tongue and the receptors on the palate and throat, and taste is not diminished. "The system is wired up so that it's almost impossible to tell," she says. "That's got to tell you evolution is treating taste as an extremely important sense."

Evolution also favored taste with another component: the delectable element of pleasure—its hedonic quality—as the scientists would say. A creamy chocolate rum candy excites our taste buds and stimulates the far reaches of our primitive brain, programmed to seek out the sweet stuff in nature. "Many things that give you energy contain sugar—and this is as true for bacteria as it is for men," says Lloyd Beidler, professor of biological sciences at Florida State University in Tallahassee. "If you put a sucrose solution in a petri dish, even some of the most primitive bacteria will head straight for it."

Gastronomic pleasures have driven men and nations to drastic measures to supply themselves with new tastes, fighting wars over trade routes to provide exotics, sugars, and salt for the family table. The original purpose of Columbus' trip was to find a quick and easy route to the Far East, a treasure trove of new taste sensations. In a sense, the discovery of the New World was a taste accident triggered by the insatiable demands of the European palate.

To this day sophisticated consumers will go to great extremes to enjoy the fleeting delights of taste, relishing chocolate truffles from Belgium, a cabernet sauvignon from Bordeaux, lewis fruit from Australia. And the craving for new tastes

and flavors is nearly insatiable. We long, says one flavorist, for designer foods—flavor substitutes that mimic the real thing, a salt substitute that's as salty as salt and an artificial sweetener that's sweeter than honey—without the potential health risks of saccharin and cyclamate.

Thousands of tasters—chemists whose tongues are their livelihoods—work to satiate our gustatory wants, sipping full-bodied liquids or licking sugar-coated confections. As the year 2000 rolls in, we'll even opt to check our tongues with "electro taste." Fruits, meats, and vegetables, electrically charged with either positive or negative electrodes, will erupt in our mouths with flavor. While the flavorists play with technology to deftly taste, neurophysiologists are determining how the brain codes, or interprets and responds to, taste. With the help of biophysicists, taste researchers hope to unravel the relationship of taste to the central nervous system. Furthermore,

---

◀ Taste is extremely robust. The system is wired up so that it is virtually impossible to kill. That has got to tell you that evolution is treating taste as a very important sense. ▶

---

scientists are trying to determine the links between disease and taste. (Before reading on, turn to page 45 and take the Omni Taste Test.)

Researchers do know that contrary to popular belief, taste and smell are actually separate physiological systems, working in concert with each other. Those of us who aren't scientists often confuse taste, smell, and touch, lumping the three together the way we mix peas, mashed potatoes, and gravy. What the layperson describes as taste is actually a tangled synthesis of a number of sensations: odor, taste, touch, texture, sight, chemical irritation (the burn of chili pepper, the cool of mint), and temperature. Taste, however, is quite simple. We differentiate four (and only four) taste qualities: sweet, salty, sour, and bitter. Flavor, say the experts, is the big category, the "gestalt" of, say, eating corned beef. It includes not only the taste but also the smell, texture, and temperature of any food we pop into our mouths. According to Bartoshuk, smell helps us label things—"That's garlicky"—and allows us to identify foods.

From the vantage point of evolution,

survival of the species depends in part on taste and smell. David V. Smith, professor of olfactory physiology at the University of Cincinnati, observes that for many species smell is essential for reproduction, particularly in locating a mate. Taste, however, is vital for personal health, allowing us to distinguish between chicken soup and strychnine. "Smell is more important to the preservation of the species, and taste, the preservation of the individual," says Smith. Bartoshuk believes that taste—from an evolutionary viewpoint—was meant to deal with acute emergencies. Many poisonous plants taste bitter, Bartoshuk claims, and that bitterness became nature's alarm system for primitive man. Early man's innate desire for sweets signaled the body to eat fruits containing energy-producing sugars; salt cravings informed the body of a sodium deficiency. Deprive the body of sodium, and it will crave salt.

The 1940 tale of a three-and-a-half-year-old boy's marital craving for salt is one of the most moving accounts in the medical literature. At one, he sucked salt off crackers and bacon. At eighteen months he discovered the saltshaker and dipped all his foods in salt. He'd even eat salt straight if given a chance. The boy was admitted to a hospital for observation, deprived of his high-salt diet, and died suddenly on his seventh day of hospitalization. An autopsy showed that the child had suffered from adrenal insufficiency. His salt craving had kept him alive.

When it comes to understanding taste, science has not served us as well as our instincts have. Remember the tongue map from junior high-school science class, with its salty, sour, sweet, and bitter sections all color-coded? Specific areas of the tongue reacted, we learned, to certain tastes. "The tongue map is wrong," says Bartoshuk, "but it's still in high-school texts, even in medical books. High-school students still are assigned experiments based on the infamous map." Scientists have known for 20 years that we taste all four sensations on the whole tongue, but the tongue map has never been revised.

Until the Thirties no one really bothered to study the intricate workings of taste. Carl Plattmann, emeritus professor at Rockefeller University and one of the seminal figures in modern taste research, recalls the haphazard way twentieth-century taste studies began. "I was an undergraduate at Brown University in the Thirties, and I wanted to study abnormal psychology. One day Leonard Carmichael, head of the department, said, 'Why don't you study taste instead?' No one knows a thing about it. What you find will add to our understanding."

After discovering that taste buds are "broadly tuned" to discern not just one but several tastes, Plattmann and his students went on to investigate the pathways to the cortex and hypothalamus. "It

# ORAL EXAM: THE OMNI TASTE TEST



The ability to taste PTC (phenylthiocarbamide) is a simple genetic trait. About two thirds of Americans are "tasters." The rest, "nontasters," have apparently lost bitter receptor sites, differing from tasters genetically and in the way they taste foods. In certain parts of the world, there is a selective advantage to being a taster or a nontaster. For example, there are certain plants in South America that, when eaten, can cause goiter, a thyroid condition. The plants have a strong bitter compound that is avoided by tasters. Therefore, in areas where the goiter-inducing plants exist, there are more tasters. But farther north in Mexico and Central America's Yucatán Peninsula, it is more advantageous to be a nontaster. Pellagra, a vitamin deficiency disease, can be treated by drinking coffee, which is not as bitter to nontasters, who are more numerous. Scientists at the Pierce Foundation and Yale University are now trying to determine why. To help researchers, and to test your own sense of taste, we are asking Omni readers to take our taste test and fill out this questionnaire, developed with the help of psychologists Linda Bartoshuk and Judith Rodin of Yale, Jeremy Wells at MIT, Richard Doty and Paul Rizen at the University of Pennsylvania, and Harvey Weingarten at Canada's McMaster University. (And please do so before you read our feature "A Question of Taste" on page 42.) Results will appear in a future issue.

A) In one cup of water, mix one packet of aspartame (NutraSweet).

B) In a separate cup of water, mix one packet of saccharin.

C) In a third cup of water, mix two teaspoons of sugar.

D) Rinse your mouth with water, spit it out, and taste each solution. (Rinse between tastings.)



E) On a nine-point scale, rate the sweetness and bitterness of each solution, with 1 being very weak and 9 being very strong.

F) Answer questions 1 through 6 on this page.

G) In one cup of water, mix one-quarter teaspoon of salt.

H) In another cup of water, mix one and one-quarter teaspoons of MSG.

I) In a third cup of water, mix one-half teaspoon of a salt substitute such as potassium chloride.

J) Rinse your mouth with water and rate these solutions on a similar scale for saltiness and bitterness in questions 7 through 12.

K) Complete the rest of the questionnaire and send the pages to: Omni-Tests, 1905 Broadway, New York, NY 10023-3885. We'll report the results in an upcoming issue.

1. On a scale of 1 to 9, rate the sweetness of the aspartame solution, with 9 being the sweetest.

1 2 3 4 5 6 7 8 9

2. Rate the bitterness, with 9 being the most bitter.

1 2 3 4 5 6 7 8 9

3. Rate the sweetness of the saccharin.

1 2 3 4 5 6 7 8 9



4. Rate the bitterness.

1 2 3 4 5 6 7 8 9

5. Rate the sweetness of the sugar.

1 2 3 4 5 6 7 8 9

6. Rate the bitterness.

1 2 3 4 5 6 7 8 9

7. Rate the saltiness of the salt solution, with 9 being the most salty.

1 2 3 4 5 6 7 8 9

8. Rate the bitterness.

1 2 3 4 5 6 7 8 9

9. Rate the saltiness of the MSG.

1 2 3 4 5 6 7 8 9

10. Rate the bitterness.

1 2 3 4 5 6 7 8 9

11. Rate the saltiness of the potassium chloride (salt substitute).

1 2 3 4 5 6 7 8 9

12. Rate the bitterness.

1 2 3 4 5 6 7 8 9

13. Eat an artichoke heart in any form (raw, cooked, baked, etc.) and then sip water at room temperature. Describe the quality of the taste you get:

- a. sweet      b. salty  
c. sour      d. bitter

14. Measure the intensity of the taste on a scale of 1 to 9, with 9 being the strongest.

1 2 3 4 5 6 7 8 9

15. Taste black coffee and rate its bitterness on a scale of 1 to 9.

1 2 3 4 5 6 7 8 9

How did you prepare it? \_\_\_\_\_

Questions continue on next page.

16. Have you ever suffered or do you now suffer from (check as many of the following as apply)

- ☐ diabetes
- ☐ hypertension
- ☐ Arteriosclerosis
- ☐ anemia
- ☐ GI disorders
- ☐ Gout's disease
- ☐ dandruff
- ☐ lactose intolerance
- ☐ psoriasis
- ☐ PMS
- ☐ small disorders
- ☐ tooth decay/dentures
- ☐ bulimia
- ☐ anorexia
- ☐ nicotine
- ☐ drug addiction

17. Do you follow a special diet?  
a. yes b. no

18. If yes, what kind?  
a. vegetarian b. kosher  
c. low salt d. low cholesterol  
e. other \_\_\_\_\_

19. How would you characterize your day-to-day diet?  
a. monotonous b. varied

20. Do you have any food allergies?  
a. yes b. no

21. If yes, to what? \_\_\_\_\_

22. If yes, do you ever crave those foods you are sensitive to?  
a. yes b. no

23. Which foods do you have over-sensitivities to, if any? \_\_\_\_\_

24. Did you ever have reactions that you no longer have?  
If yes, to what? \_\_\_\_\_

25. Describe the incident that caused you to experience the hypersensitivity. \_\_\_\_\_

26. How did you react when it happened? \_\_\_\_\_

27. Did a single event lead you to be hypersensitive to a particular food?  
a. yes b. no

28. If yes, what was it? \_\_\_\_\_

29. What foods do you experience the strongest cravings for? List the top five, starting with the strongest.

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_

30. What kinds of tastes do you most often crave?

- a. sweet b. salty
- c. sour d. bitter

31. Do you add salt to your food before tasting it?

- a. yes b. no

32. What kinds of foods do you crave most?

- a. fats b. carbohydrates
- c. proteins

33. Check any of the following foods you consider bitter.

- ☐ Swiss cheese
- ☐ cottage cheese
- ☐ broccoli
- ☐ cabbage
- ☐ Brussels sprouts

34. Do you ever crave things not commonly considered food, such as clay, dirt, paper, plaster, or ice?

- a. yes b. no

35. If yes, which? \_\_\_\_\_

36. Do you tend to eat the same foods your family does?

- a. yes b. no

37. How do you usually respond to new foods?

38. What do you want from the food you eat? Check the following in terms of importance, with 1 being the most important and 5 being the least.

- ☐ hunger satisfied
- ☐ taste
- ☐ smell
- ☐ emotional comfort
- ☐ temperature
- ☐ texture

39. Compared with your friends or your co-workers, you feel that your sense of taste is

- a. less sensitive
- b. equally sensitive
- c. more sensitive

40. Do you have a favorite flavor?

- a. yes b. no

If yes, what is it? \_\_\_\_\_

41. You find most foods  
a. pleasant b. unpleasant  
c. neither

42. Have you ever taken hallucinogenic or addictive drugs?  
a. yes b. no

43. If yes, did any of these drugs alter your ability to taste?

- a. yes b. no

44. Do you taste things better at different times of the day?

- a. yes b. no

If yes, which time of day?

- a. morning b. afternoon
- c. evening

45. Do you currently smoke?

- a. yes b. no

46. If yes, what do you smoke (and how much)? \_\_\_\_\_

47. Have you ever smoked?

- a. yes b. no

48. If yes, did your ability to taste change after you stopped smoking?

- a. yes b. no

49. What is the worst thing you have ever tasted? \_\_\_\_\_

50. What is the robot you've ever paid for a particular food or beverage, and what was it? \_\_\_\_\_

#### PERSONAL DATA

Female ☐ Male ☐ Age \_\_\_\_\_

Height \_\_\_\_\_ Weight \_\_\_\_\_

Occupation \_\_\_\_\_

If female, are you pregnant?

Ethnic or cultural background

black white Asian

Hispanic other \_\_\_\_\_

City of residence \_\_\_\_\_

Income less than \$10,000

\$10,000 to \$24,999

\$25,000 to \$49,999

\$50,000 and up

A taste test designed for individuals or the classroom that tests FPG genetic traits in humans can be obtained by sending a check or money order for \$8.95 to Human Genetics, 2700 York Road, Burlington, NC 27215, or call toll free 1-800-324-0551. Readers who send away for the test should return the completed questionnaire with name and address to Oliver-Toste, 1995 Broadway, New York, NY 10023-5993.



## LISTENING TO THIS ON ANOTHER CD PLAYER COULD BE THE REAL TRAGEDY.

**Technics SL-P999 — with 20-bit, 4 DAC, 8 times oversampling.**

When you listen to *Madame Butterfly* on our new CD player, you'll not only be listening to a great tragedy. You could be avoiding one.

The Technics SL-P999 has a 20-bit digital processing system that can help reproduce sound with greater accuracy than most conventional systems. And if that's not enough, with 4 DAC's and 8x oversampling it all but eliminates things like crossover distortion. All of which helps reproduce sound so beautifully, you

would need a front row ticket to get any closer to the music.

Of course, our new CD player has features like an optical digital output, 32-key random access programming and a special interactive editing system. But as impressive as all this sounds on paper, it's not nearly as impressive as it sounds in person. Just ask the Technics dealer in your area to play an aria from *Madame Butterfly*.

If you really enjoy a great tragedy, come fully prepared. Bring plenty of tissues.

**Technics**  
The science of sound



Technics 20 bit CD player



FICTION

# SOLACE

BY GARDNER  
DOZOIS

**K**entlemen took a  
cassidin to Denver,  
a feeder line to  
Pueblo, then trans-  
ferred to a cloth-  
ing local bus to Santa Fe.  
The bus was full of  
displaced Anglos who  
preferred the life of  
a migrant field-worker to

PAINTING BY  
BRAD HOLLAND

the Oklahoma refugee camps, a few Cambodians, a few Indians, and a number of the poorer Hispanics, mostly mestizos—unemployed who had hoped that the Liberation would mean the fulfillment of all their dreams but who had instead merely found themselves working for rich Mexican landladies rather than for millionaire Anglos. Most of the passengers had been across the border to blow their work vouchers in Durango or Canon City and were now on their way back into Aztlan for another week's picking. They slouched sullenly in their seats, some passed out from drink or God Food and steady snoring, many wrapped in ponchos or old Army blankets against the increasing chill of evening. They ignored Kleisterman, even though, in spite of his carefully anonymous clothes, he was clearly no field hand—and Kleisterman pretended it that way.

The bus was spavined and old; the seats broken in, the sticky vinyl upholstery smelling of sweat and smoke and ancient piss. A Greyhound logo had been chipped off the side and replaced by *VAJANGO AZTLAN*. The bus rattled through the cold pine night with exquisite slowness, lurching and lurching; the transmission groaning and knocking every time the driver shifted gears. The heat didn't work, or the interior lights, but Kleisterman sat stoically, not moving, as one by one the blaring radios faded and the

crying babies quieted until Kleisterman alone was awake in the chill darkness, his eyes gleaming in the shadows, shifting restlessly never closing. At some point they passed the Frontera Libertad, the Liberty Line, and its largely symbolic chain-link fence and stopped at a checkpoint. A cyborg looked in his great blank oval face glowing with sullen heat, like a dull nubus moon; he peered eyeslessly at them for a thoughtful moment, then waved them on.

South of the border, in what had once been Colorado, they began to crawl up the long steep approach to the Raton Pass, the bus sputtering and moaning like a soul in torment. Kleisterman was being washed by waves of exhaustion now, but in spite of them he slept poorly, fitfully, as he always did. It seemed as if every time his head dropped, his eyes closed, faces would spring to vivid life behind his eyelids, faces he did not need to encounter or consider, and his head would jerk up again, and his eyes would fly open, like suddenly released window shades. As always, he was afraid to dream—which only increased the bitter irony of his present mission. So he pinched himself cruelly to stay awake as the old bus inched painfully up and over the high mountain pass and into the Colorado Plateau.

At Raton the bus stopped to take on more methane. The town was dark and seemingly deserted, the only light a dim

bulb in the window of a ramshackle building that was being used as a fuel dump. Kleisterman stepped out of the bus and walked away from the circle of light to piss. It was very cold, and the inverted black bowl of sky overhead blazed with a million icy stars, more than Kleisterman had ever seen at once before. There was no sound except for a distant muffled roar of cold wind through the trees on the surrounding hillsides. He stood, staring in the Milky Way's starlight. As he watched, one of the stars overhead suddenly noiselessly flared into diamond brilliance, a dozen times as bright as it had been, and then faded, gathering, and was gone. Kleisterman knew that somewhere out there a killer satellite had found its prey, out there where the multinationals and the great conglomerates fought their silent and undeclared war, with weapons more obvious than those they usually allowed themselves to use on Earth. The wind shifted, blowing through the high valley now, cutting him to the bone with chill and bringing with it the howling of wolves, a distant, faral howling that put the hair up along his spine in spite of himself. They were only the distant cousins of dogs, after all; just dogs, talking to one another on the wind. Still, the hairs stayed up.

Feet crunching gravel, Kleisterman went back to the bus and climbed aboard, found his iron-hard seat again in the darkness. In spite of the truly bitter cold, the air inside the bus was thick and stale, heavy with sleep, exhaled breath, applied wine, sweat, the smell of cigarette smoke and marijuana and garlic. He huddled in his overcoat, shivering, and wondered whose satellite or station had just been lost and if any of his old colleagues had had anything to do with the planning or execution of the strike. Possibly. Probably, even. Once again he had to fight sleep, in spite of the cold. Once he turned his head and looked out of the window and Melissa was there in the burnished silver moonlight, standing alongside the bus, staring up at him, and he knew that he had failed to stay awake and jerked himself up out of sleep and into the close stuffy darkness of the bus once again. The other passengers tossed and murmured and farted. The moon had come out, a fat pale moon wading through a boiling river of smoky clouds, but Melissa was gone. Had not been there. Would not ever be anywhere anymore. Kleisterman found himself nodding again and pressed his face against the cold window glass, fighting it off. He would not dream. Not now. Not yet.

The bus sat unmoving in the silent town for an hour, two hours, three, for no reason Kleisterman could ascertain, and then the driver appeared again, from who knows where, climbed aboard muttering and swearing, slammed the door, twisted the engine into noisy, coughing life.

They rattled on through the night, winding down slowly out of the mountain





**ABSOLUT**

here, stopping here and there at small villages and communities to discharge passengers, the hung-over head henchmen coming waddling from the bus and disappearing like spirits into the darkness. Klesterman sleeping in split-second doses. He woke from one such dose to see that the window had turned red, red as though washed with new blood, and thought that he still slept, but it was the dawn, coming up from the broken badlands to the east, and they went down through the blood-red dawn to Santa Fe.

Klesterman climbed stiffly down from the bus at Santa Fe. The sun had not yet warmed the air. It was still cold. The streets were filled with watery fog light, through which half-perceived figures moved with the stiff precision of early risers on a brisk morning. Klesterman found a shabby cab a block away from the bus station, ordered huevos rancheros and a bowl of green chili was served the food by a seer-like Anglo woman wearing a faded Grateful Dead T-shirt. Unusually for Santa Fe, the food was tentative tasting of meat, greens and salsas. Klesterman spooned it up anyway mechanically, taking it mechanically whole, as if: How long had it been since he'd really enjoyed a meal? All food seemed to taste dreadful to him these days. How long since he'd really had a full night's sleep? His hand shook as he spooned beef sugar into his later chaotic coffee. He'd always been a tall, thin, bony man, but the reflection he made of the table window showed him was gaunt, emaciated, almost cadaverous. Had lost a lot of weight. This could not go on. Grimly he checked through his preparations once again. This time he'd been very careful about being insured. He'd made his contacts with exquisite care. There should be no trouble.

He left the cab. The light had become bluer, the shadows oil-black and sharp, the sky clear and cerulean. The sun was not yet high, but the streets were already full of people. Mexican soldiers were everywhere, of course, in their camouflaged uniforms, so absurdly ornate that it was difficult to tell a private from a general. Touring Sweden relatives, each with the scarlet King's Mark tattoo on the right cheek, indicating that they were above most local law. Gangs of skinny Cambodian kids on skateboards whizzed by, threading their way expertly through the crowds, sailing to one another in machine-gun-burst bursts of Spanish. A fat-faced Indian leaned from a storefront and swore at them in Vietnamese, shaking his fist. Two chimera displayed for Klesterman, infatigable their hoards and making playful males, then sliding aside as he continued to walk toward them unperturbed. This was the kind of unregulated, wide-open town where he could find what he needed, out on the fringes, in the interstices of the worldwide network, where things would not be watched so

closely as elsewhere—no longer part of the United States but not really well integrated into Old Mexico either, with a limited official presence of the multinationalists but plenty of back-market money circulating anyway.

He crossed the plaza, with its ancient Palace of the Governors, which had seen first Spanish, then Anglo, now Mexican conquerors come and go. There were stark gray fundasheds looming over the peaks of the Sangre de Cristo mountains, which in turn loomed over the town. There was a New Town being built to the southeast, on the far side of the mostly dry Santa Fe River, a megastucture of bizarre geometric shapes, all terraces and tetrahedrons, but here in the Old Town the buildings were still made of adobe or mock adobe, colored white or salmon or peach. He threaded a maze of little alleyways and enclosed courtyards on the far side of the plaza. The noise of the plaza fading away behind, and came at last to a narrow building of sun-faded adobe that displayed a small brass plaque that read on AU-CONJUS-VOHVOI.

Trembling a little, Klesterman entered a dusty stairwell to a third-floor office at the back of a long, dim hallway. Dr. Au turned out to be one of those slender, apologetic Oriental men of indeterminate nationality who might have been fifty or eighty years, neat, dry phlegmatic. The name was Chinese, but Klesterman suspected that he might actually be Vietnamese, as his English held the slightest trace of a French accent. He had a sad face and hard eyes. An open, unadorned window looked out through the thick adobe wall to an enclosed courtyard with a cactus garden below. The furniture was nondescript, well used, and the carpet dusty and threadbare, but an exquisite hologram of Blotnik's Adoration of the Magi moved and glittered in muted colors on the bare white walls, and the tastelessly discreet sink rearing in the doctor's left adobe might well have been real silver. There was no receptionist, just a desk with a complex of office terminals, a few laded armchairs, and Dr. Au.

Klesterman could feel his heart pounding and his vision blurring as he and Dr. Au engaged in an intricate parlay of hints and innuendos and things not quite said, code words and phrases being mentioned in passing with artful casualness, contacts named, references mentioned and discussed. Dr. Au moved with immense wariness and delicacy, at every stage ready to instantly disengage always phrasing things so that there was a completely innocent interpretation that could be given his words, while Klesterman was watched by alternate winks of impatience, fear, rage, despair, muddy black exhaustion, envy. At last, however, they reached a point beyond which it would no longer be possible to keep up the pretense that Klesterman had come here for some legal purpose, a point be-

CONTINUED ON PAGE 88



**PHENOMENON.**

An extraordinary series  
of official legal tender coins—  
the first of its kind ever issued  
by any government...



The coins in this collection  
will bear the portrait of  
Queen Elizabeth II, created  
for contemporary coinage.  
Shown actual size.  
Diameter: 38mm.

The Government of the British Virgin Islands announces

## The TREASURE COINS of the Caribbean

IN SOLID STERLING SILVER

A collection of 25 silver Proof coins, portraying the most important  
sunken treasures of the Caribbean—recovered and unrecovered.

Available by subscription only.  
Face value: \$20 U.S. / Price for  
Collector's Proofs: \$20 U.S.  
Price guaranteed for subscriptions  
entered by February 28, 1989.

**THE CARIBBEAN**—crossroads of  
empire and wealth. Where galleons,  
men-of-war and wandering privateers  
challenged the elements—and one an-  
other—in their quest for treasure. And  
where, today, adventurers explore for  
these ships that went down long ago—  
laden with riches beyond measure.

Now, for the very first time, you can  
acquire a collection of official coinage  
that embodies that seafaring heritage of  
the Caribbean. A collection of monetary  
coins unlike any other ever issued.  
Consisting of 25 sterling silver coins  
that re-create, in superb unaltered  
detail, the legendary treasures of the  
Spanish Main.

As legal tender of the British Virgin  
Islands, the coins will bear a face value  
of \$20, equal to \$40 in U.S. currency.  
The coins are large—the size of cov-  
eted pieces of eight. And Proofs will be  
struck only in solid sterling silver. The  
use of this precious metal is becoming a  
 rarity in world coinage—especially in  
coins of this size and weight.

Portrayed on the coins will be the  
most significant treasures of the fabu-  
lous ships of fortune lost in the Carib-  
bean. Each has been selected through a  
major initiative involving marine  
archaeologists, treasure-divers, and such  
noted repositories of maritime records  
as the British Museum, Lloyd's of Lon-  
don, and the Archivo General de las In-  
dias—the leading authority on Spanish  
colonial shipping.

There will be coins showing the great  
riches of empire: jeweled rings, ex-  
quisite works of silver and gold, royal  
revenue and private wealth that never  
reached its destination. Other coins will  
depict significant archaeological finds  
—offering a view of life during the age  
of exploration. And perhaps most in-  
teresting of all will be the silver coins  
portraying those treasures still undiscover-  
ed—but whose existence is known  
through drawings, ship manifests,  
and maritime disaster reports.

Taken together, these 25 match-

ing denominations coins will constitute  
the most comprehensive series ever is-  
sued on a unified theme. A collection  
unparalleled in scope by the coinage of  
any nation in our time.

The collection is available by sub-  
scription only. The Government of the  
British Virgin Islands has authorized its  
official mint, The Franklin Mint, to  
accept and fulfill valid applications.  
Subscriptions entered by February 28,  
1989, will be accepted at the guaranteed  
price of \$20 for each sterling silver  
Proof. To make this guarantee possible,  
the mint will contract for sufficient sil-  
ver, at current prices, to cover the en-  
tire series of coins for each subscriber.

Each Proof coin will be accompanied  
by a reference folder and location map,  
relating the intriguing story of the treas-  
ure portrayed. A special presentation  
case for the collection will be provided  
at no extra cost.

By entering your subscription now,  
you and your family can share a unique  
adventure in collecting—as you build a  
valuable treasure of solid silver coins. To  
acquire your collection at the guaran-  
teed price, return the accompanying  
application by February 28, 1989.



OFFICIAL SUBSCRIPTION APPLICATION

### The TREASURE COINS of the Caribbean

Please mail by February 28, 1989.

The Franklin Mint

Franklin Center, Pennsylvania 19001

Please enter my subscription for one Proof Set of "The Treasure  
Coins of the Caribbean," consisting of 25 coins of the British  
Virgin Islands with the face value of \$20 each, to be struck in  
solid sterling silver and sent to me at the rate of one per month.  
I need not pay money now. I will be billed \$20\* for each silver  
Proof, beginning when my first coin is ready to be sent. This  
price is guaranteed to me for the entire series. My presentation  
case will be sent to me at no additional charge.

\*Plus my regular sales tax and \$1. for shipping and handling.

Signature \_\_\_\_\_

NO APPLICATION IS NEEDED BY RESPONSE

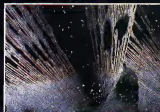
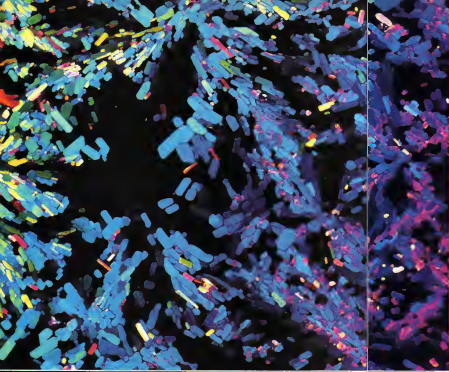
Mr./Mrs./Ms. \_\_\_\_\_

PLEASE PRINT NAME

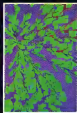
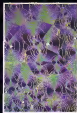
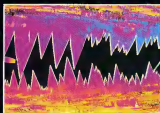
Address \_\_\_\_\_

City, State, Zip \_\_\_\_\_





**W**hen you look at newsprint through a magnifying glass, the smooth, fine-line lettering falls apart, revealing coarse, jagged edges. The print, however, remains recognizable. Under the exacting eye of the microscope things lose their common identities and express the intricacy of their nature—scientifically important and aesthetically beautiful. Submitted from around the world are the winning entries from the Nikon 1985 International Small World



Competition, an annual photomicrography contest.

Sodium thiosulfate crystals and hydroquinone seem a fitting choice for this contest—both are chemicals found in photographic developing. The delicate spiderweb pattern of sulfur hardly compares up the starch usually associated with it. Intravenous injections of fluorescein and acetylcholine examinations, particularly of the retina. And the crystalline formation of acetylcholine is a neurotransmitter secreted at the end of nerve fibers.

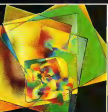
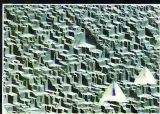
## SLIDE SHOW

BY NINA GUCCIONE

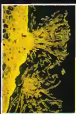
**Clockwise from left: How do you see relief? Crystallized aspirin under a microscope (at 10 × magnification); sodium thiosulfate crystals and hydroquinone (25 ×); sulfur crystals (10 ×); crystals of**

**fluorescein (16 ×); cyclohexanone oxalylidihydrazonone crystals (12 ×); crystal acetylcholine formation (40 ×).**

David Smith, an Australian, apparently has the Midas touch. He won first prize for his image of gold bubbles. Also shown: gallium arsenide, utilized in solar batteries, an important semiconductor for diodes and lasers. Second-place winner Stuart Shaw-Smith from England photographed antibiotics that are recrystallized from warm water. Germany's Peter Dantsch won third prize for his image of ascorbic acid and took seventh place for the photo of smooth muscle-cell filaments.



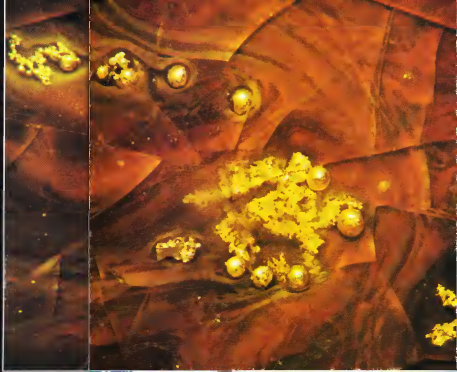
Photomicrography peers into and captures worlds we rarely see. Photographers shoot through a microscope with a 35mm camera. Various lighting techniques enhance the contrasts and colors of the specimens. Polarized lighting is especially effective with chemical crystals and living tissues that don't be stained. For information on entering the 1989 contest, write to Nikon Inc., Instrument Group, 625 Stewart Avenue, Garden City, NY 11530. Deadline for entries is June 30, 1989. OO



**Clockwise from right: Gold residue and gold-coated bubbles within a glassy matrix, magnified 20 times; filaments**

**in cultured vascular smooth muscle cell (188 ×); a taste explosion—the cross section of an orange peel as mold erupts through the skin (60 ×); antibiotic crystals, beautiful and beneficial (100 ×);**

**etched gallium arsenide (400 ×); ascorbic acid, commonly known as vitamin C (32 ×).**



# Sp perso

Merit tastes as good as other leading lights,



© Philip Morris Inc. 1993

Kings: 8 mg "tar," 0.6 mg nicotine  
av. per cigarette by FTC method.

**SURGEON GENERAL'S WARNING: Quitting Smoking  
Now Greatly Reduces Serious Risks to Your Health.**

## BODY

CONTINUED FROM PAGE 28

California. Bailey had a one-year approval from the hospital's institutional review board to test the latest transplant. His year was almost up, and he wanted to try the operation at least once. Despite the public outcry and the fact that Baby Five lived only three weeks, he pledged his intention to refine the procedure.

Last year Columbia University asked its institutional review board for permission to use chimp hearts as a bridge for patients on waiting lists for human hearts. In the future researchers will rely on genetic engineering techniques to breed prospective donor animals with immunologically "naked" organs—which cannot be destroyed by human killer T-cell lymphocytes—specifically for transplanting. This will reduce the risk of rejection to a level far below any likely to be achieved even with closely matched human donors. Because of the reduced risk, x-ray imaging may eventually be seen as preferable to human-to-human transplants. Antiviral drugs, however, are expected to carry on their protests, and religious leaders to continue objecting to transplanting animal hearts into creatures made "in God's image."

Bionics should provide a less ethically charged approach to treating terminal organ diseases. Scientists are working on a device to reproduce a few of the thousands of functions—like enzyme production, glucose processing, and filtering of toxins—healthy human livers perform. Even the most optimistic visionaries, however, admit that a machine that did everything a human liver does would occupy several acres of land. The artificial kidney or hemodialysis machine, represents a brilliant period of medical technology, but researchers say it's not likely to be miniaturized in the future. A small device that reads glucose levels and periodically injects measured amounts of insulin into the bloodstream is probably the best hope for a totally implantable organ, although it will never be able to duplicate all the digestive functions of the pancreas.

A more promising alternative lies in the transplantation of cells from some organs. Animal researchers have already produced insulin in higher mammals by transplanting key cells from the pancreas of a compatible donor to what they call an "immunologically privileged site" in a diabetic recipient (Bach et al), which may be cradled under the skin, far from the compromised organ, are so called because they've been identified as being less likely to attract the killer T cells that induce a rejection response.) Dr. Nancy Ascher at UCSF is doing similar work on hepatic (liver) cell transplants. The first woman in the world to perform a liver transplant, Ascher came to UCSF last

year when the hospital added a liver transplant unit to its existing services for heart and kidney transplants. By transplanting a few healthy cells removed from a blood relative into an immunologically privileged site in a patient's body, Ascher hopes to obviate many of the total liver transplants that keep her on her feet for 24 hours at a stretch.

Organogenesis may offer the most promising breakthrough for total organ replacement. Advances in that field have come rapidly since 1986, when Massachusetts Institute of Technology biologist Dr. Eugene Bell took early retirement to found an advanced biotechnology firm he named Organogenesis, Inc. During his tenure at MIT, Bell had explored ways to manufacture living tissues and organs from human cells. In 1961 he replaced a diseased thyroid gland from one mouse with thyroid cells cloned from a healthy mouse. A new, vascularized gland (with all blood vessels attached) soon grew in the old one's place.

Organogenesis, Inc. is already delivering cloned skin and blood vessels to reconstructive surgeons and burn units throughout the United States. It will soon introduce "bone equivalent" and other connective tissues cloned from human cells. Shortly thereafter, the firm plans to launch a pancreatic tissue product called Living Endocrine Pancreas Equivalent, which will be used to treat Amends 1.5 million diabetics. It should eventually make pancreas transplants obsolete. In 30 or 40 years, says Organogenesis spokesman Douglas Billings, it should be possible to fabricate real kidneys, livers and hearts that can be matched with any tissue type. The kidneys, for example, will have the appearance and texture of "real kidneys" since they will be cloned and grown from healthy kidney cells. Once transplanted into the place of a diseased kidney, they will become vascularized and function just as normal kidneys do. The beauty of these organs will be in something they won't have: the surface antigen markers that normally trigger the immune system's rejection response.

Further down the road, medical visionaries like noted French transplant surgeon Jean Hamburger predict advances in genetic engineering that should make transplants obsolete. Hamburger foresees a day when healthy, immunologically "naked"—possibly fetal—cells will be placed next to a failing organ and genetically "commanded" to grow a new one in its place. Futurists say nanotechnology may yield even more improbable additions to our medical arsenal. They describe tiny automata a few nanometers long capable of assembling and reproducing themselves by the billions as they float through our capillaries repairing dead or damaged cells. But even the most hopeful nanotechnology enthusiasts forecast a 50- to 100-year wait for these miniature repair shops. **DO**

# Merit personality.

yet has up to 27% less tar.





*They call him the "terrorist of the lab," but this self-appointed scourge of scientific fraud has reason to suspect that as much as 25 percent of all research papers may be intentionally fudged*

## INTERVIEW

# WALTER STEWART

**W**hen I was young I always assumed scientists told the truth," says fraud investigator Walter Stewart. "Today he knows otherwise. Some scientists, maybe many, he says, 'fiddle with their data. A few scientists lie. And lots publish erroneous results. But when something is published that turns out to be wrong,'" Stewart points out with indignation, "you almost never see a retraction." In courtrooms and before congressional panels, Stewart

and colleague Ned Feder have decided to redress this wrong. For their efforts, they have earned the enmity of a number of luminaries among them Nobel laureate David Baltimore, who has warned angrily that their activities could serve to "cripple American science." Other colleagues just don't seem to appreciate their dedication. Reviewing some of Stewart's early research, J. Edward Rall, a deputy director at the National Institutes of Health (NIH), painted Stewart as a

PHOTOGRAPH BY MIKE MITCHELL

brilliant laboratory investigator who has unfortunately chosen to waste his time "grubbing around in the sewers of scientific stupidity, sloth, and fraud."

Officially, Stewart is a researcher at the NIH in Bethesda, Maryland, where his current project is the genetic control of the shape of nerve cells in snails. Much of his research time in recent years, however, has on his own initiative been spent investigating cases of questioned sciences. Stewart and Feder receive more than 100 allegations a year that published work is wrong or cooked—a figure at least four times higher than the number of complaints lodged with the NIH's official misconduct office.

Last summer Stewart joined magician/investigator James Randi and Nature editor John Maddox to investigate a mysterious experiment that had just been published in *Nature* and that was making headlines around the world. A team of Parisian scientists led by Jacques Benveniste of the French Medical Research Council had supposedly discovered and documented a biological effect caused by infinitesimal amounts of a human antibody known as anti-IgE, or anti-immunoglobulin E. The experiment suggested a scientific underpinning for homeopathy, a pseudoscience that purports to cure patients with vanishingly small doses of medication. The scientific world was baffled by Benveniste's claims. A number of experts considered the effect Benveniste claimed to have observed—biological effects due to solutions diluted past the point where they could contain molecules of anti-IgE—to be impossible.

After seeing the experiment repeated seven times under various conditions and after examining the laboratory records for the last five years, Maddox, Randi, and Stewart decided the "impossible reaction" was a case of self-deception. Benveniste, however, dismissed the three as witch-hunters. They had unleashed, he said, a "tornado of suspicion, fear, psychological and intellectual pressure" and had "annoyed" his staff. "Never let these people into your lab!" Benveniste warned the world.

Back home Stewart and Feder's challenge to a paper published by high-profile immunologist David Baltimore and co-workers attracted congressional attention. Stewart and Feder claimed that the published paper was contradicted by the groups' own experimental data. They based their assertions on 17 pages of data discovered by Margot O'Toole, a postdoctoral fellow in the lab of one of the coauthors. O'Toole thought the data showed the paper contained errors that ought to be corrected in the scientific literature. Baltimore and his coauthors disagreed, and they were backed up by two university committees at Tufts and MIT that investigated the matter.

Stewart and Feder also argued that the scientific establishment was trying to look

the other way instead of investigating in earnest. A three-man panel chosen by the NIH to look into the matter included a former student of Baltimore's who had collaborated extensively with him and a prominent scientist who had recently coauthored a textbook with him. The researcher who had stepped forward after discovering the 17 pages of lab notes, meanwhile, found herself publicly denounced and out of a job.

Whatever problems there were, Baltimore responded angrily, accuse from minor errors, not fraud. Stewart and Feder asked to see the rest of the lab records just to check. Baltimore refused. "External reviews of data are relevant," he argued, "only when probable causes of fraud have been established." Baltimore's stand was seconded by his peers in the scientific community. Others interpreted the message as, "Let the old-boy network take care of it." Baltimore finally agreed to release his team's records to

*“I noticed the journal paper included a seventeen-year-old with the disease. He was listed as having four children, including an eight-year-old daughter.”*

an investigating committee provided, among other things, that Stewart and Feder promise in advance to drop public discussion of the matter if the committee found no fraud. The pair refused, saying they were engaging in the scientific tradition of free and open debate. They have, however, stopped talking about the case publicly while it is being investigated.

Stewart argues that their involvement in cases like this is science, not meddling. Science is a search for new and unknown truths, and as such is bound to involve errors. But, he says, scientists have a responsibility to correct published error. Stewart insists that he welcomes criticism but prefers it be focused on correcting factual mistakes or methodological errors he has made, rather than attacking his right to carry on investigations in the first place. His critics seldom feel thus constrained. Daniel Koshland, editor of *Science*, has written that Stewart and Feder's activities smack of McCarthyism. Arnold Reisman, editor of *The New England Journal of Medicine*, wrote more ominously that "truth squads and special investigative teams are not

only unnecessary but would also be destructive of the scientific spirit."

The forty-three-year-old Stewart's own inclinations as scientist and reformer revealed themselves at an early age. As a seventh grader at Marshfield's Dalton School, he noticed a flaw in the procedure for casting votes during class assemblies, a simple show of hands in the auditorium. Kids weren't apt to cast unpopular votes if it made them feel conspicuous. He designed and built a portable voting machine for class elections, using parts he scavenged at second-hand shops. His creation, finished with help from his psychoanalyst father, came complete with latching keys to prevent students from voting twice.

After Stewart graduated summa cum laude from Harvard College in physics and chemistry in 1967, Harvard's Society of Fellows appointed him a junior fellow. This honor is given to scholars not enrolled in doctoral programs, letting them pursue individual studies. He came to the NIH in the late Sixties. Though Stewart has worked as a scientist for some 20 years, he never earned a Ph.D.

Today he shares a windowless basement lab in Bethesda with Feder and a large collection of snails. Stewart is considered a talented researcher who has made a number of useful discoveries, including the synthesis of Lucifer yellow, a dye used to study nerve cells. In recent years, however, the NIH hierarchy is said to be disaffected with his lack of scientific productivity, an unhappiness reflected in cutbacks in his lab space and equipment. Lately Stewart has been spending less time in the NIH basement and more on Capitol Hill. The NIH has acquiesced in loaning him to a congressional subcommittee headed by Michigan's John Dingell. The subcommittee is looking into scientific misconduct.

Putting in 80-hour weeks on fraud sleuthing has left him less time than he'd like for his family and no time at all for such chores as lawn mowing at their suburban home. His resulting experiment in "meadow gardening" has outraged his neighbors. The county government cited the incipient jungle under the so-called weed law, which creates the legal presumption that plants over 12 inches are dangerous to the public. Stewart, chair-scientifically, has fought the neighbors and county to a standoff.

Interviewer Doug Stewart (no relation) found scientist Stewart to be a man obsessed, impulsive, excitable, precise, and utterly serious; he would be the quintessential eccentric were it not for the perfectly reasonable explanations he offers for everything he does.

**Ques:** The editor of *Science* magazine has suggested that "99.9999 percent" of published scientific reports are truthful. Do you agree?

**Stewart:** Daniel Koshland's estimate is almost

FICTION

# MR. FIDDLEHEAD

*Nothing comes between Juliet and her friend Lenna Rhodes—that is, almost nothing*

BY JONATHAN CARROLL

On my fortieth birthday Lenna Rhodes invited me over for lunch. That's the tradition—when one of us has a birthday, there's lunch, a nice present, and a laughing afternoon to cover the fact we've moved one more step down the staircase. We met years ago when we happened to marry into the same family. Six months after I said yes to Eric Rhodes, she said it to his brother Michael.

Lenna got the better end of that wedding. She and Michael are still delighted with each other, while Eric and I fought about everything and nothing and then got divorced.

But to my surprise and relief they were a great help to me during the divorce, even though there



were obvious difficulties climbing over some of the thornbushes of family and blood allegiance.

She and Michael live in a big apartment on One-hundredth Street with long halls and not much light. But the gloom of the place is offset by their kids' toys everywhere: colorful jackets stacked on top of each other, and coffee cups with

WORLDS GREATEST MOM and CARMOUTH written on the side. There is a horse full of love and hurry, children's drawings on the fridge alongside reminders to buy La Stampa. Michael owns a very elegant vintage fountain pen store, while Lenna freelances for Newsweek. Their apartment is like their life: high-ceilinged, thought-out,

PAINTING BY GERVASIO GALLARDO



overflowing with interesting combinations and possibilities. It is always nice to go in and share it with.

I felt pretty good about being forty years old. Finally there was some money in the bank and someone I liked, talking about a trip together to Egypt in the spring. Forty was a milestone but one that didn't mean much at the moment. I already thought of myself as being slightly middle-aged anyway, but I was heady and had good prospects, so so what? to the beginning of my fifth decade.

"You out your hair!"

"Do you like it?"

"You look very French."

"Yes, but do you like it?"

"I think so. I have to get used to it. Come on in."

We sat in the living room and ate. Elbow, that bull terrier, rested his head on my knee and never took his eyes off the table. After the meal was over we cleaned the plates, and she handed me a small red box.

"I really hope you like them. I made them myself."

Inside the box were a pair of the most beautiful gold earrings I have ever seen.

"My God, Lenna. They're exquisite. You made these? I didn't know that you made jewelry."

She looked happily embarrassed. "You like them? They're real gold, believe it or not."

"I believe it. They're art. You made them, Lenna? I can't get over it. They're really works of art; they look like something by Klimt." I took them carefully out of the box and put them on.

She clapped her hands like a girl. "Oh, Juliet, they really do look good!"

Our friendship is important and goes back a long way, but this was a lifetime present—one you gave a spouse or someone who'd saved your life.

Before I could say that (or anything else), the lights went out. Her two young sons brought in the birthday cake, forty candles strong.

A few days later I was walking down Madison Avenue and, caught by something there, looked in a jewelry store window. There they were—my birthday earrings. The exact ones. Looking closer, open-mouthed, I saw the price tag. Five thousand dollars! I stood and gaped for what must have been minutes. I was shocked. Had she lied about making them? Or spent five thousand dollars for my birthday present? Lenna wasn't a liar, and she wasn't a bitch. All right, so she had them copied in brass or something and just said they were gold to make me feel good. That wasn't her way either. What the hell was going on?

The confusion emboldened me to walk right into the store. Or rather to walk right up and press the buzzer. Someone rang me in. The salesgirl who appeared from behind a curtain looked like she had to

graduated from Radcliffe with a degree in bluestocking. Maybe you had to go to work in this place.

"Can I help you?"

"Yes. I'd like to see the pair of those earrings you have in the window."

Looking at my ears, she suddenly realized I had a very familiar two thousand dollars hanging from my earlobes. It changed everything. Here she said she would be my slave—or friend—for life. "Of course, the Dixies."

"The what?" She smiled like I was being very funny. It quickly dawned on me that she must have thought I knew very well what "Dixies" were, since I was wearing some.

She took them out of the window and put them carefully down in front of me on a blue velvet card. They were beautiful, and admiring them, I entirely forgot for a while I had come on.

"I'm so surprised you have a pair. They only come in a week ago."

*Our friendship is important and goes back a long way, but this was a present you gave to a spouse or someone who had saved your life. Before I could say that, the lights went out.*

Thinking fast, I said, "My husband bought them for me, and I like them so much I'm thinking of getting a pair for my sister. Tell me about the designer. What's his name, Dixie?"

"I don't know much, madam. Only that the owner knows who Dixie is, where they come from—and that whoever it is is a real genius. Apparently both Bulgari and people from the Memphis group have already been in, asking who it is and how they can contact him."

"How do you know it's a man?"

I put the earrings down and looked directly at her.

"Oh, I don't. It's just that the work is so masculine that I assumed it. Maybe you're right; maybe it is a woman." She picked one up and held it to the light. "Did you notice how they don't really reflect light so much as enhance it? Golden light you can own. I've never seen that. I envy you."

They were real. I went to a jeweler on Forty-seventh Street to have them appraised, then to the only other two stores in the city that sold "Dixies." No one knew anything about the creator or

weren't taking it they did. Both dealers were very respectful and pleasant, but mum's the word when I asked about the jewelry's origin.

"The gentleman asked us not to give out information, madam. We must respect his wishes."

"But it is a man?"

A professional smile. "Yes."

"Could I contact him through you?"

"Yes. I'm sure that would be possible. Can I help with anything else, madam?"

"What other pieces did he design?"

"As far as I know, only the earrings, the fountain pen, and this key ring." He'd shown me the pen, which was nothing special. Now he brought out a small golden key ring shaped in a woman's profile. Lenna Rhoades's profile.

The doorbell tinkled when I walked into the store. Michael was with a customer and, smiling hello, gave me the sign he'd be over as soon as he was finished. He had started INK almost as soon as he got out of college, and from the beginning it was a success. Fountain pens are cranky, unforgiving things that demand full attention and patience. But they are also a handful of flash and old-world elegance, gratifying slowness that offers no reward other than the sight of shiny ink flowing wetly across a dry page. INK's customers were both rich and not so, but all of them had the same collector's fiery glint in their eyes and added it to their desire for more.

A couple of times a month I'd work there when Michael needed an extra hand. It taught me to be cheered by old pieces of Bakelite and gold plate, as well as other people's passion for unimportant but lovely objects.

"Juliet, hi! Roger Peyton was in this morning and bought that yellow Fisher Duofoil. The one he's been looking at for months!"

"Finally! Did he pay full price?"

Michael grinned and looked away. "Rog can never afford full price. I let him do it in installments. What's up with you?"

"Did you ever hear of a Dixie pen? Looks a little like the Carter Santos?"

"Dixie? No. It looks like the Santos?" The expression on his face said he was telling the truth.

I brought out the brochure from the jewelry store and, opening it to the pen photograph, handed it to him. His reaction was immediate.

"Why that bastard! How much do I have to put up with?"

"You know him?"

Michael looked up from the photo, anger and confusion competing for first place on his face. "Do I know him? Sure I know him. He lives in my goddamned house, I know him so well! Dixie, huh? Cute name. Cute man."

"What? I'll show you something, Juliet. Just stay there. Don't move! That shit."

There's a mirror behind the front

CONTINUED ON PAGE 33

• According to one  
neuropsychologist, UFO field-workers  
are particularly  
vulnerable to suicide and cancer •

## ANTI MATTER

These days cancer seems to lurk behind everything we eat, drink, and do. So it should come as no surprise that investigating UFOs may bring on the disease as well. That, at least, is the warning issued by Canadian neuropsychologist Michael Persinger, one of the world's leading authorities on the effects of magnetic fields.

According to Persinger, a professor at Laurier University of Sudbury in Ontario, the danger does not come from extraterrestrial weapons or from deadly green rays but rather from intense natural electromagnetic fields. That's because most UFOs, says Persinger, are simply "luminous phenomena produced by extremely energetic geophysical forces" such as the movement of the earth's crust.

Similar low frequency fields, Persinger says, are routinely experienced by electrical engineers and technicians and by those living near overhead power lines. And studies of these groups indicate that they are likely to suffer a higher risk of brain tumors and leukemia, as well as depression and suicide, than the normal population.

These complications are also a concern for the UFO buff, adds Persinger, "particularly for those who spend literally hours, if not days, out in the field."

Persinger is not suggesting that people stop investigating UFOs. Nor does he suggest that all those who investigate UFOs will develop brain tumors or other cancers. (Not everyone who smokes, he notes, gets lung cancer.) But, he warns, UFO researchers should take precautions like bringing detection equipment to do the dirty work and try to



## UFO UPDATE

keep exposure down.

Persinger's evidence for the UFO-cancer theory, many critics believe, is slim. It's true that at least two UFOlogists—including J. Allen Hynek, the father of the field—have died of brain tumors. And at least two others are known to have committed suicide.

But UFO researchers are not impressed with these examples. "I think it's just a crazy coincidence," says John Keel, author of *Discreet*, the Gods, who spent four years in the field investigating UFOs in the mid-Sixties. "Probably just as many UFOlogists have died

of appendicitis." And Mutual UFO Network (MUFON) director Walt Andrus, who first published Persinger's warning in *The MUFON UFO Journal*, says, "I was afraid to even publish the article, because I thought it might scare people away. But that has not occurred." MUFON has about 1,000 investigators across the country, Andrus adds, and no one has resigned due to the recent report.

Persinger, however, counters that while many researchers write about UFOs, few actually spend much time in the field. This lack of exposure, he adds, means that UFO researchers may not be the best population in which to demonstrate his hypothesis.

Toward that end, Persinger has begun examining cancer records in areas that have been repeatedly exposed to the luminous displays otherwise known as UFOs. If he is correct, Persinger says, these areas should show a rise in cancers and depressive disorders within two years of the time a spate of sightings occurs.—PATRICK HUYGHE



## ANIMAL SUICIDE

KANGAROO KILLS HIMSELF, AFTER LOSING HEAVILY COMMONWEALTH, head the headline in the reputable Italian daily newspaper *Corriere della Sera*. It seems that a female kangaroo at a zoo in Brescia, Italy, had to be destroyed after breaking a leg. Within a week, the dead kangaroo's mate either fell or threw himself into the deep ravine surrounding the compound, and reports of the "suicide" began to surface.

By OMN

The kangaroo is not alone. Finches, for instance, often die for no apparent reason shortly after the death of a mate. And dogs sometimes refuse to eat following a master's death, consequently succumbing to starvation.

But can animals consciously commit suicide? "I know of examples where one animal dies and a perfectly healthy mate dies shortly thereafter," says David Corrod of Florida's Busch Gardens. "But why

this happens is a mystery.

Some answers might be gleaned from the recent incident in Italy. Michel Vastano, who covered the kangaroo suicide story for *Agence France Press*, believes the kangaroo in question "was very disturbed by its mate's death. One employee I spoke with," he adds, "described the kangaroo as deeply depressed. Its state of mind certainly contributed to its death."

—Rick Bolling

## PSYCHIC PHYSICS

Just before the turn of the century, psychics Annie Besant and C. W. Leadbeater announced they would use their powers to investigate the microscopic world. In 1906, three years before Ernest Rutherford (below) proposed the nuclear model of the atom, they described subatomic particles as small as one ten-thousand-billionth of an inch. Their psychic findings, however, remained suspect because they included descriptions of objects unknown to science.

Now Stephen M. Phillips, author of the book *Extrasensory Perception of Quarks and a Physicist Who Has Studied the Psychics' Work*, says Besant and Leadbeater were accurately describing quarks and superspins decades in advance of scientific theory. He contends that their 38-year-long study, which was completed in 1933, offers remarkable supportive evidence for micro-remote viewing, the apparent ability to perceive objects of microscopic size.





ret Dennis Bakke's director of the Archæus Project which studies the phenomenon of psychic research doubts Philip's conclusion. He says, "My guess is that even if it's possible, the direct perception of subatomic processes would appear enormously confusing and complex."—Rob MacGregor

"In saying what is obvious, never choose cunning, telling words better."  
—Cynthia Ozick

## WHY ARE WE HERE?

Why do so many UFO abductees and contactees believe in reincarnation? Why, if there are extraterrestrials (ETs) have they not taken over the earth? Those are the kinds of questions being pondered by James Deardorff, a retired professor of atmospheric sciences at Oregon State University. Deardorff first noticed that the belief in reincarnation is far more widespread

among abductees and contactees than among the general population. "The level in the general population is about twenty-three percent," says Deardorff. "Those who know abductees well, however, claim that they essentially all believe in it."

In many cases, adds Deardorff, people report flashbacks from their past lives in the years following their abductions. Still others claim that they were themselves aliens in a past life.

But it didn't dawn on Deardorff why reincarnation beliefs would go hand in hand with alien contact until he began thinking that the ETs themselves just might hold the same beliefs. He now thinks that a reincarnation ethic would explain why planet Earth hasn't been invaded by UFOs.

Killing everyone on the planet would be bad Karma," explains Deardorff. "Besides, the souls would live on. And what if those human souls were to reincarnate as ETs? Would they really want that?" —Patrick Hughes

## CARTRIDGE

Dozens of partially buried cars rise in a circle out of the Nebraska sand hills, bent bumpers pointing skyward in a bizarre formation. Another rare cars form archways into the circle. In the center a lone upended ambulance, two station wagons, and an LTD complete the resemblance to an ancient monument 5,000 miles away.

The scene in Carhenge, built by James Rinders at his

homestead three miles north of Alliance, Nebraska, is homage to Stonehenge's famed Sarsen Circle. Why replicate the ancient site with cars? "It's a joke," Rinders says. "And it's fun."

But some residents of Alliance do not share Rinders's sense of humor. Within days of completing his monument, he received official notices from the city of Alliance and the state of Nebraska. Carhenge, it seemed, violated local zoning ordinances as well as state right-of-way laws.

Alliance city manager Wolfgang Bauer gave Rinders 180 days to remove Carhenge or apply for a special-use permit. Write: Bauer. "This will allow some enjoyment for let's sake, yet ensure that the eyesore is removed."

Rinders fought the state-required junkyard permit on the grounds that Carhenge was art, not junk. Officials agreed, with the stipulation that Rinders screen his monument from traffic and install an access road. In addition, the Alliance city council granted a special-use permit on the condition that Rinders get liability insurance and put in a parking lot for visitors.

"We came, we saw, we Carhenged," Rinders says. The epitaph for his new monument, he adds, is "Rust in Peace." —Marilyn Salts



"Once embarked on a course of worship and propitiation involving great monuments, no leader could afford to relax."

—Albert Kuttler II

## SEVEN WHEELS

Whales, with their inch-long spiral shells, are among the most common gastropods on Brian's shores. Now they may be the strangest as well. According to reports, female dog whales have recently begun growing penes and developing sperm ducts. The bizarre transformation, which stops the creatures from breeding, is threatening their future and has already caused their virtual disappearance along some parts of the coast.

The culprit, tributyltin (TBT), an ingredient found in antifouling paint used by boat owners to fight off such pests as barnacles.

The phenomenon has recently been studied by Geoff Bryan, a researcher at the Plymouth-based Marine Biological Association. After examining several hundred whales, he was surprised at his failure to find females of the species. Closer inspection showed half were females that had grown penes.

To see whether TBT was really the cause, females that had not yet changed sex were painted with the chemical. Sure enough, penes sprouted and grew to alarming lengths. Soon the researchers could calculate how close a female lived to a marina. The nearer to ships the longer the penes. Just one part per million of TBT in seawater was said to be enough of the chemical to cause the sex switch.

Accepting that TBT can kill, retard, or deform a wide variety of marine life, the British government had



already banned its use on boats less than 75 feet long. Now the whales may help detect offenders against the law. Says Bryan, "Measuring the lengths of their penes could be a good way of indicating the amount of TBT at a particular site, circumventing the usually lengthy processes necessary for analyzing low concentrations." —Ivor Smullen

"Erection is chiefly caused by acornus, wingosa, onissas, crynon, persaps, antichokes, turnips, asparagus, candied ginger, acorns, bruised to powder and drank in muscatel, scallion, sea shellfish, and so on."

Aristotle

"The water is dead and doesn't sing! The moon looks in my throat!"

Gerardo Diego

## CRYSTAL ADVENTURES

Zee Haag, who travels the globe searching for rare stones and crystals for his Tucson, Arizona-based whole-sale-gem business, may have discovered a mother lode of New Age crystals. On a recent trip to the African territory of Namibia he uncovered a 7,622-pound eight-foot-long quartz crystal—among the largest of its kind in the world.

Located about 35 feet underground and surrounded by smaller crystals, the mammoth rock was about to be blown up by quartz miners. When Haag came on the scene with a plan to move it with a crane brought in through 50 miles of bush country, The crystal, which he named Ovombo after a tribe in the area, was shipped to the United States.

Because Ovombo is the largest doubly terminated (pointed at both ends) crystal known, Haag believes it may possess unusually strong paranormal powers. "Both positive and negative charges come off each point of doubly terminated crystals, so they are called generators. The one is so huge that if anybody can figure out how to tap its energy, it might possibly be the most powerful crystal on Earth," he explains.

Lawrence Jerome, who teaches research and statistics at the University of San Francisco and is conducting experiments to test the claims of crystal believers, notes that the alleged powers of crystals have no scientific basis.

"New Agers claim their thoughts and feelings can resonate with crystals, and activate energies within them. But that is impossible. Even if you could project electromagnetic energies with your brain, they wouldn't resonate in a crystal because the resonant frequency of crystals isn't even near the same range as brain waves," Jerome says.

Haag disagrees. "Crystals have increased his psychic abilities," he declares. And "because some energy fields are not yet understood by man, crystals like Ovombo could be sleeping giants."

—Sherry Baker

"I believe that what unites us universally is our emotions, our feelings in the face of experience, and not necessarily the actual experiences themselves."

—Anais Nin

# TASTE

CONTINUED FROM PAGE 46

was a virgin field, and I would select an other area that needed to be examined," he says, "and my students would pick up on it and start working." Students and colleagues like Linda Bartoshuk, Milton Frank, and Ingile Miller—today's aficionados of taste—worked with Pfaffmann tackling questions like the connection between taste and the limbic system (which controls involuntary function), something Pfaffmann had long suspected.

An astonishing proportion of the fundamental principles of taste studies owe their discovery to Pfaffmann and his pupils. They have found that the chemistry of each taste is unique. Sour substances, like the citric acid in lemons, contain hydrogen ions or, more precisely, hydronium ions (hydrogen ions attached to water). Salty foods have the sodium ions found in table salt (NaCl, or sodium chloride). Sweet substances, the sugars, contain two hydrogen bonds in a molecule that's shaped like a triangle, called the AHB gemma triangle. Bitter foods also have a pair of hydrogen ions. In fact, the chemical makeup of sweet and bitter compounds is so similar that when chemicals that taste very sweet are slightly altered, they become bitter.

Drop any substance, sweet or bitter, into the mouth, and enzymes in saliva break the food into a solution made up of small molecules. The diluted food bathes thousands of orange-shaped taste buds located on the tongue, palate, pharynx, tonsils, esophagus, the roof of the mouth, and the epiglottis, the flap that closes the windpipe when we swallow. Bunches of taste buds cluster around tiny bumps called papillae.

Ingile Miller, associate professor of anatomy at the Bowman Gray School of Medicine at Wake Forest University, studied the anatomy of taste buds, looking at tongues with a powerful microscope. Recording the images on videotape, he discovered that the number of taste buds varies from person to person—up to an astonishing tenfold difference. "Some people have fewer than five taste buds per square centimeter, others have more than five hundred in the same area. The average is about one hundred to one hundred fifty," he says. The ability to discern flavors—the big "gestalt"—at very low concentrations appears to be in direct proportion to a higher density of taste buds. "In simple terms," Miller believes, "people who have more taste buds taste more, people with fewer taste buds taste less."

Each taste bud, in turn, contains some 40 to 60 receptor cells, or fibroblasts. On the surface of each fibroblast are several microwells, tiny hairlike projections that "poke their heads" through an opening

on the taste bud. Miller suggests, "Try to picture an elevator full of people peering up through the trapdoor at the top." The "trapdoor opening" is the taste pore.

Fibroblasts are miracle workers, regenerating about every ten days. Why does it happen? "We don't really know," Bartoshuk says, "but due to the wear and tear on the receptor cells in the mouth, apparently evolution designed replaceable parts." Among nerve cells, only the olfactory and taste receptor cells consistently grow, develop, die—then replace themselves with new cells. "It happens all your life," she says. That may be why older people have good taste systems.

Given the wide variety in taste and in chemical structures that produce each particular taste, it isn't surprising that receptor cells "read" and react to different taste qualities in different ways. The sodium ions (saltiness) are small, positively charged atoms that fit through tiny openings or channels in the membrane of the

*• In a sense, taste researchers have pointed out, Columbus's discovery of the New World was simply a freak accident triggered by the insatiable demands of the European palate. •*

taste receptor. These channels are precisely the right size to permit sodium ions—but no others—to pass through. Once inside the receptor cell, the ions' positive charge excites a series of reactions that ultimately release a neurotransmitter from the far end of the cell. The neurotransmitter crosses the synapse (gap) between the receptor and its adjacent nerve cell, snapping the latter to attention and shooting the taste message along nerve lines to the brain.

The cells of sweet- and bitter-tasting substances are far too large and complex to pass through the receptor cell's membrane. Instead, sweet and bitter stimuli are adsorbed, loosely adhering to the cell membrane surface, causing electrochemical changes within the receptor cell. Sour-tasting acids may actually be channel blockers. As these are channels to allow sodium ions to pass into the cell, there are also channels that let positively charged potassium ions out. The sour acids block the channels, and the potassium ions build up within the receptor cell, firing it with their positive electrical charge.

To further confuse students of taste neurophysiology, there isn't one nerve (as with sight and hearing) servicing the taste receptors but three: the seventh, ninth, and tenth cranial nerves (the eighth nerve being the auditory nerve). These three nerves are bilateral, found on both sides of the body. The first relays signals to the medulla, where second-order neurons, the brain's microchips, process the incoming information and distribute it to the appropriate departments in the brain.

At this juncture in its journey the taste message splits, unlike hearing and sight. The medulla subjects the taste message to an unusual routing, sending one signal to the most highly developed regions of the human brain, the dorsal thalamus and the sensory cerebral cortex, responsible for elaborate problem solving. The second message is delivered to the hypothalamus and the amygdala, structures that form a part of the "old brain," or limbic system. The old brain is a "very primitive region of the human brain, controlling involuntary responses," says Milton Frank, professor of biostructure and function at the University of Connecticut. "Hunger, anger, sexuality, emotions—the nonrationalized, preprogrammed responses occur in the limbic system. It's hardwired to react automatically to a variety of incoming information."

The limbic system is taste's connection to what scientists refer to as hedonic response. The word *hedonic* comes from the Greek word for "pleasure" and it is the limbic connection that allows us not only to eat our food but to enjoy it. While the reasoning, calculating parts of the brain can tell you you're eating "a bitter-sweet substance with a smooth texture and cool temperature," it is your limbic system that says, "Mocha almond mousse; let's have some more." The pleasure (or pain) principle in taste is reflexive. An infant smiles and suckles when he tastes sweet or scowls and spits when he tastes bitter. "There are particular taste qualities that are inherently pleasant or unpleasant, and so we have a pair of systems—one that signals the quality and intensity of taste, and another that provides a hedonic component," Smith says. Because the cerebral cortex is paired with the limbic system, we not only discover what is in our mouth but have a pleasurable or aversive reaction to it.

Taste, like hearing, is subject to the whims of trendsetters. The hungry public grows weary of last year's oral fashions and quickly switches to the latest in food fashions. Tom Giel, vice-president of flavor creation and application at International Flavors and Fragrances (IFF), located in South Brunswick, New Jersey, describes himself as "an artist who paints in chemicals." Working with a palette of thousands of substances—essential oils, extracts, aromatic chemicals—he can create, say, a picture of a strawberry. Choosing from 10 to 200 ingredients, he

combines the elements until he's found a perfect replica of the original strawberry. The process might take several months or several years, the cost, well into the hundreds of thousands of dollars.

Gel says his job has gotten tougher over the past 16 years. "The American consumer is more sophisticated. People have tasted fresh papaya and fresh kiwi and demand a flavor that reproduces the exact taste." Fifteen years ago, Gel says he would have used fewer ingredients in a flavor, 20 at the most. Now the consumer's taste is more picky, picking up subtleties he wouldn't have noticed before, "so we have to find formulas that are closer to the actual fruit," he adds.

The sophisticated consumer is fickle as well as finicky. Peach has been the "hot" flavor for the past couple of years, "a superior flavor," says Bill Zick, vice-president of marketing for IFF. The flavor replicated the real thing so well, "you could not only taste the fuzz on the peach skin, the aromatics were mind-boggling," he says. "The guys who created DeKuyper Peachtree Schnapps really hit a home run with that."

What flavors will we want next? "Ethnic and regional" is Gel's guess, "the Southwest spicy taste or the Southern smoked flavor. In fruits, probably a red fruit like a red raspberry." Zick agrees with the raspberry prediction, saying black raspberry also may be a hit. Ethnic flavors like satay, an Indonesian flavor that Zick describes as "beefy peanut," as well as mustard and honey, separately or together for a sweet-and-sour effect, will gain in popularity.

Does Gel think he'll be asked to develop that staple of science-fiction literature, the little green pill we pop into our mouths in the morning to get our daily supply of nutrients and vitamins? No way. "Sitting down to a meal is an event," he says, "in the future food will be easier to prepare but not any easier to eat. Food will still be food."

What intrigues both flavorists and scientists is the connection between foods we crave and foods our bodies require for good health—the difference between appetite (need) and taste (preference). Why do some people like (even prefer) a good meal to good sex? What about the chocoholics who reach for the bonbon box after another relationship fails? What about the carb cravers, or the salt freaks who dump half the saltshaker onto the plate every time they sit down to dinner? Are they just obsessives, or are their bodies telling them something?

Some scientists would say that their bodies are trying to relay a primitive, visceral message that should come as a whisper but to the craver sounds more like a biochemical scream. The prime culprit in the case of food obsession is the limbic system—pleasure central. Cravings seem to have that desperate, irrational component to them, and it has

been found that when the centers of thought and reason in an animal's brain have been injured, the limbic system ensures that the animal will still respond positively to sweet and will shy away from bitter tastes.

The evolutionary argument that sugar attracts because sweet things in nature tend to be beneficial is widely accepted. The craving for salt—despite recent discoveries that excessive salt intake can be hazardous to your health—may actually stem from an evolutionary disposition similar to the sugar reflex. Marion Frank argues that sodium is a vital chemical used throughout the body in various important processes of cell metabolism. Back in the days when our ancestors were primarily vegetarians, sodium was often in short supply. Says Frank, "The ability to detect and prefer sodium produced a superior organism." Explaining the drive to consume salt in excess, Frank suggests, "The location of salt in nature was

---

**Thousands of  
tasters—chemists whose  
tongues are their  
livelihoods—are attempting to  
satisfy our gustatory  
wants, sipping full-bodied  
liquids as well as  
licking sugary concoctions.**

---

patchy, so it made sense to construct an animal that would consume salt in large quantities to have in reserve.

What about the so-called carb cravers—people who would give anything for a plateful of carbohydrates? Adam Drewnowski, director of the Human Nutrition Program at the University of Michigan School of Public Health, says that carb craving is a mancrave; what we're really keen on is a combination of sugar and fat. When we dream of that Snickers bar or that spoonful of Haagen-Dazs, what gets our salivary glands going is the combination of the sweetness of the sugar and the richness of the fat. And that mmm-mm-goo feeling we get is not merely our imagination, says Drewnowski.

"Cravings are triggered by some kind of physiological mechanism," he explains, "some urge in the body for self-healing." It's not just psychology; it's also physiology. The chocolate or the ice cream really does make you feel better. According to recent research at the University of Pennsylvania, the biochemical gratification is instant. When sugar is present in the mouth, levels of insulin and

of opiates (natural narcotics) in the brain increase. "That's an immediate hormonal reaction to the presence of sugar. It happens too quickly for the sugar to have reached the stomach," says Drewnowski.

In experiments on rats at Johns Hopkins University, researchers observed an analogous effect—the rats were less responsive to pain when given sugar and fat. They traced the rats' reaction to this combination to their earliest experiences as newborns. Mother's milk in rats contains opiate peptides. This produces an immediate numbing effect in the infant rat. The good feeling derived from the intake of sweet/fat milk laced with opiate peptides encourages the baby rat to suckle again. And the milk fat supplies it with most of the calories essential for growth and development.

The craving for fat in particular has been studied by Susan Schiffman, psychologist at Duke University, in her work with people who are obese. "People overeat because they have a need for high flavor and texture in their food—namely fat," says Schiffman. "Take out the fat in your diet, and you take out the flavor." Schiffman proposes that each of us has a "flavor set point," a level of flavor that allows us to be satisfied by the food we eat. "Until we reach that set point," says Schiffman, "we tend to keep eating, and overweight people appear to have a higher flavor set point than an average-weight person."

What can be done to alleviate an over-eater's cravings? Simple. If it's flavor he craves, give him a double-barreled barrage of it, without the calories. Schiffman has developed products for Nutri-System, Inc., of Willow Grove, Pennsylvania, including Flavor Enhancers and Flavor Chews. Enhancers are low-cal powders made to pour over cheese, butter, chocolate, bananas, even on Mexican or Italian dishes to bring out the flavor. Chews, chunks of calorie-free textured fruit, keep your tongue and jaws busy and your appetite satisfied. Schiffman's experiments have shown that the extra blast of flavor helps to keep people on low-fat diets.

On the opposite end of the scale from the people who crave more and more flavor are those who confuse flavors or can barely taste anything at all—people with so-called taste disorders. Not surprisingly, new work in the field of taste disorders is being pioneered by Carl Plattmann, who came out of retirement to work on the project with his former student Bartoshuk. Only this time Plattmann himself is the guinea pig. As he discusses his new work in his office at Rockefeller University on the Upper East Side of Manhattan, he draws a neatly folded handkerchief from the breast pocket of his blazer and raises his half specs to wipe his eyes. The left one has been giving him trouble recently, tearing often. This is a vestige of an illness Plattmann suffered six months ago, herpes zoster ob-

cus (chicken pox virus), which left one side of his face paralyzed and caused deafness in one ear. Ironically, Plattmann's illness deprived him completely of his ability to taste anything at all on the left side of the front of his tongue.

"I came down with the disease last May," recalls Plattmann. "I was delirious for four days. They even had me in a straitjacket in the hospital." Undaunted by his illness and its debilitating consequences, Plattmann has spent the last six months working with Bartoshuk, measuring the process of regeneration. "It's fascinating that one of the most famous people in the taste world has developed a taste disorder and that, as a scientist, he is studying it," Bartoshuk says.

Though Plattmann had lost some of his ability to taste, he had no awareness that anything had happened to his sense of taste until Bartoshuk isolated and tested specific areas. "Now it's regenerating, and he and I are measuring that regeneration," she says.

The National Institutes of Health (NIH) in Bethesda, Maryland, estimates that more than 10 million Americans suffer from chemosensory (taste and smell) disorders. And NIH studies from the early Eighties suggest that more than 200,000 people visit doctors each year complaining of problems with taste or smell. People who suffer from depression such as anhedonia, a condition characterized by an inability to experience any kind of pleasure, often complain that food tastes like cardboard. Many other people seek help because of distorted tastes—sugar doesn't taste sweet, or quinine bitter. After inquiring about past accidents, taste researchers usually find that the person with confused tastes has injured the back of his head.

Viral infections and extremely bad colds can also cause taste disorders—both temporary and permanent. And during dental or ear surgery the taste nerves may be severed. "Unfortunately, there's still very little we can do for people with taste disorders," Bartoshuk says. For people who have lost taste sensations, "we try to help them concentrate on other sensory experiences like textures and temperature," she says.

The most troublesome disorder, what the experts call a "phantom" taste, particularly a salty or bitter phantom, in which the person tastes salt, for example, even though the stimulus isn't present. Researchers don't know what causes the phantom phenomenon, whether the source is in the oral cavity or in the brain. Several years ago a woman arrived at the clinic where Bartoshuk works complaining of an intense salt phantom that lived on the tip of her tongue. It never, never went away. Bartoshuk poked the tip with a topical anesthetic. The phantom didn't move. Then Bartoshuk anesthetized the whole tongue. The phantom became stronger, actually doubling in saltiness.

Like epilepsy, there is activity in the brain that needs to be turned off, and a phantom sensation may be produced by some sort of epileptic activity. When a neurologist administered an anticonvulsive drug to the woman, the phantom disappeared. "We took her off the drug, and the phantom returned," Bartoshuk says. "There was nothing else we could do." But after two years, the phantom spontaneously disappeared.

Many people undergoing chemotherapy treatment for cancer often complain of a bitter phantom. Bartoshuk suspects, based on her studies, that these people are especially sensitive to bitter tastes. She claims that people differ in their sensitivity to bitter tastes, and the reason is genetics. Based on studies with the chemical phenylthiocarbamide (PTC), scientists believe that two thirds of the US population find PTC extremely bitter. They are called tasters. The one third who don't taste anything are the nontasters. If you're

---

As the year 2000 rolls in, we'll opt to charge our tongues with "electric taste." Fruits and vegetables, charged with either positive or negative electrodes, will erupt in our mouths with flavor.

---

a taster, then you have the gene for tasting certain kinds of bitter, says Bartoshuk, and the gene is dominant; if you're a nontaster, the gene is recessive. Bartoshuk thinks that patients who complain about bitter phantoms from chemotherapy drugs are PTC sensitive. Tasters say that many substances are bitter to them, including caffeine, saccharin, potassium chloride (salt substitute), cabbage, Swiss cheese, Brussels sprouts, broccoli, and calcium-enriched cottage cheese. Tasters also find a variety of sweets to be more intense than nontasters do.

Genetic differences aside, senior citizens often complain that as they grow older, they are less able to discriminate among flavors, saying they can't savor the flavor of a peppery pizza as well as they could when they were younger. These flavor losses, however, reflect loss of smell, says Bartoshuk. Taste remains relatively unimpaired. "I've done work with the elderly and the extraordinary thing is that when I tested people with a mean age of eighty-four, their taste data looked like those of Yale undergraduates. Some researchers argue that there

is a certain loss in ability to detect bitter or salty, but the loss is very small. What's going on? Smell is the culprit, most scientists think. Between the ages of sixty-five and eighty, half the population experiences some loss of smell. Over eighty, almost everyone demonstrates some loss, from mild to severe.

There are many gaps in our knowledge of taste (and smell) partly because of funding problems. Miller laments that "government agencies and medical schools tend to place a higher priority on funding based on the questions, 'How severe is the debilitation?' and 'How many people are complaining?'" Miller thinks this attitude is changing slowly.

By the beginning of the next century 40 percent of the population will be older than fifty. Given the demographics of an aging population, Miller says, "we'll have an elderly population that can't see or hear too well. They quit reading, they quit listening to the radio, but they continue to eat. No matter what else is gone, they can still enjoy a meal. It all has to do with maintaining a certain basic quality of life." And so researchers await the day when the remaining riddles of taste will be solved. Bartoshuk is eager to determine the genetic differences among individuals. "I think we live in different taste worlds," she says. "When a family sits down to the dinner table, each person is probably having a different taste experience." If this is true, does it mean our ability to taste is influenced by our genes? she asks. "It's time to find out." One of the big empty areas in our knowledge, Bartoshuk claims, is how the central nervous system processes taste. As yet there are no theories.

Researchers also hope to decipher the way the brain actually codes taste. Scott Hermans, assistant professor in the neurobiology and behavior laboratory at Rockefeller University, proposes that biophysicists, unraveling the mysteries of taste physiology, might stumble upon how the brain codes information from all the senses. "Taste is simpler than the mechanisms for hearing or sight," says Hermans. "The mechanism that can detect the presence of and identify a chocolate bar is obviously less sophisticated and complex than the mechanism that can read the word *sweet* on a page and differentiate it from the word *chocolate*," he says. As researchers discover the intricate functions of the brain, "perhaps those of us in taste research may get the payoff first because taste is a simpler sense."

Over and over again we're getting the message from nature that there's something terribly important about the intimate workings of taste, so important that it kicks in right at birth, survives even if severely damaged, and continues throughout most people's lives. □

Reported by Melanie Menagh, Ellen Kines, Justin Kapas, and Joan Goldberg

# FIDDLEHEAD

CONTINUED FROM PAGE 70

counter at INK. When Michael trotted off to the back of the store, I looked at my reflection and said, "Now you did it."

He was back in no time. "Look at this. You want to see something beautiful? Look at this." He handed me something in a blue velvet case. I opened it and saw the Dixie fountain pen.

"But you told me that you'd never heard of them."

His voice was hurt and loud. "It is not a Dixie fountain pen. It's a Sibbad. An original, solid-gold Sibbad made at the Benjamin Swire Fountain Pen Works in Konstanz, Germany around 1915. There's a rumor the Italian futurist Antonio Sant'Elia did the design, but that's never been proven. Nice, isn't it?"

It was nice, but he was so angry I wouldn't have dared say it wasn't. I nodded eagerly. He took it back. "I've been selling pens twenty years, but I've only seen two of these in all that time. One of them was owned by Walt Disney and I have the other. Collector's value? About seven thousand dollars."

"Won't the Dixie people get in trouble for copying it?"

"No, because I'm sure they either bought the design or there are small differences between the original and this

one. Let me see that brochure again."

"But you have an original, Michael. It still holds its value."

"That's not the point. It's not the value that matters. I'd never sell this."

"You know the classic 'bathtub Porsche'? One of the strangest, greatest-looking cars of our time. Some smart, cynical person realized that and is now making fiberglass copies of the thing."

"But it's a lie car, Juliet, sniff it and it smells only of today—little plastic things and cleverly cut corners you can't see. Not important to the car but essential to the real object."

"The wonder of the thing was Porsche designed it so well and thoughtfully so long ago. That's art. But the art is in its original, everything, not just the look or the convincing copy."

"I can guarantee you that your Dixie pen has too much plastic inside where you can't see and a gold point that probably has about a third as much gold on it as the original. It looks good, but they always miss the whole point with their cut corners."

"Look, you're going to find out sooner or later, so I think you better know now."

"What are you talking about?"

He brought a telephone up from beneath the counter and gestured for me to wait a bit. He called Lenna and in a few words told her about the Dixies, my discovery of them...

Michael was looking at me when he asked, "Did he tell you he was doing that, Lenna?"

Whatever her long answer was, it left his expression deadpan. "Well, his going to bring Juliet home. I want her to meet him. What? Because we've got to do something about it, Lenna? Maybe she'll have an idea of what to do. Do you think this is normal? Oh, you do? That's interesting. Do you think it's normal for me?" A dab of saliva popped off his lip and flew across the store.

When Michael opened the door, Lenna stood right on the other side, arms crossed right over her chest. Her soft face was scrunched into a tight challenge. "Whatever he told you probably isn't true, Juliet."

I put up both hands in surrender. "He didn't tell me anything, Lenna. I don't even want to be here. I just showed him a picture of a pen."

Which wasn't strictly true. I showed him a picture of a pen because I wanted to know more about Dixie and maybe my five-thousand-dollar earrings. Yes, sometimes I am nosy.

Both of the Rhodesses were calm and sound people. I don't think I'd ever seen them really disagree on anything important or raise their voices at each other.

Michael growled, "Where is he? Eating again?"

"Maybe. So what? You don't like what he eats anyway?"

He turned to me. "Our guest is a vegetarian. His favorite food is plum pits."

"Oh, that's mean, Michael. That's really mean." She turned and left the room.

"So he is in the kitchen? Good. Come on, Juliet." He took my hand and pulled me behind on his stalk to their visitor.

Before we got to him I heard music. Ragtime piano. Scott Joplin?

A man sat at the table with his back to us. He had long red hair down over the collar of his sport jacket. One freckled hand was fiddling with the dial on a radio nearby.

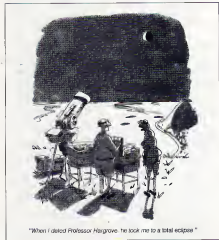
"Mr. Fiddlehead? I'd like you to meet Lenna's best friend, Juliet Skotchdopole."

He turned, but even before he was all the way around, I knew I was sunk. What a face! Ethereally thin, with high cheekbones and deep-set green eyes that were both merry and profound. Those story-book eyes, the carroty hair, and freckles everywhere. How could freckles suddenly be so damned sexy? They were for children and cute advertisements. I wanted to touch every one on him.

"Hello, Juliet! Skotchdopole, is it? That's a good name. I wouldn't mind having it myself. It's a lot better than Fiddlehead, you know."

His deep voice lay in a hammock of a very strong Irish accent.

I put out a hand, and we shook. Looking down, I ran my thumb once quickly, softly across the top of his hand. I felt hot



"When I asked Professor Hargrove, he took me to a total eclipse."

# The Artist

© ART CUMINGS



and dizzy, as if someone I wanted had put his hand gently between my legs for the first time.

He smiled. Maybe he sensed it. There was a plate of something on the table next to the radio.

To stop staring so embarrassingly at him, I focused on it and realized the plate was full of plum pits.

"Do you like them? They're delicious." He picked one off the shiny orange-brown pile and putting the stony thing in his mouth, bit down on it. Something cracked loud, like he'd broken a tooth, but he kept his angel's smile on while clenching away on the plum pit.

I looked at Michael, who only shook his head. Lenna came into the kitchen and gave Mr. Fiddlehead a big hug and kiss. He only smiled and went on eating pits.

"Juliet, the first thing you have to know is I lied about your birthday present. I didn't make those earrings—Mr. Fiddlehead did. But since he's me, I wasn't really lying." She smiled as if she was sure I understood what she was talking about. I looked at Michael for help, but he was poking around in the refrigerator. Beautiful Mr. Fiddlehead was still eating.

"What do you mean, he's 'you'?" Michael took out a carton of milk and at the same time a plum, which he exaggeratedly offered his wife. She made

a face at him and snatched it out of his hand. Being it, she said, "Remember I told you I was an only child? Well, like a lot of lonely kids, I solved my problem the best way I could—by making up an imaginary friend."

My eyes widened. I looked at the red-headed man. He winked at me.

Lenna went on, "I made up Mr. Fiddlehead. I read and dreamed so much then that one day I put it all together into my idea of the perfect friend. First, his name would be Mr. Fiddlehead because I thought that was the funniest name in the world—something that would always make me laugh when I was sad. Then he had to come from Ireland because that was the home of all the leprechauns and faeries. In fact, I wanted a kind of life-size human leprechaun. He'd have red hair and green eyes and whenever I wanted the magical ability to make gold bracelets and jewelry for me out of thin air."

"Which explains the Duke jewelry in the stores?"

Michael nodded. "He said he got bored just hanging around, so I suggested he do something useful. Everything was fine so long as it was just the earrings and key chain." He slammed the glass down on the counter. "But I didn't know about the fountain pen until today. What's with that, Fiddlehead?"

"Because I wanted to try me hard at it. I loved the one you showed me, so I thought I'd use that as my model. Why not? You can improve on perfection. The only thing I did was put some more gold in it here and there."

I put my hand up like a student with a question. "But whose Dues?"

Lenna smiled and said, "I am. That was the secret name I made up for myself when I was little. The only other person who knew it was my secret friend." She stuck her thumb in his direction.

"Wonderful! So now Dues fountain pens, which are lousy rip-offs of Sribeds, will be bought by every asshole in New York who can afford to buy a Paget watch or a Hermes briefcase. It makes me sick." Michael glared at the other man and waited belligerently for a reply.

Mr. Fiddlehead's reply was to laugh like Woody Woodpecker. Which cracked both Lenna and me up.

Which sent her husband storming out of the kitchen.

"Is it true?"

They both nodded.

"But I had an imaginary friend, too, when I was little! The Bimbergoon! But I've never seen him for real!"

"Maybe you didn't make him real enough. Maybe you just cooked him up when you were sad or needed someone to talk to. In Lenna's case, the more she



## Everyday People on CompuServe

### Take a Trip.

Whether you travel for business or pleasure, CompuServe can help you get a better handle on it. You'll have access to information from virtually every major domestic and international airline,

right at your fingertips. So, you can compare fares, select your route and the most convenient travel times—even book your reservations, right down to the car rental and hotel.

Before you travel abroad, verify passport and visa requirements in advance. And, if you're going to a new resort, try the Travel Forum for firsthand tips from people who have been there before. Call 800 848 8399, or see your computer dealer. You'll find CompuServe is just the ticket, when it comes to traveling anywhere.

*"I often fly from New York to Europe, and if I plan my flight online, I can save \$150 to \$200 on that trip alone. In the last year, I've saved enough money to buy a round-trip ticket to Paris."*

—Eric Sponderica, Systems Consultant

# CompuServe®

needed me, the more real I became. She needed me a lot. One day I was just there for good.

I looked at Lenna. "You mean he's been here since you were a girl? Living with you?"

She laughed. "No. As I grew up I needed him less. I was happier and had more friends. My life got fuller. So he was around less." She reached over and touched his shoulder.

He smiled, but it was a sad one, full of memories. "I can give her pots of gold and do great tricks. I've even been practicing ventriloquism and can throw my voice a little. But you'd be surprised how few women love ventriloquists."

"If you will excuse me, I think I'll go in the other room and watch TV with the boys. It's about time for *The Three Stooges*. Remember how much we loved that show, Lenna? I think we saw one episode at least ten times. The one where they open up the hardening salon down in Mexico?"

"I remember. You loved Moe, and I loved Curly."

They beamed at each other through the shared memory.

"But wait, if he's... what you say, how come he came back now?"

"You didn't know it, but Michael and I went through a very bad period a little while ago. He even moved out for two weeks, and we both thought that was it: no more marriage. One night I got into bed crying like a fool and wishing to hell Mr. Fiddlehead was around again to help me. And then suddenly there he was, standing in the bathroom door smiling at me. She squeezed his shoulder again. He covered her hand with his own.

"God, Lenna, what did you do?"

"Screamed! I didn't recognize him."

"What do you mean?"

"I mean he grew up! The Mr. Fiddlehead I imagined when I was a child was exactly my age. I guess as I got older, so did he. It makes sense."

"I'm going to sit down now. I have to sit down because this has been the strangest afternoon of my life." Mr. Fiddlehead jumped up and gave me his seat. I took it. He left the room for television with the boys. I watched him go. Without thinking, I picked up Michael's half-empty glass of milk and finished it. "Everything that you told me is true?"

She put up her right hand. "I swear on our friendship."

"That beautiful man out there is an old dream of yours?"

Her head recoiled. "Ooh, do you think he's beautiful? Really? I think he's kind of funny looking, to tell the truth. I love him as a friend, but—she looked guiltily at the door—"I'd never want to go out with him or anything."

But I did, so we did. After the first few dates I would have gone and hunted rats with him in the South Bronx if that's what he liked. I was completely gone for him.

The line of a man's neck can change your life. The way he digs in his pockets for change can make the heart squawk and halids grow cold. How he touches your elbow or the button that is not closed on the cuff of his shirt are demons he's locked without ever knowing it. They own us immediately. He was a thoroughly compelling man. I wanted to rise to the occasion of his presence in my life and become something more than I'd previously thought myself capable of.

I think he began to love me, too, but he didn't say things like that. Only that he was happy or that he wanted to share things he'd held in reserve all his life.

Because he knew sooner or later he'd have to go away (where he never said, and I stopped asking), he seemed to have thrown all caution to the wind. But before him, I'd never thrown anything away: caution included. I'd been a careful reader of timeables, made the bed tight and straight first thing every morn-

He picked one off the shiny orange-brown pile and, putting the story thing in his mouth, bit down on it. Something cracked loud, like he'd broken a tooth, but he kept his angel's smile.

ing, and hoted dishes in the sink. My life at forty was comfortably narrow and ordered. Going haywire or off the deep end wasn't in my repertoire, and normally people who did made me squint.

I realized I was in love and haywire the day I taught him to play racketball. After we'd batted it around an hour, we were sitting in the gallery drinking Coke. He flicked sweat from his forehead with two fingers. A hot, intimate drop fell on my wrist. I put my hand over it quickly and rubbed it into my skin. He didn't see. I knew then I'd have to learn to put whatever expectations I had aside and just live purely in his jet stream, no matter where it took me.

That day I realized I'd sacrifice anything for him, and for a few hours I went around feeling like some kind of holy person, a zealot, love made flesh.

"Why does Michael let you stay?"

He took a cigarette from my pack. He'd begun smoking a week before and loved it. Almost as much as he liked to drink, he said. The perfect Irishman.

"Don't forget he was the one who left Lenna. Not vice versa. When he came

back he was pretty much on his knees to her. He had to be. There wasn't a lot he could say about me being there. Especially after he found out who I was. Do you have any plum pits around?"

"Question two: Why in God's name do you eat those things?"

"That's easy, because plums are Lenna's favorite fruit. When she was a little girl, she'd have tea parties for just us two. Scott Joplin music, imaginary tea, and real plums. She'd cut the fruit, then put the pit on my plate to eat. Makes perfect sense."

I ran my hand through his red hair, loving the way my fingers got caught in all the thick curls. "That's disgusting. It's just like slavery! Why am I getting to the point where I don't like my best friend so much anymore?"

"If you like me, you should like her, Juliet—she made me."

I kissed his fingers. "That part I like. Would you consider moving in with me?"

He kissed my hand. "I would love to consider that, but I have to tell you I don't think I'll be around very much longer. But if you'd like, I'll play with you until I, uh, have to go."

I sat up. "What are you talking about?"

He put his hand close to my face. "Look hard and you'll see."

It took a moment, but then there it was: from certain angles I was able to see right through the hand. It had become vaguely transparent.

"Lenna's happy again. It's the old story—when she's down she needs me and calls." He shrugged. "When she's happy again, I'm not needed, so she sends me away. Not consciously but look, we all know I'm her little Frankenstein monster. She can do what she wants with me. Even dream up that I like to eat sucking plum pits."

"It's so wrong!"

Sighing, he sat up and started pulling on his shirt. "It's wrong, but it's life. Sweet girl. Not much we can do about it, you know."

"Yes, we can. We can do something."

His back was to me. I remember the first time I'd ever seen him. His back was to me then, too. The long red hair falling over his collar. When I didn't say anything more, he turned and looked at me over his shoulder, smiling.

"We can do something? What can we do?"

His eyes were gentle and loving, eyes I wanted to see for the rest of my life.

"We can make her sad. We can make her need you."

"What do you mean?"

"Just what I said, Fiddy. When she's sad she needs you. We have to decide what would make her sad a long time. Maybe something to do with Michael. Or the children."

His fingers had stopped moving over the buttons. Thin, artist's fingers. Freckles. DO

# INTERVIEW

CONTINUED FROM PAGE 35

most certainly wrong. Most working scientists assume that misconduct is no problem at all. It's alarming how little we actually know about the level of scientific misconduct. Dr. Jerome Jacobstein, formerly at Cornell University Medical College, testified before Congress that he believed twenty-five percent of scientific papers may be based in part on data that's been intentionally fudged. That's a shocking figure, but it's conceivable.

**Omn:** What's the difference between misconduct and fraud?

**Stewart:** Fraud is fabricating results with the intent to deceive. Misconduct is simply behavior that most scientists consider unacceptable. If researchers cut corners they'd be ashamed to admit to in public and go ahead and publish the research anyway that might be misconduct. If they're simply ignorant of correct methodology, that's just poor science.

**Omn:** How much misconduct do you suppose is out-and-out fraud and how much is error?

**Stewart:** Wait a minute. I wasn't talking about error. Error is absolutely intrinsic to the process of science. In trying to roll back the frontiers of knowledge, you're guaranteed to make mistakes. In sci-

ence—unlike say, accounting—we have to expect that people will make lots and lots of errors. And that means we have a responsibility to deal with those errors, whether it's our own, a colleague's, or anybody else's. It may be okay to make errors, but unless they're minor, it's not okay not to fix them.

**Omn:** You recently returned from an investigation of the so-called "impossible experiment" of Dr. Jacques Benveniste. What reaction did he say he saw?

**Stewart:** The researchers were measuring the way white blood cells react to an antibody from the human immune system. The antibody, anti-IgE [anti-immunoglobulin E], causes white blood cells to release histamine, which is what happens when people have an allergy attack. When you add a particular blue stain to a sample of white blood cells, the cells that have not released their histamine turn red. You measure the strength of the reaction by counting the red-stained cells in your sample under a microscope.

The researchers in Paris were measuring the reaction using progressively weaker solutions of anti-IgE in water. They made a series of one-to-ten dilutions—that is, they poured one-tenth of the IgE solution into a new test tube and filled the other nine tenths with water. Now, if you make those dilutions four times in a row, you're left with only one ten thousandth

as much of a dissolved substance as you started with. After you've made fifteen dilutions in a row, the chances are there's just a single molecule of the substance still in solution. Make two more dilutions, and there is only one chance in one hundred thousand that you've got any molecules of the anti-IgE left at all. That's only twenty dilutions, but Benveniste reported that after twenty-five dilutions, he was still observing a strong effect! His researchers did experiments with one hundred twenty dilutions in a row, and they still claimed to get an effect.

**Omn:** Did they try the experiment using just water?

**Stewart:** Yes. They said plain water didn't give the effect.

**Omn:** Benveniste's paper in *Nature* last summer caused quite an uproar. Were he correct, what would the implications have been?

**Stewart:** It would have meant, first of all, that doctors could expect to treat certain diseases with water instead of medicine. But more broadly, the whole basis for experimental biological science would be called into question. The universal experience of scientists has been that the effects in any reaction are due to what is there, not to what was there. Benveniste's results seemed to show that water molecules "remember" so to speak, previous contacts they've had with other mole-



## Everyday People on CompuServe

### Communicate.

When it comes to getting your message through, nothing delivers like EasyFlex<sup>®</sup>, CompuServe's electronic mail service. Businesses, families, and friends can communicate

across the country, and around the world. Through EasyFlex, members can also communicate with MCI Mail<sup>™</sup> and Telex<sup>®</sup> users, as well as send fax messages directly from their computers.

*"I bought my son in New York a CompuServe package and modem, and we often keep in touch that way. It's nice to be able to send messages or share files when we need to."*

—David Seib, Attorney

—James Seib, Physician

There are hundreds of discussion Forums and the original CB Simulator, where you can "talk" to other members from all ages, professions, interests, and cultures. Call 800-848-8195, or see your computer dealer. The next time you want to drop someone a line, simply go online.

**CompuServe<sup>®</sup>**

cules long after those other molecules are gone. Benveniste's findings were absolutely extraordinary, especially because his work appeared to have been so carefully done.

**Orrin:** I understand that homeopaths were cheered by his results.

**Stewart:** Yes. Benveniste's results seemed to show that homeopathy has a scientific basis. Homeopathy claims to treat human ailments with solutions so enormously diluted that they actually don't contain any molecules other than water. It's a branch of pseudoscience that scientists don't take seriously.

**Orrin:** How did you get the opportunity to test Benveniste's findings?

**Stewart:** I was one of several scientists John Maddox, the editor of *Nature*, asked to review Benveniste's original manuscript in 1987. Benveniste let an inspection team visit his lab because Maddox made this inspection a condition of *Nature*'s publishing the paper. The team consisted of Maddox, me, and James Randi, a professional magician known for his outstanding work showing that various paranormal claims have no factual basis. Randi's job was to ensure that Benveniste's people were doing what they said they were doing—to prevent trickery in other words. My job was to make sure they weren't doing something wrong without realizing it, like putting their thumbs in their samples.

**Orrin:** When did you first notice anything unusual?

**Stewart:** We learned as soon as we got to the lab that the experiments weren't always successful. This flabbergasted me because up until then it had been either said or implied that the experiment never failed. If Benveniste's article had said, "We sometimes observe these results," it would have been a great deal less publishable. He'd first have had to answer the question: What are you doing sometimes that you're not doing at others?

**Orrin:** Did you notice other odd things?

**Stewart:** Well, one astonishing thing we found out was that the experiments worked best—by far—when one particular scientist, a Dr. Elisabeth Davenas, was doing them. Her salary, we also learned, was being paid by a French company selling homeopathic medicines. Now to put the kindest interpretation on this, one researcher can have a "touch" that another lacks. But even so, right away the science is less convincing. Experiments that work intermittently pose a problem. When you have trouble repeating an experiment, you've got to fix that before you publish the result, not afterward. And other odd things turned up. Researchers had to agitate the series of solutions violently for exactly fifteen seconds, as I recall, for the experiment to work. That sort of thing is a tonal of homeopathy, as it happens. Another member

of Benveniste's team turned out to be a practicing homeopath, which hadn't been mentioned before our visit.

**Orrin:** How did your own investigation proceed?

**Stewart:** At first the three of us just stayed out of the way while Davenas carried out the experiment three times. The first experiment was fairly successful; the second and third spectacularly so. In the fourth experiment, we agreed that she would read the slides in a blind fashion, meaning she would look through the microscope and count the number of micro-stained cells without knowing what dilution they had been treated with. This experiment, too, was a striking success.

**Orrin:** So in every case a strong reaction seemed to occur even using astronomically diluted solutions?

**Stewart:** Yes. Finally we did three more experiments. This time Davenas prepared the dilutions while I watched very carefully. The test tubes were then placed in front of a video camera, and Davenas left the room. The video camera made an objective, unbroken record of what we did. In that way we couldn't be accused later of mistakes or deliberately introduced errors. We then relabeled all of the test tubes with a random code. The key to the code was sealed in an envelope and taped to the ceiling of the lab in full view of everyone. At the last minute I suggested we add five controls—test tubes with plain water only. Once we began mixing on ground rules for the experiment, the atmosphere in the lab grew increasingly tense. We began to encounter objections, even animosity from the staff. Until then Benveniste had been extremely friendly, greeting us on our arrival with delight. Davenas, on the other hand, had maintained an extremely guarded attitude during our entire stay. We had planned to pour everything into a new set of test tubes so the tubes themselves couldn't have been secretly coded. But the French objected, saying that they couldn't be sure of the effect of transferring a solution to a new test tube.

**Orrin:** How could they object to that?

**Stewart:** Well, it was neither extraordinary. Randi and I had begun making lists of all the little things that they said could interfere with the experiment: the source of the blood, the quality of the stain or the distilled water, the number of ordinary blood cells, the age of the chemicals, observer fatigue, pipetting more than twice—the list went on and on. Earlier Benveniste had drawn me aside and told me in an elated way, almost alarmingly so, about some mathematical theory that a series of one-to-nine dilutions—I don't recall the exact number—would lead to a reaction, while one-to-ten dilutions would be just inconceivable. The whole situation began to seem very silly.

**Orrin:** In these final experiments, did you also insist on tightening up the way cell counts were made?



**Stewart:** Yes, we arranged for two researchers to read the slides without knowledge of the other person's counts. These people had never attempted to take into account observer bias and didn't seem to understand the necessity of doing so! Whenever you're measuring something, you have to ask what your errors in measuring are. Counting chickens is relatively simple. But in counting cells with red granules under a microscope, you have a number of decisions to make. Do you count cells with bluish-red granules? What about cells with purple granules or faded pink granules? People sometimes count the same cells twice. Whenever you use a human as a scientific instrument, as you do when you have an observer count or measure something by eye, you have to find out how prone they are to making mistakes.

**Orent:** So no one knew how successful these final tests were until the codes were unveiled at the end of the day?

**Stewart:** That's right. And as the time came to pull the envelope containing the codes off the ceiling in order to decode the observations, the tension present during the experiments dissolved into euphoria. Benveniste seemed enormously confident that the results were going to be positive. He had even scheduled a press conference immediately after the code was to be broken. By this time I

was pretty certain the experiments would turn out to be failures and was feeling extremely uncomfortable.

Benveniste is an emotional man. Everything was being videotaped, and he was saying things like, "Someday these videotapes will be famous." He even told Maddox that when this was over he'd be happy to offer him a job. He was apparently serious, but I was flabbergasted. Even the world's top scientists don't go around offering jobs. John Maddox, who, as editor of *Nature*, already has a rather distinguished job, I found Benveniste's euphoria a little odd.

**Orent:** Were the experiments a failure?

**Stewart:** Well, when we were about eight or ten test tubes into decoding the first experiment, Benveniste said, "That blood's not working. Try another!" His comment seemed to be a metaphor for what they had been doing all along. It was soon clear that none of the experiments had worked. As we were working out the results in the conference room, one of Benveniste's secretaries put her head in through the door and said, "Dr. Benveniste, the TV cameras are here." And he said, "Tell them to go away. Tell them we will be in discussion all day!" There was enormous excitement in the French media about this, you see. Homeopathy seems to be much more popular in France than it is here. In Paris you see

homeopathy remedies advertised all over the place.

**Maddox:** Randi, and I all felt it was important at this point to inform Benveniste of the grave reservations we had about the way he and his staff had conducted their experiments. Randi made the point that extraordinary claims require extraordinary proof, explaining that if a man claims to have a goat in his backyard, you might verify this by calling up a neighbor and asking him to look over his fence to check. But if the man claims to be keeping a unicorn in his backyard, you'd want a higher standard of proof.

**Orent:** Did Benveniste argue with you?

**Stewart:** Yes, fiercely, almost angrily. I actually thought Benveniste had taken advantage of us. We'd wasted a lot of effort coming there simply because he had not disclosed all the facts he knew. I thought I had a duty to advocate my belief as forcefully as possible. It was never a screaming match, but I wouldn't call it a casual conversation. The whole situation was unpleasant for everybody. People in the lab were crying. On our way out we noticed one of the staff putting away bottles of champagne, unopened.

**Orent:** Did Davenia cheat or not?

**Stewart:** That's certainly one explanation. But whether Davenis was cheating or not, among all of the gross breaches of proper scientific practice that we saw



## Everyday People on CompuServe

### Sit Down and Shop.

No matter how close you live to the local mall, it'll never be as convenient as CompuServe. Because The Electronic Mall® is as close as your keyboard, and it's open 24 hours a day.

You'll find a wide variety of shops you might not normally find locally like Bloomington's or the Metropolitan Museum of Art gift

*"Prices in the Mall are very good for comparison shopping, especially for someone like me who lives in a small town where there's only one store, and no software."*

—Greg Foster, College Student

shop. There's a discount shopping club called Shopper's Advantage™. You can talk directly to merchants. And you can make informed shopping decisions with *Greenover Reports* online.

Call 800 848-8299 or see your computer dealer. Then, instead of shopping 'til you drop, you can just pull up a chair.

## CompuServe®



Jack Bateman  
a Jack Daniel's whiskey maker  
since 1956

## From the makers of Jack Daniel's...

there, observer bias was certainly a key factor. Numerous studies have shown that when you know what result is expected of you, you're more likely to reach the result that fits your theory. When Dawkins counted the same slide more than once, her duplicate counts were too good—they were in closer agreement than sampling error and the laws of probability allowed. When we pointed this out to Benveniste, he said, "But you don't understand how meticulous her technique is!" He just didn't understand.

**Ques:** What was your first investigation of scientific misconduct?

**Stewart:** The John Dansee case, although it wasn't actually Dansee whom Ned Feder and I investigated. A heartbreak, Dansee had worked at Emory University and Harvard Medical School. His peers considered him to be a brilliant researcher. He had published an unusually large number of papers for someone so young. In 1981 he was being offered an assistant professorship at Harvard when some people in his lab noticed that he had fabricated a piece of evidence. When confronted, Dansee admitted to only this one fabrication.

As Harvard alumni Feder and I received a report from the school detailing its own investigation of the matter. We immediately saw very serious flaws in the investigation, which concluded that Dan-

see had fabricated no more than three related pieces of evidence in his career. As scientists, we knew that the evidence the Harvard committee reviewed couldn't possibly have supported that conclusion. When the NIH re-investigated the matter some time later, it discovered a huge amount of fraud. Dansee had fabricated data on an absolutely blatant scale throughout his career.

**Ques:** Whom did you investigate?

**Stewart:** We decided it would be interesting to tabulate the practices of the scientists who had coauthored papers with Dansee. We simply read the reports the investigative committees at Harvard and Emory had written and then Dansee's papers. There were eighteen full-length research papers, three book chapters, and eighty-eight abstracts.

We were astonished to see that Dansee's papers contained a very large number of obvious errors. For example, one paper, published in *The New England Journal of Medicine*, introduced a human pedigree [genealogy] showing the inheritance of a new disease that the paper described. It later turned out the entire pedigree was fabricated. I noticed the paper included a seventeen-year-old with this disease. He was listed as having four children, including an eight-year-old daughter. We thought the journal's referees should have caught this kind of thing.

Instead, it was published right there in Figure 1 of the lead article in what is widely considered to be the leading journal of medicine. When I phoned up Dr. Arnold Reizen, the journal's editor, to call his attention to this, he said instantly, "That's a misprint." Well, obviously it wasn't. The seventeen-year-old's age was mentioned twice elsewhere in the article. **Ques:** How did Dansee's coauthors react when you started calling them up?

**Stewart:** Those who were completely cooperative were a minority. Some felt quite threatened, which is understandable. One Harvard professor refused to talk to us at all. Our overall tally showed thirty-five of the forty-seven coauthors engaging in scientific practices that would not generally be considered acceptable. Some had made false statements that they either knew or, in our judgment, should have known were false. An example would be hiding the fact that the control for an experiment had been done a year before. This would make the experiment look much stronger than it actually was.

Many of the errors were minor, probably caused by haste. But some—like the seventeen-year-old with four children—were so fundamental as to undermine the truthfulness of the paper as a whole. Some statements gave the appearance of an intent to deceive. I believe coauthors, except in cases where they're col-

laboring across disciplines, have a responsibility to ensure the accuracy and truthfulness of the entire paper.

**Omni:** What became of your report on Darsheel's coauthors?

**Stewart:** We sent a draft off in 1983 to Maddox, who was quite interested in publishing it. The draft also went to many of the coauthors. Shortly after that, Nature, the NIH, and Ned and I began to receive letters from lawyers clearly implying that we'd all be sued for libel if Nature published our report. We spent a year and a half replying to these arguments and wrote about fifty different drafts, trying to accommodate the lawyers.

Finally we withdrew the paper and sent it informally to about fifteen other journals. All but one said, "No, we couldn't even consider it." Well, a journal at MIT was actively moving toward publication but then made two unusual stipulations. The first was that we take complete financial responsibility for any litigation involving the journal or MIT. We agreed, although I'd never do that again. The second was that we agreed never to discuss the subject with anyone in any forum. This was later softened to five years but was still unacceptable to us. We felt that scientists have an absolute right to say what they believe.

Eventually we resubmitted it to Nature, reluctantly agreeing to a few last changes

It's amazing how the longer you wait, the more flexible you become. Nature published it in 1987. No one was sued. We didn't even receive angry letters. We got hundreds of letters from the scientific community many saying the problem was worse than we'd described.

**Omni:** Have you any concrete suggestions for raising report standards?

**Stewart:** Individual scientists can make a personal commitment to keeping their data. Many of Darsheel's collaborators had failed to retain all their lab records—results of experiments, measurements on patients, things like that. Few data should be saved for a few years.

With present attitudes it's difficult for an outsider to ask for a scientist's raw data without appearing to question that person's integrity. But that attitude absolutely has to change. You have to distinguish among three things: new ideas, proving them with experiments, and finally documenting your proof and publishing it. I've never suggested that anybody has a right to anybody else's unpublished research. But once you publish a paper, you're in essence giving its ideas away. In return for benefits you gain from that—fame, recognition, or whatever—you should be willing to make your lab records and data available. And there is another reason for full disclosure. Published experiments should be re-

peatable. A published report can never disclose everything you did in the lab. But you have an obligation to describe the most important parts. A scientist trying to repeat another scientist's work is essentially like someone reading a recipe out of a cookbook.

**Omni:** But famous chefs are notorious for concealing hard-won secrets.

**Stewart:** Look, the whole idea of science is to communicate your findings and methods. One of the beautiful things about science is that you build on others' results. Two or three centuries ago scientists often held back essential parts of a procedure to protect their positions. Antoine van Leeuwenhoek, who was honored by [Britain's] Royal Society for discovering microbes, never revealed how he built his microscopes. Today no one thinks that's satisfactory, although it's still sometimes done.

**Omni:** You haven't published very much yourself—less than a dozen papers after nearly twenty years of research. Why?

**Stewart:** I publish only when I have something I think is worth communicating to other scientists. That hasn't happened frequently. If I were pressured to publish more papers, it's doubtful I'd make more discoveries. There are something like eight thousand biomedical journals publishing papers today and most of these papers are unimportant and un-

## To the drinkers of Jack Daniel's.

Our very own, very special recipe for sippin' Jack Daniel's in the wintertime.

JACK DANIEL'S  
TENNESSEE MUD  
½ oz. Jack Daniel's  
½ oz. Amaretto  
Mug of Coffee  
Whipped Cream



© 1994 Jack Daniel's Inc. All rights reserved. Jack Daniel's, Old No. 7, and Tennessee Whiskey are trademarks of Jack Daniel's Inc. Amaretto is a registered trademark of Amaretto S.p.A. All other trademarks are the property of their respective owners.

basically dull. What's important is not how much you publish but what you discover and whether it's useful.

**Omni:** One significant discovery of yours has to do with something called wildlife toxin. What is it?

**Stewart:** Wildlife toxin is a chemical produced by a bacterium that causes a disease of tobacco plants. The disease used to spread like wildfire, hence the name, although it was brought under control long ago. The late D. W. Woolley, a brilliant experimental scientist (despite being totally blind since the age of twenty-five), had studied the toxin. In the Fifties he published a paper describing its molecular structure, but it later proved to be wrong.

I decided to use modern methods to determine the molecule's structure. I thought I could do it using old chemicals that Woolley had left behind in his lab at Rockefeller University, where I had been a graduate student after he died. His widow and I went over his old test tubes and notebooks looking for his results. The experience turned out to be fascinating. Here's a practical example of error in science being corrected through the sharing of data. Woolley was sharing his data with me after his death by means of his carefully kept lab records and chemicals. I was actually able to pick up the research where he left off. After I went to the NIH, I solved the toxin's molecular structure and published it in *Nature*.

**Omni:** What research have you worked on more recently?

**Stewart:** One very exciting piece of work I did that's proved useful to others is the synthesis of Lucifer yellow, a fluorescent dye. You inject it with a thin glass needle into nerve cells that are maybe one fifth the width of a human hair, and all of the nerve endings become not only visible but fluorescent. The dye never existed before—I had to invent it. I must have made a hundred different dyes trying to find one with the properties I wanted. It was an obsessive, mad hunt for a miracle reagent. When I finally succeeded and began to get these images under the microscope that no one had ever seen before, beautiful images of nerve cells glowing against a black background, it was incredibly exciting.

**Omni:** What do you think about NIH deputy director J. Edward Rall's comment about you wasting your talent?

**Stewart:** Perhaps he believes investigating scientific practices isn't important. If so, I disagree. Scientific misconduct affects not only the health of science but also the public's perception of whether or not scientists care about the sort of thing. In doing an investigation, I'm both using my skills as a scientist and following my own interests.

I remember noting that pedigree of the seventeen-year-old with the eight-year-old daughter in *The New England*

*Journal of Medicine*. We had been wading through all these very complex medical papers, and it wasn't obvious what we were going to find, if anything. All of a sudden to make this unexpected discovery—it was exhilarating. I felt the joy of discovery that I think all scientists feel when they suddenly understand something they didn't before.

**Omni:** Arnold Reisman recently accused you and Feder of having "antagonized a mission that nobody has given [you and] have set [yourselves] up as more or less grand inquisitors."

**Stewart:** That's inaccurate. We've used ordinary scientific methods in our investigations of scientific papers. We had no unusual powers to get this material. It's true that nobody specifically gave us this mission, but nobody told me to synthesize Lucifer yellow either. I just decided I was going to do it. As I recall, Reisman's comment refers to our challenge to the accuracy of the paper David Bolam's group published in *Cell* in 1986. Scientists must feel free to challenge a paper if they have evidence suggesting it's wrong.

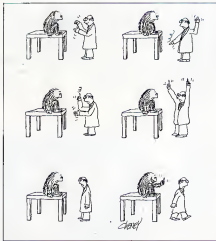
**Omni:** The *Berkeleyside* after wasn't the first time you contributed a published rebuttal of someone's paper in *Nature*.

**Stewart:** Right. There was the scotophobin paper in 1972. Scotophobin was the name given to a chemical that was said to transfer learned information between rats. You'd allow a rat to enter a dark box, which rats like to do, then you'd punish it with an electric shock. After the rat learned to avoid the box, you supposedly extracted from its brain this chemical, scotophobin—scoto means "dark," phobos means "fear." When you injected the chemical into other rats, these rats supposedly acquired an instant fear of the dark. It seemed to be the first demonstration of learning caused by a chemical, not experience. A scientist in Texas claimed to have discovered it. Other teams confirmed the phenomenon. If it had been real, it would have profoundly advanced our understanding of learning.

*Nature* sent me the scotophobin manuscript for review. I wasn't impressed with the data, and I suggested that *Nature* ask the authors to put their best evidence together, then ask an expert to write a rebuttal. *Nature* chose me to write the rebuttal. The scientists were not willing to publish all their data, which was a tip-off that there were problems.

**Omni:** What was the gist of your rebuttal?

**Stewart:** They had used their mass spectrometer to analyze the chemical's composition. [The mass spectrometer displays each chemical's composition as a unique spectrum, like a fingerprint.] But they had used the results selectively. They didn't present the whole spectrum. I got a spectrum of a completely unrelated chemical and, using their reasoning, showed that it fit their analysis just as well. What they were extracting from the rats



brems could have been any number of things. The authors were allowed a fifteen-hundred-word reply to my analyses, in which, as I recall, they complained of not having enough time to reply and advanced some pretty poor scientific arguments. No one believes in the existence of scotophobin today.

**Omri:** You said several other labs had confirmed the scotophobin phenomenon. How do you explain that?

**Stewart:** Observer bias—wastful thinking. It happens all the time. Just after the turn of the century a respected French physicist named Blondiot discovered a phenomenon he called N-rays. This was supposedly a new kind of radiation given off by a variety of sources: heated metal, the sun, even muscles. Blondiot believed N-rays passed through aluminum, and he carried out experiments using an aluminum prism to focus the radiation. A number of other laboratories confirmed his observations. Nature got involved too, agreeing to publish a report by American physicist R. W. Wood, who went to France to see for himself. When Blondiot wasn't looking, Wood slipped the aluminum prism into his pocket. The effect continued to work perfectly, utterly demolishing the basis of Blondiot's theory, which was instantly discredited in most of the scientific community. But as so often happens, Blondiot and some colleagues remained convinced of the validity of what they thought they'd observed. So the next time you hear someone arguing that independent repetition of experiments will show up bad results quickly, you can remind them of N-rays.

**Omri:** Arnold Reiman and others insist that peer reviews weed out bad science before it gets into journals. So why are investigations necessary?

**Stewart:** Peer review, to Dr. Reiman, means that bad stuff doesn't get into his journal, that's all. That's clearly wrong, because John Dasek had a field day with *The New England Journal*. The only function peer review ever serves is to decide which magazine an article gets published in. There's virtually no article so bad it's not publishable somewhere. Peer review doesn't control the quality of what's published; it just assigns a rating. Journals have a pecking order. If your piece doesn't get accepted by a first-rate journal like *The New England Journal*, you can always drop down to a third- or fourth-rate journal. As for fraud, it's almost never detected by peer review or by attempts at replication. Fraud is usually discovered only when an insider tells someone else about it, as with Caserio. Somebody rats. Bear in mind, though, that the results of a fraudulent experiment may be perfectly correct.

**Omri:** There have been suggestions in Congress that scientific fraud be treated as a white-collar crime.

**Stewart:** I don't agree. First, scientific fraud already breaks various laws. If you

misrepresent your results in a grant application, you're lying to the government to get money, and that's illegal. Second, the problem of fraud is so complicated and poorly understood that using legislation as a remedy could do more harm than good. I would prefer to see scientists solve the problem themselves.

**Omri:** How does the NIH now handle allegations of misconduct that it receives?

**Stewart:** Until recently it had an office staffed by two full-time people and one part-time secretary, responsible for reviewing allegations on approximately five billion dollars' worth of research. The office received allegations about only a tiny amount of misconduct, approximately twenty-four claims a year.

Before the congressional hearings last April, Ned and I estimated we were receiving about a hundred allegations a year. The rate has probably gone up since then. Typically, researchers who believe they have evidence of fraud or miscon-

---

**•Fraud is  
almost never detected by  
peer review or  
by attempts at replication.  
It's usually  
discovered only when an  
insider tells  
someone else. Someone rats. •**

---

duct are apprehensive about going through the standard channels. So we can't tell them they won't suffer professional harm if they choose to proceed. Even if people have documented their allegations in detail, if they report their allegations to anyone, it usually gets back to their university. Universities in the past haven't been very sympathetic to those so-called whistle-blowers.

Jerome Jacobstein, for example, accused a colleague at Cornell of improper conduct. The colleague was exonerated in a meeting that lasted only two hours and resulted in a single handwritten slip of paper. The disruption to Jacobstein's career afterward was enormous. He had to spend thirteen thousand dollars of his own money on legal fees related to defending his charges. The NIH finally concluded that he was right in almost all of his allegations. The people who make their charges stick are usually, like Jacobstein, extraordinarily tenacious. Whistle-blowers are often accused of being malcontents, but that's not been my perception at all. They tend to be people who believe strongly in making the sys-

tem work. If anything, they're a bit naive about their chances.

**Omri:** It has been widely publicized that you refused to mow your lawn and that your neighbors are furious.

**Stewart:** First of all, we do mow an acre around the house but have let the other six acres become a meadow. The house is in a neighborhood of large homes with large lawns. The first year we owned the house, we bought a tractor and mowed everything. The following year I began to question why we were mowing that whole seven acres, maintaining an ecological monoculture. We thought it would be better just to let it go wild, giving birds and mammals a habitat they sorely need.

Very quickly our five-year-old figured out that the reason we have rabbits and our neighbors don't is that rabbits need tall grass to hop off into. Now we've had four or five hummingbird pairs, hawks, bluebirds, a pilated woodpecker, a fox for a while, and all sorts of mice, wood chucks, mooons, opossums, even deer. The county cited our meadow as a health hazard, and it was going to take us to court to make us mow it. There is a real question about whether that would have been constitutional. I told the prosecutor we were planning to bring in nine or ten national experts on our side—it was going to be a trial to end all trials. She said, "Maybe we just won't go forward with this." **Omri:** Didn't *Science* run a half-page article on your lawn?

**Stewart:** The way *Science* handled that was a disgrace, especially because they've given my work on matters of science little coverage. Then a half page to my lawn. Of all the articles about this, *Science's* was among the least thoughtful and most gossipy. Even the article People did on our lawn battle was more thoughtful. The scientific establishment is obviously unhappy with some of the things Ned and I are doing. I'm not the only person to see the *Science* article as an attempt to discredit me personally.

**Omri:** The editors of the two top American scientific journals, *Science* and *The New England Journal*, criticize your investigative work. Does this bother you?

**Stewart:** The main thing that bothers me is that I don't understand their criticisms—Reiman's comment that write "needlessly inflaming" the issues in the Baltimore case, for instance. We've asked people to criticize our work on the basis of its factual accuracy or appropriateness to specific issues. When people make general criticisms like that, I don't even know what they're trying to say. In a way, these editors are agreeing with us, because now they're at least discussing the question of misconduct publicly. We wanted a public debate—not with this degree of acrimony perhaps, but a debate—and that's starting to happen. You're pointing out a success of ours. We aroused the attention of two very prominent editors. **□**



yond which both men could not proceed without committing themselves. Dr. Au sighed, made a fateful gesture and said, "Well, then, Mr. —glancing at the card on his desk—"Ramirez, what can I do for you?"

"Toror rose up in Kleisterman then. Almost, almost, he got up and fled. But he mastered himself. And as he pushed himself low down, guilt and self-hate and anger rose, black and brooding and strong. None of this had reached his face."

"I want you to destroy me," Kleisterman said calmly.

Dr. Au looked first surprised, then wary—assessing the situation for signs of potential entrapment—then, after a pause, almost regretful. "I must say this is somewhat out of our line. We're usually asked to supply illicit fantasies, clandestine perversions, occasionally a spot of nonconsensual behavior modification." He looked at Kleisterman with curiosity. "Have you thought about this? Do you really mean what you say?"

Kleisterman was as cool as ice now, although his hands still trembled. "Yes, I mean it. I used to be in the business; I used to be an operator myself, so I can assure you that I understand the implications perfectly. I want to die. I want you to kill me. But that's not all. Oh, no." Kleisterman leaned forward, his gaunt face intense. His voice rose. "I want you to destroy me. I want you to make me suffer. You're an operator, an adept, you know what I mean. Not just pain, anybody can do that. I want you to make me pay." Kleisterman slumped back in his chair, made a fated gesture. "I know you can do it. I know you've done it. I know you are discreet. And when you're done with me, a hundred years subjective from now, you can get rid of my body discreetly, and no one will ever know what happened to me. It will be as if I had never existed." His voice roughened. "As if I had never been born. Would to God I had not been."

Dr. Au made a noncommittal non-sapped his fingers together thoughtfully. His face was fixed as though in his life he had been made to see more deeply than he cared to into the human soul. His eyes glinted with interest. After a polite pause he said, "You must be quite certain of this for later there will be no turning back. Are you sure you won't reconsider?"

Kleisterman made an impatient, despairing gesture. "I could have put a bullet in my head at any time, but that means nothing. It's not enough; not nearly enough. There must be retribution. There must be restitution. I must be made to pay for what I have done. Only this way can I find solace."

"Even so—" Dr. Au said, doubtfully. Kleisterman held up his hand. Moving

with slow deliberation, he reached into an inner pocket, produced a coded credit slip. "All my assets," he said, "and they are considerable." He held the credit slip up for display, then proffered it to Dr. Au. "I want you to destroy me," he said.

Dr. Au sighed. He looked left; he looked right; he looked down, he looked up. His face was suffused with dull embarrassment. But he took the credit slip.

Dr. Au ushered Kleisterman politely into an adjacent room, stood by with sad patience while Kleisterman removed his clothing. At a touch, a large metal egg rose from the floor, opened like a five-petaled flower, extruded a narrow metal bench or shelf. Dr. Au gestured brusquely; Kleisterman lay down on the bench, wincing at the touch of cold metal on his naked skin. Dr. Au leaned close over him, his face remote now and his movements briskly efficient, as though to get it all over with quickly. He taped soft cloth pads first over Kleisterman's left eye, then over his

◆His skin began  
to prickle over every inch  
of his body, as  
feathery probes contacted  
his nerve endings,  
and as the pricking began  
to fade, with it  
went all other sensation.◆

right. There was a feeling of motion, and Kleisterman knew that the metal shell was sliding back into the machine, which would be retracting around it, the petals closing tight to form a featureless steel egg with him inside.

Darkness. Silence. At first, Kleisterman was aware of a sense of enclosure, was aware of the feel of the metal under his back, could even stir a little, move his fingers impatiently. But then his skin began to prickle over every inch of his body as feathery probes made contact with his nerve endings, and as the pricking began to fade with it went all other sensation. He could no longer feel his body no longer move; no longer wanted to move. He didn't have a body anymore. There was nothing. Not even darkness. Not even silence. Nothing. Nonexistence. Kleisterman looked in the void, waiting for the torment to begin.

This kind of machine had many names—simulator, dream machine, iron maiden, imager, shadow box. It fed coded impulses through the subject's nerves directly into the brain. With it, the operator could make the subject experi-

ence anything. Pain, of course. Any amount of pain. With a simulator you could torture someone to death again and again, for years of subjective time, without doing them any actual physical harm—not much comfort for the subject in that, though, since to them the experience would be indistinguishable from objective reality. Of course, the most expert operators scorned this sort of thing as hopelessly crude, lacking in effectiveness. Not artistic. Pain was only one key that could be played. There were many others. The subject had no secrets, and with access to the subject's deepest longings and most hidden fears, the skilled operator, the artisan, the clever craftsman could weave cunning scenarios much more effective than pain.

Kleisterman had been such an operator, one of the best, admired by his colleagues for his subtlety and ingenuity and skill. He had clandestinely "processed" thousands of subjects for his multinational and had never felt a qualm, until suddenly one day, for no particular reason, he began to sicken. After Donaldson, Ramaswamy, and Koko, three especially difficult and unpleasant jobs, he had sickened further and, for the first time in his life, began to have difficulty sleeping—and, when he did sleep, began to have unquiet dreams. Then Melissa had somehow become the target of corporate malice and had been sent to him for her ministrations. By rights he should have declined the job, since he knew Melissa and had even had a brief affair with her once, years before. But he had had his professional pride. He did not turn down the job. And somewhere deep in her mind, he had found himself, an emboldened and idealized version of himself as he had never been, and he realized that while for him her affair had been unimportant, for her it had been much more intensely charged—that in fact, she had loved him deeply and still did.

This discovery brought out the very worst in him, and in a fever of sick excitement, he created scenario after scenario for her. After life, each scenario working some variation on the theme of her love for him, and each time, "his" treatment of her in the scenario became worse, he betrayed of her up and more humiliating, the pain and shame and anguish he visited on her more severe. He turned the universe against her in grotesque ways, too, so that in one life she died in a car wreck on the way to her own wedding, and in another life she died slowly and messily of cancer, and in another she was hideously disfigured in a fire, and in another she had a stroke and lay paralyzed for years as a semi-aware paralytic in a squalid nursing home, and so on. Each life began to color the next not with specific memories of other existences but with a dark emotional residue, an unspoken, instinctual conviction that life was drab and bitter and harsh, with

nothing to look forward to but defeat and misery and pain, that the dice were stacked hopelessly against you—*is*, in fact, they were. Then, tinge of subtlety, irresistibly tempted to put aside his own aesthetic precepts, he began to hit her, in the scenarios—at first just slapping her around in drunken rages, then beating her severely enough to put her in the hospital. Then, in one scenario, he picked up a knife. Several lifetimes subjective later, the heart in her physical body finally gave out, and she died in a way that was no more real to her than the dozens of times she'd died before, but which put her at last beyond his reach. He had been dismayed to discover that in the deepest recesses of her mind, below the fear and hate and bitterness and grief, she loved him still, even at the last. He switched off the machine, and he awoke, as from a fever dream, as though he had been possessed by a demon of perversity that had only now been exorcised, to find himself alone in his soundproofed outside with the simulator and Mekka's cooling body. He betrayed the cooption on his next assignment, seeing the subject rather than "processing" him, and from then on he had been on the run. He had found that he could successfully hide from the multinational, hiding from himself had proved more difficult.

Light exploded in his head, and it took

a second for his vision to adjust and to realize that the patch over his left eye had been removed. Dr. Au leaned in over him again, filling his field of vision like a god, and this time Kiesterman felt the painful yank of tape against skin as Dr. Au ripped the other eye patch free. More light. Kiesterman blinked, disoriented and confused. He was out of the machine. Dr. Au was tugging at him, "getting him to sit up." Dr. Au was saying something, but it was a blur of noise, harsh and hurtful to the ears. He pawed at Kiesterman again and Kiesterman shook him off. Kiesterman sat, head down, on the edge of the metal bench until his senses readjusted to the world again, and his mind cleared. His skin prickled as sensation returned.

Dr. Au tugged at Kiesterman's arm. "A red security flag came up on your credit account," Dr. Au said. His voice was anxious, and his face was pinched with fear. "There was a security probe. I barely avoided it. You must leave. I want you out of here right away."

Kiesterman stared at him. "But you agreed—" he said thickly.

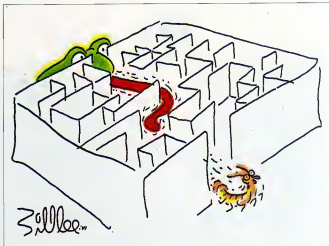
"I want nothing to do with you, Mr. Ramirez," Dr. Au said apprehensively. "Here, take your clothes, get dressed. You have some very ruthless forces opposed to you, Mr. Ramirez. I want nothing to do with them, either. No trouble. Leave now. Take your business elsewhere."

Slowly Kiesterman dressed, manipulating the clothes with stiff, clumsy fingers while Dr. Au hovered anxiously. The office was filled with watery gray light that seemed painfully bright after the darkness inside the simulator. Dust motes danced in suspension in the light, and a fly hopped along the adobe edge of the open window before darting outside again. A dog was barking out there somewhere, a cat, faraway sound, and a warm breeze puffed in for a second to ruffle his hair and bring him the smell of pine and juniper. He was perceiving every smallest detail with exquisite clarity.

Kiesterman pushed wordlessly by Dr. Au, walked through the outer office and out into the dusty hallway beyond. The floor was scuffed, grime between the tiles, and there were pooling water stains on the ceiling. A smell of cooking food came up the stairwell. This is real, Kiesterman told himself fiercely. This is real, this is really happening, this is the real world. The multinational boys aren't subtle enough for that; they wouldn't be satisfied with just denying me solace. Letting me go on. They're not that subtle.

Are they? Are they?

Kiesterman went down the narrow stairs. He dragged his fist against the rough adobe wall until his knuckles bled, but he couldn't convince himself that any of it was real. **DD**



# DR. DATABASE

## BOOKS

By A.J.S. Rayl

**A**fter your doctor runs a battery of tests and renders his diagnosis, how do you know he's giving you all the facts? Is he explaining all your options—or only those he believes in? Do you know enough to make a decision about your treatment?

If you really want to know everything about your illness and your alternatives, you could consult medical specialists and pore over reams of published reports. Or you could enlist the aid of the World Research Foundation (WRF) in Sherman Oaks, California.

"The foundation is really the library of the future, a Grand Central Station of global medical research," says WRF cofounder Steve Ross.

With access to 400 databases of traditional and alternative medicine, WRF computers scan more than 5,000 medical journals from 100 countries, including the Soviet Union and China. The nonprofit health and environmental information center's library contains more than 10,000 books, periodicals, and research reports. The volumes include information on practically every form of traditional and alternative medical treatment—from chemotherapy and color therapy to herb pill therapy and acupuncture. There's also information on such hazards as electromagnetic fields, radiation, and pollution. Some WRF texts date back hundreds of years while others are so new they're unknown to many medical practitioners in this country. Many of WRF's materials can't be found in medical or university libraries or elsewhere.

WRF branches, with their own on-site libraries, have been established in Sedona, Arizona, and Stuttgart, West Germany, with another scheduled to open soon in Chicago. The Rosses hope to open centers in 29 major cities.

When they met in 1983, Steve Ross and his future wife, Laverne, shared a mutual interest in creating "a place where people could go to learn about their options to the pharmaceutical and chemical approach to medicine." They pooled their lives' savings, rented

office space, and opened WRF in 1984.

Since that time the Rosses have made eight overseas trips, touring various medical and scientific institutes, colleges, and laboratories and establishing the WRF network. On a recent journey to West Germany, for example, they visited a clinic where doctors are using a 100-year old therapy that induces fever to "burn up" a patient's cancer cells.

In another West German clinic, the Rosses found researchers studying the effects of ozone pyrotherapy, a process that enriches blood with ozone, in fighting the AIDS virus. "The German newspapers have reported the results of the therapy," Steve Ross says. "But the American public hasn't been informed about ozone pyrotherapy because it doesn't involve a drug."

While there is no charge for using the library yourself, the WRF staff will conduct personalized research for a nominal fee of \$30. The basic computer search provides abstracts of the 26 most recent articles on any particular

subject. You can, of course, obtain abstracts of all the available articles or even the complete texts. The fee, however, rises according to your request.

WRF searches do not differentiate between clinical studies and anecdotal evidence—unless you request one or the other. You can also obtain reports that are critical of a specific treatment. The foundation, however, does not offer interpretations of or judgments on research findings. "We created the foundation to accumulate and disseminate information in an unbiased manner," Steve Ross says.

The American Medical Association (AMA) encourages patients to learn as much as possible about their diseases. But that information, it cautions, should not be considered a substitute for the diagnosis and instruction of a licensed physician. The AMA takes no official position on holistic medicine, self-healing, or other alternative therapies. But, it asserts, a patient who follows nontraditional medical advice ignores a physician's advice. To avoid conflict and possible malpractice suits, moreover, many physicians will likely discontinue treating patients who are undergoing nontraditional therapies.

The purpose of the WRF, Ross points out, is not to antagonize or undermine the AMA. "But we can no longer overlook techniques that seem to have success in other countries," he says. "We don't care whether that information comes from the Harvard Medical School or the jungles of Brazil. We're more interested in people's results, not their titles."

The Rosses also want to encourage and aid medical research. To that end, they are expanding the WRF's operations with the World Research Fund to seek and distribute financial support. "The fund will be a way of proving or disproving electrical, light, color, and other alternative therapies," Ross says. "Some of them have been around for decades and have been successful in many cases. But mainstream scientists in this country aren't interested in validating them with their own studies." □



A research service that has heart



Imagine that you are holding a pump, ripe lemon in your hand. Hold the picture in your mind until you can smell the lemon's fresh scent. Imagine slicing off a thick, juicy wedge and then taking a big bite. As the tartness of the lemon juice hits your taste buds, your cheeks curl and your lips pucker.

Let the image fade. What remains? The inside of your mouth is actually primed with saliva. This simple demonstration of the power of the imagination is impressive, but consider a study conducted by Robert Kunzendorf, a cognitive psychologist at the University of Lowell in Massachusetts. Kunzendorf attached electrodes to the eyes of 20 subjects, five of whom were capable of producing very vivid mental images, and had them look at colored lights that were flashed in front of them. He discovered that each color affected the retina differently. Red produced one electrical pattern, green another, and so on. Kunzendorf then asked the five subjects who were superb at producing vivid images to imagine the colors one by one, he found that their imagined colors produced the same effects on the eye. More amazing, when Kunzendorf flashed a colored light at these subjects and asked them to imagine that it was another color, they regularly reported seeing the other color, and 25 percent of the time their eyes responded as though they were perceiving the imagined, not the actual, flashing color.

Other researchers have also charted connections between what people fantasize or imagine and the biological mechanisms involved in actually performing those activities. As far back as the 1930s, Edmund Jacobson found that if you imagine or visualize yourself doing a particular action—say, lifting an object with your right arm—the muscles in that arm show increased electrical activity. Other scientists have found that imagining an object moving across the sky produces more saccular (eye) movements than visualizing a stationary object.

More recently, a number of researchers have begun ex-

ARTICLE

## PICTURES OF HEALTH



BY ANEESA SHEIKH

amining how the images we produce influence our health. One of the first doctors to use imagery as part of a therapeutic program was O. Carl Smolton, a radiation oncologist in Dallas. By combining relaxation with personalized images, he has helped terminal cancer patients reduce the size of their tumors and sometimes experience complete remission of the disease. His patients might visualize their white blood cells as white knights, the forces of good that attack and triumph over the dark force of cancerous cells. Other doctors, including Bernie Segel, author of the best-selling *Love, Medicine, and Miracles*, have also successfully helped cancer patients improve their health with imagery exercises.

Because everyone has a different ability to produce vivid images, some people will benefit more from positive-imagery techniques than others. Nevertheless, health practitioners have found them useful in healing a wide variety of problems and disorders, including depression, insomnia, sexual dysfunction, asthma, and breast tumors. Despite the success of imaging in healing, however, little is known about why or how imagined pictures affect the immune system. Joanne Achterberg, a psychologist at the University of Texas Health Science Center, suggests that emotions may form the link between mind and immunity. "Many of the autonomic functions associated with health and disease," she explains, "are emotionally triggered."

The images we produce may subtly change our emotions, creating either a positive or a negative effect on our immune systems. As evidence of this, researchers J. K. Kiecolt-Glaser and the late physician Hans Selye documented the lowering of immunity in people suffering from depression and/or stress. The killer T cells, which fight infections, are less active during depression and periods of emotional stress, making it less to gain a foothold. For many people, engaging in "guided imagery" during stressful times has helped bolster their immunity.

PHOTOGRAPHS BY ELLEN SCHUSTER

## PICTURES OF HEALTH

If mental imaging can help people overcome disease, it may also help healthy individuals keep their immune systems in top form. Practicing daily positive-imagery techniques may, like a balanced diet and a physical exercise routine, tip the scales of health toward wellness. The eight exercises below are designed to help you do this. Researchers have yet to conduct controlled studies in which the effectiveness of such techniques on healthy people is measured, so you should think of these exercises as an experiment. Keep track of your responses, and chart for yourself what effect the procedures seem to have over a period of time.

Before attempting each technique, read through it carefully until you feel that you have absorbed its essence and can practice it with your eyes closed. (You can also record the imaging technique and play the tape while you practice it.) These exercises should be practiced only when you are able to relax and give them your undivided attention. Allow at least 15 minutes for each. (As you become more skilled, you will probably want to take more time.) At the conclusion of each imaging session, slowly count to five and then bring yourself back to your surroundings. Take a few minutes to orient yourself before you return to your usual activities.

In the beginning, do not try



all the techniques. Stick with the first few exercises for a week and then expand your repertoire with more. If you find, within a few days, that one of the methods is not helpful, do not continue using it—concentrate on some of the other exercises. A word of caution: Anyone with a serious physical, mental, or emotional problem should consult a physician or therapist before employing these exercises. Finally, while most readers will quickly relax and begin to benefit from these activities, a few may find that the images persistently evoke anxiety and discomfort. If this occurs, seek professional guidance on the use of methods such as those that follow.

### 1. STRESSBUSTER

**Purpose:** Studies show that people who lead stress-filled lives may be at an increased risk for heart disease, stroke, and other serious disorders. Stress may also be at the root of many minor ailments, including headaches, stomach disorders, and skin problems. This imagery exercise is designed to slow heart rate and raise body temperature—physiological changes that signify a relaxed state. In workshops, patients using this image have discovered that many of their minor stress-related health problems have disappeared within a few weeks. To measure the success of the image, take your pulse and temperature before and after

the exercise. You should experience a drop in heart rate (about ten beats a minute less than before) and a rise in body temperature. Do the exercise during lunch hours or after work. With practice, achieving a completely relaxed state will become as natural as flexing a muscle.

**Technique:** Loosen any tight clothing you're wearing and assume a relaxed position. Take a deep breath and hold it for a while. Now let it go. Take another deep breath and hold it again. The time when you let go, make the sound *Heaaaaaa*. Now breathe normally for a few moments and concentrate on nothing else except your own breath.

Next, when you inhale tell yourself, *I am*, and when you exhale tell yourself, *relaxed*. *I am (inhaling) relaxed (exhaling)*. Repeat this a few times. When you say the word *relaxed* to yourself, let your body slowly sink deeper and deeper into the chair, rug, or bed.

During the day, you spend a great deal of your energy fighting the force of gravity. Now for a few moments let that force take over completely. Let every muscle, every fiber, every cell in your body be pulled down and down—farther and farther down—Feel your body slowing down and your mind slowing down. There is no rush—no hurry. There is nowhere you have to go, nothing you have to do. Tensions and frustrations are gradually seeping out of your system. Every time you breathe in, imagine that you are breathing in a wonderful

glow of relaxation and every time you breathe out, imagine that you are breathing out all of your tensions, fatigue, and frustrations. A feeling of peace washes over you and through you. It is so calm, so quiet... so silent. The silence feels warm and comfortable and healing... deeply healing. You feel at ease... and at peace... at peace with yourself and all that is around you... at peace with the universe.



in response to stress and anxiety—in their bloodstreams than did a group of soldiers who didn't know how much farther they would have to hike. That first group of hopeful soldiers was also far more likely to finish its march than the second, more pessimistic group. By focusing on the positive we may be able to bolster our immunity to disease and gain the strength that's needed to achieve our goals. Try this

## 2. HEALING MEMORIES

**Purpose:** Like stress, feelings of depression tend to weaken the immune system. When we focus on unpleasant events in our past, we often become pessimistic. The power of positive thinking is more than a cliché; researchers are discovering that having hope can produce physiological changes that make and keep us healthy. In a series of studies, Shlomo Breznitz, director of the Center for the Study of Psychological Stress at the University of Haifa in Israel, discovered, for instance, that soldiers who knew that the end of a long march was in sight (and therefore had hope) had far less prolactin and hydrocortisone—hormones released

image in the morning, just after waking and then again at night, before going to sleep. You might find it helpful to record your "new" experiences of happy events in a journal, adding a few each day. You may think that you'll quickly run out of uplifting memories, but once you start concentrating on the positive, you will recollect much more of it in your past—and in your present.

**Technique:** Find yourself a quiet place, and make yourself comfortable. Take a deep breath, hold it for ten seconds, and let it go. Repeat several times. Now breathe normally. With every breath, feel your body slowing down and your mind slowing down. Let outside noises and the verbal chatter in your mind fade away. They are



becoming fainter... and fainter... and fainter.

A number of happy events occurred in your past. You have not thought of some of them for a long time. Some were big events; others were just incidents. But they all made you feel happy, joyful. Perhaps it was your wedding... or the birth of your first child... or the recognition of your achievements by someone whose opinion mattered a great deal to you. Any scenes of events when you experienced others' kindness, compassion, and love... when you, in turn, felt kind, compassionate, secure, elated, successful... on top of the world. Do not merely call these events to mind—relive them. Experience once again the sights, sounds,

smells, textures. Take your time. Dwell on each image until it renews the original feelings in the very center of your being. Enjoy your feelings thoroughly before you move on to the next event.

## 3. THE ENERGIZER

**Purpose:** An instant detenser, this exercise helps you to relax and get focused right before undertaking a stressful event. It is designed to relax muscles and increase blood flow.

**Technique:** Close your eyes and relax. Imagine that your body consists of billions of cells tightly packed together. If you were to look at a sample of actual body tissue through a powerful microscope, you would discover that its cells are not so close together but have

## PICTURES OF HEALTH



some space between them. Now imagine that the cells are being crushed together from head to toe; your body is a tightly packed mass.

Now let some space creep back in between the cells. Create even more space between the cells than was lost there. All of these trillions of cells now have room to breathe, to move around.

Imagine that all of these cells throughout your body are beginning to move in a very rhythmic way. They are beginning to dance. You can feel this beautiful dance of life going on from head to toe. Each and every cell in your body is participating in this dance—dancing to the rhythm of life. You feel full of energy, joy bubbles up in you. You feel like a bottle of

champagne that has just been opened.

After you have fully experienced this joyful dance, retain the wonderful feelings it has left in you. Then gently bring yourself back to your surroundings and slowly open your eyes.

### 4. ALLMENT ANTIDOTE

**Purpose:** Minor infections and viruses may be avoided or made less severe by employing techniques similar to those used by cancer patients who have successfully shrunk tumors through imaging. The hypothesis is that imaging can create the same physiological changes in the body that a real experience can. For instance, at the 1985 World Conference on Imaging, registered nurse Carole Pajon reported that people

who used this imagery technique to heal wounds recovered more quickly than those who did not. In workshops, the same technique has been used by individuals suffering from colds with similar good results.

**Technique:** Many doctors believe that to heal various physical disorders, we must imagine the physiological function of the body part that has become diseased or otherwise disabled. Then we can

needs arising. Imagine yourself building new healthy cells or sending cleansing blood to an unhealthy organ or area. If you have a headache, picture your brain as a rough bumpy road that needs smoothing, and proceed to smooth it out. The point is to focus on the area you believe is causing you to feel sick, and to concentrate on imagining it to be well.

Practice this until you sense that you are healing.



help heal it by picturing the organ in a healthy state, working properly. For example, if you have a sinus infection, the doctor might show you a picture of the sinus passageways and cavities and ask you to imagine that the mucus is beginning to undo and that your sinus passageways are opening up. Or if you have a kidney disorder, the physician might give you two pictures: one depicting a sick kidney and another showing a healthy kidney. Your task is to imagine that your sick kidney is beginning to look like the healthy one.

In trying to imagine your self healthy, you needn't view realistic representations of the ailing body part. Instead, imagine a virus as tiny spots on a blackboard that

### 5. THE WORRY WHITE-OUT

**Purpose:** Anxiety can burden the body just as depression can. People who tend to worry excessively are prone to a variety of maladies from heart disease to headaches. The next time you feel anxious or can't stop worrying about something, try this ancient exercise.

**Technique:** Relax and imagine that you are sitting in a great meadow on a perfect day. The sky is filled with rainbow lights, and one shaft of the white light has found you. It is brighter than one hundred suns. You feel it warming the top of your head. Now it penetrates your skull and flows into your body. You feel it warming the inside of your head; then it flows down your neck into

your chest. It radiates into your arms, into your hands, right down to your fingertips. The light continues to flow through your abdomen and into your legs, feet, and toes. You feel that you are brimming over with light. The light is cleansing you. All negative emotions and thoughts are dissolved by the light. Imagine that the impurities are leaving you in the form of dark smoke, which is quickly blown away by a gentle breeze. You are left feeling free and joyful.

#### 6. COMBATING INSOMNIA

**Purpose:** One of the reasons animals sleep is to allow their bodies to rest and rejuvenate. People who suffer from bouts of insomnia may be depriving their bodies of this rest and creating added stress on their immune systems. This exercise has helped some insomniacs to overcome the anxiety that keeps them awake. It usually enables them to fall asleep in only ten minutes. A word of caution: If your insomnia is accompanied by severe anxiety or depression, you should consult your physician or psychotherapist.

**Technique:** Try to recall occasions from your past when you were extremely sleepy, when your body ached for sleep, but you had to fight it off due to external demands. Perhaps you had to force yourself to remain awake in order to study for an important examination, to prepare a lecture, or to supervise a machine during the night shift. In all of these



situations, your need for sleep was pitted against a rational and often successful demand, and it was always the latter that won.

As you imagine yourself to be in one of these situations, and as you concentrate on this image, you will begin to feel drowsy. But at this point, disregard the rational demands. For example, tell yourself: *Let someone else take the room or supervise the machine. I am going to sleep. You will slowly feel yourself drifting off to sleep.*

#### 7. RESISTING TEMPTATIONS

**Purpose:** We all know that smoking and excessive eating or intake of alcohol have grave health consequences. The problem is how to break the habit. The

following technique has been shown to work for some people. The idea is to reward and/or punish yourself in your imagination, not in reality.

**Technique:** Imagine that you are in a situation in which alcohol, cigarettes, or junk food is tempting you. You hear a voice inside you say, *Stop! I don't need it anymore. I am free.* There are so many better things in life to enjoy. Picture yourself resisting the temptation. Then reward yourself by imagining yourself in a desirable situation—a favorite outfit; his well again, or you can him along a beach without gasping for breath.

Occasionally, you may imagine that you do not heed the voice that said *Stop*, instead you give in to the

temptation. Then imagine the undesirable consequences: You see yourself fatter; you see your lungs black. Practice this technique several times a day.

#### 8. THE IMPORTANCE OF BEING IN TUNE

**Purpose:** Our bodies may reflect the harmony or disharmony between our desires and actions. If our hearts are out of step with our actions, we may experience stress, anxiety, and depression that seems to come from nowhere. This ancient technique connects you with your inner self, enabling you to do what you really need and want to do.

**Technique:** Close your eyes and relax. Imagine that you are lying on the edge of a lovely forest. The lush green grass is dotted with blossoms. Brightly colored songbirds dart in and out among majestic trees. Sunbeams dance in the cool, clear water of a stream. Mountains rise up in the distance. On one of the peaks you spy a moving white speck. It is radiating a bright light and is slowly moving down the mountain toward you. You are intrigued by this light, and you start walking toward the mountain. As you get closer to the light, you sense it is a wise and compassionate being that knows you completely—your past, your present, your future. You keep on moving toward this being until you are face-to-face. It is your inner adviser. The guide may take the form of someone who is familiar to you, or it may be a stranger. This adviser may

## PICTURES OF HEALTH

not take a human shape but could simply be a wise presence. Talk to this presence about issues in your life. Feel free to ask questions about anything that is on your mind. Wait patiently for the answer. Your communication with this adviser may not be performed through words—but you will understand the guide's message.

When the experience of being with this inner guide seems to be over, express your appreciation for the advice given, and perhaps

*The Potential of Fantasy and Imagination: Imagination and Healing, The Anthology of Imagery Techniques, and Imagery in Education.* Sheikh is a past president of the American Association for the Study of Mental Imagery. For further information about the exercises presented here and about Sheikh's books, tapes, and forthcoming lectures and workshops, contact the American Imagery Institute, Box 13453, Milwaukee, WI 53213, or telephone (414) 781-4045.



make arrangements to meet again. Then gradually allow this image to fade, but hold on to the advice offered. Open your eyes.

It is not advisable to follow the suggestions of the inner guide without first evaluating them carefully. If, after examining these ideas, they seem to make sense and the risk is minimal, try putting them into action.

Anees A. Sheikh, professor and chairperson of the department of psychology at Marquette University in Milwaukee, is one of the leading researchers in mental imagery. He was the founding editor of *The Journal of Mental Imagery* and is currently the editor of *The International Review of Mental Imagery*. His books include

### A PORTRAIT OF HEALING

By Justine Kaplan

It was a wave, a tsunami of sorts, that surged from the Hudson River with a local crest: It crashed through the window of my fourth-floor apartment, but there was no flood. Instead, a winged creature shrouded by downy feathers lodged itself in the broken glass and held the water back. My boss was in the room, and she ordered the creature away. When it was gone, she turned from the window and defiantly ripped away the faux-brick siding that lined the decorative fireplace. "You see," she said, holding the wood paper out for me to examine, "it isn't real."

This was the first dream I



remembered in more than a year. Sleep had been a stranger, my enemy. My body was struggling with the effects of chemotherapy—a regimen of drugs being used to combat Hodgkin's disease, a cancer of the lymphatic system that attacks the body's infection-fighting white blood cells. Weakened by fatigue, nausea, incessant itching, and night sweats, I was fearful of the weeks the night might bring. Fearful of death, more nausea, the unknown. But this day I woke up with a feeling of hope. The dream had come as a gift, and I accepted it as such.

My battle with Hodgkins had begun inauspiciously six months earlier, just after my twenty-sixth birthday. I'd developed a pneumatic cough

and spent my nights wheezing, sweating, and spilling the skin from my hands and feet. The doctor I went to for a physical exam could find no medical explanation for my symptoms and suggested I was suffering from stress and anxiety. He sent me to a neurologist, who referred me to a psychiatrist, who, in turn, recommended a sleep disorder clinic.

The week after I visited the clinic, I started having trouble getting air into my lungs. I went to see an ear, nose, and throat surgeon who had treated me for sinus trouble in the past. He put his hand on my throat and said I had a big problem, adding that I should have trusted my instincts and come to him earlier. He stuck a large needle into my neck and extracted

some fluid to biopsy, then sent me to get a thyroid scan and a chest X-ray.

I'd been working at Omni exactly three weeks when the surgeon called with the biopsy results. He told me to leave work immediately and check into the hospital.

"What is it?" I asked.

"I'll talk to you about it at the hospital," he said.

"Tell me now," I said.

"The lab shows lymphoma," he said.

That night, an intern tried to hook me up to an IV filled with antibiotics. I finished as he dug for a vein that would take the flow. Terrified and in tears, I asked that he stop.

"I would have had it if you hadn't moved," he snapped. He stormed out with his antiseptic tray of bandages and syringes. I curled into a fetal position and tried to sleep, longing that night to be back in the womb.

They did a surgical biopsy on my neck the next morning. I woke up to the smell of flowers. Familiar faces. The surgeon told me quickly that the tumor was malignant. That I had cancer. He said he was hopeful because he saw Reed-Stenberg cells in the microscope. If it was Hodgkins disease, which the cells suggested, my chances of recovery were better than if it were another lymphoma.

How did I get Reed-Stenberg cells? I asked in a post-surgical trance.

This was not an easy question to answer. Because there is no explanation. There is only theory, speculation. A virus. The environment. Genes. Repres-



sion. Chance. "Disease has no morals," someone told me. "Just make sure you don't blame yourself."

Lymphomas are a relatively rare type of cancer, and their causes are not fully understood. About 30,000 cases are diagnosed each year, one third of them Hodgkin's disease. Before 1970 few patients with Hodgkins survived, but major strides in drug treatment have brought the cure rate up to nearly 90 percent.

I got a second opinion from one of the leading U.S. oncologists specializing in lymphoma. He recommended that I begin chemotherapy immediately.

"You're a sensible girl," he said. "I think you want to live. Your chances of recovery are good with this disease,

but if it's not treated fast, it can kill you." Then he told me about the man who made wigs from human hair.

"Call him," he said. "It's expensive but worth it. You have long, thick hair and it's going to be gone in two weeks. Your eyebrows will probably fall out, too."

It wasn't the thought of losing my hair that caused the lump in my throat at that moment. It was the mention of death. It had been avoided until now.

Eugene Ionesco said that fearing death is a petty, human problem. "A cow doesn't think about death," he wrote. "A cow can't potty." But what of the streaking of life of youth? And what about suffering? Chemotherapy, I knew, was not a painless procedure. Leukemia and

stenity—although the worst possible risks—were not petty concerns. And nausea, which I dreaded more than pain, was assured.

After a third consultation my decision was made. Hodgkin's has four stages, and the doctors had agreed that since mine was some where between stage two and stage three chemotherapy was my best option. For the next six months I checked into the hospital on alternate Friday afternoons. The chemotherapy was administered through an IV, in huge syringes filled with red viscous chemicals. It felt like fire burning through my veins. Waves of nausea washed over me as my cells were attacked.

Although I could breathe more easily after the first treatment and the intense itching that had tormented me at night ceased, the sessions became more difficult. The nurses seemed to dread my visits and told me I had "bad veins." The smell of the hospital made me queasy immediately. The nausea became grotesque and gigantic, violent and pervasive. It crippled me from head to toe, froze me in its icy grip. "I'm not coming back," I mumbled to my doctor after the fourth treatment. "I'd rather die than go through this again." I said this looking at the ceiling, because I couldn't look at him. Couldn't move my head.

The next day the doctor suggested I speak to Dr. Howard Glazer, a clinical psychologist who could use hypnosis to help me fight off the nausea. Glazer called his

## PICTURES OF HEALTH

therapy modified desensitization. Through self-regulated hypnosis, he explained, he would counter-condition me to elicit a competing, but in this case relaxing, response to the stimulus causing my queasiness.

Glazer started out by suggesting that we develop an anxiety hierarchy together. We began with a situation that provoked the least amount of anxiety—getting into a cab for the trip to the hospital—and worked our way up to the most traumatic—the actual administration of the drugs. He taught me to roll back my eyes and slowly let the lids fall closed. I was to do this three times, breathing deeply, and repeat it. Then I was to visualize myself slowly descending a floating staircase. Next I was instructed to count slowly and deliberately from ten down to one.

Once I was relaxed, Glazer told me to visualize images of peace, like the ocean and its salty spray, the warmth of the sun falling slowly on a mountain. The rhythm of my breath was to match that of a repetitive image, such as the tide. Then he told me to concentrate on my forearm, feeling it first as a heavy weight and then as light as air. I imagined that my arm could float, it took no effort at all to hold it above my body.

With my muscles loose and my blood vessels open from the relaxing effects of the exercise, Glazer said I should be able to compete with the images and smells that brought on the nausea. I was to start using this tech-



nique as soon as I got into a cab bound for the hospital, repeat it on arrival and do it again in my hospital bed as the nurses dug for veins.

When I arrived at the hospital the next weekend, I played a tape of Glazer's voice and tried to concentrate on it, but the constant interruptions of the hospital routine foiled my efforts. Just as my mind began to wander to the turquoise waters of the Caribbean, a doctor would come in with a checklist: Did I use crutches? Was my vision blurred? Was I in pain? Was I eating?

I begged the staff to leave me alone with my tapes. "I'm trying to put myself into a trance," I explained. "I can't be distracted."

In the end I gave in to the nausea. I accepted it as a

sort of exorcism. It's necessary to suffer in the way I thought, in order to be cleansed. I temporarily abandoned Glazer's natural images and concentrated instead on my hair. I visualized each strand as a separate entity and imagined myself strengthening the roots that bonded it to my head. The individual strands I envisioned as having a set of clutched fingers holding on to my scalp. I thought of them playing tug-of-war with the drugs. In my fantasy the drugs always let go first.

I decided to take the imaging one step further. Early on in my series of treatments, an artist friend gave me some colored pencils and suggested I try to sketch my feelings. I drew a tangled web of string with monstrous

heads and bodies intertwined. It was my inner rage that had manifested itself in this illness, the earth, blackened from a fire fed by the docility within me. It was a sticky mass of everything bad and everyone who had ever hurt me. It was refuse I could purge.

I stopped thinking about the ocean altogether—instead, I imagined the tumor I gave it a name and a shape. I pictured it full of black holes inhabited by cancer-causing worms. I let them battle against the opposing force, the exotic agents of my chemotherapy. Wielding swords they fought the invaders, ferocious and lunging, vaporizing when they were struck down. Some became unplugged and were vanquished; others came out of hiding to surrender. Each time the needle went into my arm, the fight continued. By the last chemo session only a few injured worms remained.

In a passage at the end of *The Big Sleep*, Raymond Chandler wrote that when one was "sleeping the big sleep" there was no difference between lying dead in a "dirty dump or in a marble tower on top of a high hill.... oil and water were the same as wind and sea to you." There was a time for me, not long ago, when oil, water, fire, and earth were indistinct and irrelevant forces. But now, months later, I've learned otherwise. A devastating and blackening sea can nurture the planet, plant new seeds. When I visualize my muscles now, I see new young buds. ☐

**SPACE**  
1988 CRYSTAL WORKSHOP



From Star Trek: The Motion Picture to the new Star Trek: The Next Generation

Handcrafted from:

**The CRYSTAL WORKSHOP**

2080 21st St., San Francisco, CA 94110

☐ Sterling Silver @ \$10.00  
☐ Catalogue free with purchase  
☐ Catalogue \$3.00 without purchase

Check or money order  
 enclosed (in US dollars)

VISA / MasterCard Charge Exp. Date \_\_\_\_\_

Address # \_\_\_\_\_

Signature \_\_\_\_\_

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

State \_\_\_\_\_ Zip \_\_\_\_\_

**Just Released**

**Creativism** is the text for the first section of the Avatar® Course.

Since the Avatar Course's introduction in 1988, its popularity has mushroomed into a global delivery and research network with 150 offices in 14 countries.

Thousands of initiates hail Avatar as the most powerful technology of our time. The workbook describes the discovery and application of the basic principle that governs our interpretation and experience of creation.

**\$12.95 ppd. (Visa/MC 607-734-4977) or check to STAR'S EDGE, RD #2 Box 170, Elmira, New York 14901**



Section One  
**CREATIVISM**

# SPACE

CONTINUED FROM PAGE 20

clear from the 200-mile-high Mir, COSPAR T3 ranges out to 23,000 miles. You'll need a good receiver and a high-gain antenna to hear its weak signal. Soviet Radlo-Sputnik ham satellites also transmit VHF radiotelemetry beacons. RS-10 and RS-11, a cluster of transponders aboard a single satellite in an orbit 600 miles high, have beacons at 145.857, 145.903, 145.907 and 145.953 MHz.

## LISTENING TO SHORTWAVE

Soviet spacecraft—such as the unmanned cargo hauler Progress and the common rail transporter Soyuz—transmit their telemetry on the SW frequency 19.964 MHz. You can hear the cosmonauts' space-to-ground docking chatter (as they near Mir) at 20.008 MHz. They talk over the same frequency after they leave Mir in the Soyuz for the flight home. Cosmonauts also use Morse code to communicate with Earth, and these signals sometimes accompany telemetry data from the Soyuz itself. RS-10 and RS-11 also transmit on shortwave at 29.257, 29.403, 29.407 and 29.453 MHz.

The ham club at the Goddard Space Flight Center in Greenbelt, Maryland, retransmits U.S. shuttle astronauts' VHF space-to-ground chatter on 3.860, 7.185, 21.396, and 28.650 MHz shortwave. NASA tracking stations around the globe also rebroadcast astronauts' voices. The signal from Cape Canaveral on 10.750 MHz (USB) is easy to receive.

If you tuned in last September, when cosmonauts Vladimir Lyakhov and Abdul Ahad Mohmand ran into trouble returning from Mir in their Soyuz, you could have listened while Lyakhov explained that he was more concerned with the toilet working properly than with the shortage of food and water in the craft—and calmly requested that mission control pipe in music and let them rap before their last make-or-break (and ultimately successful) reentry attempt.

For a bit of space chatter in English, you could have listened to former President Reagan and then-spaceborne Senator Jake Garn, when he took a trip on Discovery in April 1985.

Reagan: "Jake, how are you doing? You are doing a fine job up there, but I could use your help down here right now in getting the federal budget under control and arranging assistance for some people fighting for their freedom in Central America. So don't stay up there too long."

Garn: "Mr. President, I'm doing just great. I've missed you, but I'll be back on Tuesday. I'm well aware of the vote on Nicaraguan aid on Tuesday night, and I'll be voting just the way you'd like me to when I get back."

Since then both the federal budget and Discovery have gone up again. **OO**



## The Mysteries of Self

### Have You Had These Experiences?

- That strange, inexplicable hunch.
- The mysterious familiarity of a place never visited previously.
- The unconscious speaking to you in dreams.
- The impelling urge to act in a certain way.

These are not weird phenomena. They are the working of the natural powers that lie behind your everyday conscious mind. They can be revealed, understood and applied in a practical way to open a new life of fulfillment. There is no greater fascination or deeper satisfaction than knowing your full self.

### Let This Free Booklet Explain

The Rosicrucian Order, AMORC, educational, and cultural organization, has for centuries made this mystical knowledge available to thousands of men and women. If you are serious about inner self-development and personal refinement, write today for a free copy of *The Mystery of Life*. This booklet tells how you too may receive this useful knowledge in the privacy of your home. Address: Scribe, BPC.

Scribe BPC  
 The Rosicrucian Order, AMORC  
 San Jose, California 95191

I am sincerely interested in the spiritual knowledge possessed by the Rosicrucians, therefore, kindly send me a FREE copy of *The Mystery of Life*.

Name \_\_\_\_\_

Address \_\_\_\_\_

ZIP Code \_\_\_\_\_

**The Rosicrucian Order, AMORC**  
 San Jose, California 95191

## Brain Tune-up?

- **Running up your brain needs is not increasing a reality**
- **Wires in a brain decrease about 10% from birth and steadily decline during the next 3 years after the white history of brain development is complete**
- **Wired neuroscientist**—Dr. Robert, John, David, Ph.D. has discovered about 100,000 brain cells, which are produced every 10 minutes in the brain and allow for greater concentration, actively seek performance, vast memory and even the formation of old self-identity patterns.
- **Genetics**—10 days, 10 hours a day, even while sleeping. Total knowledge increases.

- Are you willing to achieve major breakthroughs in your ability to learn, create, expand your brain, eliminate self-doubts—those subconscious belief systems that block your happiness and success?
- Will you do your *BrainWise* "homework" (your brain's fitness center)? (A proven strategy, supported by a body of peer-reviewed research.)
- Are you willing to cross the threshold into the 21st century?

Downloaded At: 11:52 11 September 2009  
This document is copyrighted by the American Psychological Association or one of its allied publishers. This article is intended solely for the personal use of the individual user and is not to be disseminated broadly.

FREE TAP & CATALOGUE  
1-800-637-0300  
Including Canada

**JOHN-DAVID LEARNING INSTITUTE**  
2443 Impala Drive • Research Center  
Carlsbad, CA 92008 • 760.921-2455

## -RENEWALS ON

- Whole-Brain Learning
- Whole-Brain Reading
- Certification Training

"FREE  
DEMO TAPE.  
LISTEN, FEEL THE  
DIFFERENCE."



## EXPLORATIONS

CONTINUED FROM PAGE 30

hugging openly is considered disgusting and inhuman. A couple who indulge in such a moment of warmth would be subject to contempt, fury, and hatred.

Anger is what went you respect. For example, the new wife of Rashid, one of the young men in the village Abu-Lughod was observing, ran away Rashid was distraught. But a man is not allowed to reveal his emotional wounds. Rashid's pained reaction was considered weak and worthy of scorn. Even his relatives scolded him. Later Rashid began to rage. Now everyone approved. This was the manly thing to do.

Author Leon Uris, who reviewed considerable anthropological research to compile his vision of Arab family life in *The Haj*, believes that this same coldness extends to the way Arab village dwellers raise their kids. Children, Uris claims, are seldom shown warmth. But they are frequently punished harshly.

Could the denial of warmth be behind Arab brutality? Could these keepers of the Islamic flame be suffering from a lack of hugging? Could that deprivation help explain their thirst for blood?

It wouldn't be the first time that a lack of physical affection has gone hand in hand with a love of inflicting pain. In sixteenth- and seventeenth-century England children were raised without warmth and affection. Displaying love to your kids was considered utterly inappropriate.

The youngsters of England in those days displayed a brutality the Bedouin would have understood. They tethered chickens in the yard, then pelted them with stones until the poor, tortured creatures finally died. They burned cats alive. And all of this was considered fun.

When the sixteenth- and seventeenth-century English reached adulthood, they never got over their love of violence. Englishmen set dogs on bulls for sport. The dog would clamp its teeth on the bull's nose, tear off its ears, and shred its skin in the and either the dog would slash the bull's throat open or the bull would gore and trample the dog. One way or the other, the crowd would be amused.

A few hundred years later the British changed their minds about how children should be raised. They offered a bit more affection. And the scenes of brutality in English streets came to an end.

In much of Arab society the cold and even brutal approach to children has not stopped. Public warmth between men and women is considered a sin. And the Arab adult, stripped of intimacy and trust into a life of cold isolation, has become a walking time bomb. An entire people may have turned barbaric for the simple lack of a hug. ☐

Excerpted from *The Luckier Principle: A Scientific Expedition into the Forces of History*

**MAKES YOU  
ALMOST 2"  
TALLER**

SIZES: 5-11  
 WIDTHS: B-EER  
 FINE MENS  
 SHOES



Looks just like an ordinary shoe, except hidden inside is an innersole which increases your height almost two inches. Choose from a wide selection of **ELEVATORS®** including dress shoes, boots, sport shoes and casuals. Satisfaction guaranteed. **Exceptionally comfortable.** Call or write today for your **FREE** color catalog so you can look taller at no time. **NO RESID. CALL 800-565-5111.**

**TOLL FREE 1-800-343-3810**

## ELEVATORS®

RICHLIFE SHOE COMPANY, DEPT CM92  
P.O. Box 3846, Frederick, MD 21701

**FREE**  
CATALOGUE

CALL TOLL FREE  
1-800-426-6027

In New York 1-718-417-3732

DE WHITE  
J&B Music World, Dept. DM2044  
23 Bank Row, Mt. Airy, NC 28551

5.4 M

---

288 M. A. J. H. J. M. J. M. J. M.

# STARTECH

## ACCESSING THE FUTURE



### REEFER MADNESS

When you're diving in the dark, the isoscapic face of the Digitek—a computerized depth and pressure gauge—illuminates itself. The device (left) displays the remaining air supply and time, depth, and water temperature. While you're swimming along, a pair of Tekna's high-

### SON OF BOOM

Space Age boomarang redesigned for the future. When tossed, the Bee-Bah soars up three stories, stalls, flips over, and returns to the thrower—thanks to unique design and special plastic compounds. Price: \$8.95.

Contact: Allied Toy Company, Kansas City, MO, (816) 363-5114.



tech Spectra-Fin (589.95) will help you to get the most out of your hike, too. Digitek price: \$549.95. Contact: Tekna, Redwood City, CA, (415) 593-0450.



### WORKOUT STATION

The scientific system for your exercise bike, Dynalink monitors speed, cadence, heart

rate, and calories burned. Included are sensors, floppy and PC interface card. Price: \$349.95. Contact: Cullodyne, Cleveland, (216) 241-8100.

### PLAYING SAFE

For the young cat, the Incrediball Soft-Touch provides the look, feel, and performance of a major league hardball—without the hard knocks. Leads to fewer injuries for future shikast articles. Price: \$5.49 (also shown, a pre-broken-in glove, \$15.95). Contact: Incrediball, Concord, CA, (800) 358-5223.



### PUMPED UP

The Maynard air-cognition racket's inflatable inner tube between the head's inner and outer frame absorbs shock when the ball hits the strings. Price: \$159 to \$179. Contact: Maynard Racquet, Snowvton, OR, (503) 641-1660.



Explore the terrain in this  
month's issue and you may unearth your reward in

# THE GREAT OMNI TREASURE HUNT

From a university in the United States to the wilds of Nepal and Egypt, the now-legendary explorer Indiana Jones followed nuggets of information that led him to the infamous lost ark, a discovery made against all odds. The fourth annual Great Omni Treasure Hunt offers readers a similar opportunity: a chance to track down their own clues in pursuit of fortune, if not fame. Each of the 12 discs displayed below is a portion of a photo in an advertisement or part of an illustration accompanying an article or short story appearing in the pages of this month's Omni. Explore the issue and find the pictures that match our clues. Note the page number for each picture. For clues appearing on the front or back cover or any pages that fold out from the front or back cover, consider that page number as zero. In the event a clue page does not have a number, use the first numbered page following that clue page. When you have found all 12, add the page numbers to arrive at a grand total. Submit that solution to the Great Omni Treasure Hunt and you could end up folkloping on your local lake, river, or bay in Kawasaki's Jet Moto. You could fly to a Caribbean destination, drive away in 1989 Jeep Wrangler Islander, or win another of the multitude of prizes on the following pages.

## OFFICIAL RULES

1. No purchase necessary. Post your name, address, zip code, and your solution on a three- by five-inch sheet of paper. Mail your entry to: Omni Treasure Hunt, Box 803, Gibbstown, NJ 08027. Enter as often as you wish, but each entry must be mailed separately. We are not responsible for lost, illegible, misdirected, or late mail. All entries must be received by May 31, 1989. The drawing will be held immediately thereafter.

2. Winners will be selected from among all eligible entries in random drawings conducted by Power Group, Inc., an independent judging organization whose decisions are final. Odds of winning are determined by the number of entries received. Winners will be notified by mail and may be required to sign and return an affidavit of eligibility and release within 15 days of the date on the letter of notification, or an alternate winner may be selected. Limit of one winner per household address. Winners agree to the use of their names and likenesses for publicity purposes without additional compensation.

3. Open to residents of the 50 United States, except employees (and their families) of Omni Publications International, Ltd.; its subsidiaries or affiliates; its advertising and production agencies, and Power Group, Inc. All federal, state, and local laws and regulations apply. Void where prohibited.

4. Prizes are not transferable, assignable, or redeemable for cash. No substitution of prizes except as necessary due to availability. Jeep Wrangler includes standard equipment only. Advertising, licensing, registration, transportation, and dealer preparation charges are the winner's responsibility. Wrangler and Jet Moto winners will be required to pick up their prizes from the nearest dealership location. The Caribbean vacation consists of accommodations for two for one week and round-trip economy airfare from the major airport nearest the winner's home. Trip winner is responsible for any other charges not specified above. Travel dates are subject to space and departure availability, and travel must be completed by November 30, 1989. Prizes with alcoholic content will not be awarded in states where prohibited or restricted. If won by a person less than twenty-one years of age, the following prizes will be awarded to the winner's parents or legal guardians: Jeep Wrangler, Jet Moto, Caribbean vacation, Montague bicycles, Carlton Importers liquor products. Winners release Omni Publications International, Ltd., its subsidiaries or affiliates, their advertising and production agencies, prize manufacturers and donors, and Power Group, Inc. from all liability regarding prizes awarded. All taxes are the responsibility of the prizewinner.

5. For the solution and a copy of the official rules, send a self-addressed, stamped envelope to: Omni Rules, Box 818, Gibbstown, NJ 08027 no later than April 30, 1989. No return postage is required for Washington and Vermont residents; Vermont postage will be refunded.

6. For a list of winners, send a self-addressed, stamped envelope to: Omni Winners, Box 814, Gibbstown, NJ 08027 no later than June 30, 1989.



# OMNI'S BOUNTIFUL BOOTY



## THE TREASURE HUNT PRIZES

The following are the prizes in the Great Omni Treasure Hunt. Their descriptions correspond to the numbered photos above:

- 1) Grand prize: a 1989 Jeep Wrangler (airlander).
- 2) First prize: Kawasaki Jet Ski watercraft.
- 3) Second prize: Kenwood KDT-30R digital car audiotape (DAT) deck and tuner with wireless remote control.
- 4) Third prize: One-week accommodations for two at a Resort Condominiums Inter-

national Caribbean island destination, courtesy of *Endless Vacation* magazine, plus round-trip airfare.
- 5) Fourth prize: Reference Standard 8 Kappa loudspeakers from Infinity Systems, Inc.
- 6) Fifth prize: Casio VZ-1 67-key, 16-note polyphonic digital synthesizer with eight-part multimodal MIDI implementation.
- 7)

Ricoh Miro 35-135mm single-snap camera with auto-focus, autoexposure, built-in flash, wide-range zoom lens, and 200mm teleconverter.
- 8) Brother WP 1 word processor with 3.5-inch disk drive, 70,000-word dictionary, and letter-quality printer.
- 9) SH-





main American Corporation's dream tackle package of fishing rods and reels, from ultralight spinning gear to heavy-duty bait casting, including the new BearMaster two-speed bait-casting reel and the BearMaster graphite Fightin' Rod. 10) One 23-inch bicycle plus clothes and accessories from Kamekaze by Cotler. 11) Two Montague M-1000 frame bicycles, the world's first high-performance folding bicycle. 12) Three winners will each receive a \$500 assortment of liquor from Carlton Importers, Ltd. 13) Six winners will each receive a Proton Organizer II com-

puter diary, which holds 2,000 entries, includes alarm reminders, calendar, calculator, expense log, sales journal, message pad, and notebook as well as appointment, phone, and address books, and can link with almost any PC. 14) Courtesy of Sonya Fisher (USA) Corporation, an ER 550 car audio receiver. 15) Ten winners will each receive an assortment of Maxell products, including a selection of Maxell floppy disks with storage cases.

**PRIZE VALUES:** 1989 Jeep Wrangler Islander, \$12,156, including \$435 for shipping costs (1). Kawasaki Jet Motor



party platform, \$5,795 (1); Kenwood KDT-99R car DAT deck and tuner, \$2,499 (1); Resort Condominiums International/Endless Vacation Caribbean holiday for two plus round-trip airfare, \$2,300 (1); Infinity Systems' Reference Standard II Kippee loudspeakers, \$1,898 (3); Casio VZ-1 polyphonic digital synthesizer, \$1,499 (1); Ricoh Mini camera, \$1,300 (1); Brother WP 1 word processor, \$1,200 (1); Shimano rods and reels, \$1,008 (1); Montague tricycle, \$1,000 (1); Kamikaze clothing, accessories, bicycle, \$788 (1); Carlton Importers' assortment of liquor, \$500 (3); Pison Organiser II computer diary, \$300 (8); Sanyo/Fisher ER 650 car audio receiver, \$259 (1); Mas-

sell assortment of products, \$160 (10). Total prize value: \$26,512.

#### GIFT FINDER'S GUIDE

Our annual Great Omni Treasure Hunt has steadily increased its total number of omnis each year—last year's sweepstakes resulted in more than 650,000 entries. This year the number of winners will increase to 31—that's 10 more than last year. We've also opened the sweepstakes to residents of Alaska and Hawaii. And you no longer have to be twenty-one years old to enter the Great Omni Treasure Hunt. But read the official rules carefully. The awarding of some prizes is affected by the winner's age and residence.

Are you interested in finding out more about the products and services featured in the Great Omni Treasure Hunt? The following are the names, addresses, and/or telephone numbers of the individual corporations and companies supplying our prizes. For further information concerning any particular item, contact the companies directly. The specific prizes donated by the manufacturers are indicated after each address.

**Brother International, Inc.**, 8 Corporate Plaza, Piscataway, NJ 08854 (201) 981-0300 (word processor)

**Carlton Importers, Ltd.**, Glenpointe Centre West, Teaneck, NJ 07666-6897 (201) 636-7799 (liquor assortment)

**Casio, Inc.**, Attn: Product Information, Dept. 570, Mount Pleasant Avenue, Dover, NJ 07801 (synthesizer)

**Resort Condominiums International/Endless Vacation** magazine (800) 338-7777 (Caribbean vacation)

**Infinity Systems, Inc.**, 9409 Overnashua Avenue, Chatsworth, CA 91311 (818) 703-9400 (loudspeakers)

**Jeep Corporation**, (800) JEEPEAGLE (Jeep Wrangler Islander)

**Kamikaze, H. Copter Company, Inc.**, 10 West 33rd Street, New York, NY 10001 (clothing, accessories, and bicycle)

**Kawasaki Motors Corporation, USA**, 6650 Jerommo Road, Irvine, CA 92714 (Jet Maxx party platform)

**Kenwood USA Corporation**, 2201 East Dominguez, Long Beach, CA 90810 (800) 4-KENWOOD (DAT deck, tuner)

**Masell Corporation of America**, 22-08 Route 208, Fair Lawn, NJ 07410 (201) 794-0900 (product assortment)

**Montague Corporation**, Box 118, Cambridge, MA 02238 (617) 461-7200 (folding tricycle)

**Pison, Inc.**, 320 Sylvan Lake Road, Watertown, CT 06779 (800) 548-4535 (Pison Organiser II)

**Ricoh Corporation**, 165 Passaic Avenue, Fairfield, NJ 07006 (800) 225-5550 (Mini single-snap camera)

**Sanyo Fisher (USA) Corporation**, 21314 Lassen Street, Chatsworth, CA 91311 (818) 998-7322 (car audio receiver)

**Shimano American Corporation**, One Shimano Drive, Irvine, CA 92718 (714) 951-5003 (fishing rods and reels; send \$2 for rod-and-reel catalog and a TEAM Shimano patch) **DO**



## Why radar makes mistakes. How to protect yourself.

It's hard to believe, but traffic radar does not identify which vehicle is responsible for the speed displayed. It shows only a speed number. The radar operator must decide who to blame.

#### How radar works

The radar gun is aimed at traffic and it transmits a beam of invisible radar waves. Moving objects reflect those waves back to the radar gun. Using the Doppler principle, the radar calculates speed from the reflected waves. But there's a problem.

#### The best guess

Remember, these reflections are invisible. And truck reflectors can be ten times stronger than car reflectors. How can the operator know for sure which vehicle is responsible for the number?



The truth is, in many cases he can't be sure. The result? You can be ticketed for somebody else's reflection.

The only way to defend yourself against these wrongful tickets is to know when radar is operating near you.

#### Self Defense

We specialize in radar warning. Escort and Passport have a unique warning system that tells you radar strength—with both a variable-rate beeper and a visual

meter. You'll know when the radar unit is

near enough to hide you under surveillance.

Car and Driver, Popular Mechanics and Road and Wheel magazines have each tested radar detectors. And each gave us their highest ratings. Call toll-free and we'll send reprints of the complete tests.

#### We're as close as your phone

To order, call toll-free. Orders in by 5:00 pm eastern time go out the same day by UPS and we pay the shipping.

And we guarantee your satisfaction. If you're not entirely satisfied within 30 days, return your purchase. We'll refund your money and shipping costs.

The best defense against wrongful tickets can be in your car tomorrow.

**TOLL FREE 1-800-543-1808**

(Call Mon-Fri 9am-5pm; Sat-Sun 9am-5pm)

**ESCORT**  
RADAR WARNING HELICOPTER

ESCORT \$245 (Ships, incl. \$13.49 ins.)

**PASSPORT**  
RADAR RECEIVER

PASSPORT \$256 (Ships, incl. \$13.49 ins.)

Cincinnati Microwave  
Department 625329  
One Microwave Plaza  
Cincinnati, Ohio 45240

© 1988 CM

# FORUM

CONTINUED FROM PAGE 16

researcher to help their personal abduction investigations along.

- The researcher must be either a competent hypnotist or must work with one.
- The investigator and/or hypnotist must be well versed in the common patterns of UFO abduction.
- The hypnotist should be either a therapist or should work with one, in order to help the abductees deal with the memories that may be revealed.

If the process of finding competent abduction professionals seems intimidating, the Fund for UFO Research hopes to help Omni readers with that task. Too. Sometime in the future, in fact, Swasek and company hope to personally interview those who have filled out the questionnaire. "Even assuming these people are telling the truth," Swasek says, "without talking to them one-on-one, there's no way to tell."

"Our goal," says Berliner, "is to work with investigators, mental health professionals, and therapeutic groups around the country and the world. As more professionals join the network, we can supply them with names of possible abductees in their regions by going through the information given in the Omni questionnaires." Adds Maccabee, "Those with pat theses will now have data points to pit their notions against. Budd Hopkins has been criticized, but now the critics will have the chance to put their money where their mouths are by studying this mother lode of virgin cases in which most people have probably not been hypnotized or exposed to the bulk of material associated with abductees."

Yet some critics disagree, contending the questionnaire has no validity at all. Says UFO skeptic Philip J. Klass, "The Omni questionnaire reminds me of a poll that asks whether there should be a federal law against male homosexuals with polka-dot underwear: You will get responses only from those who are homosexuals or those who are opposed to federal regulations of personal matters. A questionnaire about abductions will get responses mostly from those who already believe in an extraterrestrial explanation for UFOs. The results will be biased. If the questionnaire indicates that people have been abducted, and if Omni puts any credence in those results," Klass adds, "then Omni should encourage the FBI to investigate what would certainly be the worst emergency this country has ever faced."

Even if the abduction scenario is nothing more than fantasy, the Omni questionnaire may help to prove that, too. Our newly the Center for UFO Studies (CUFOS) in Illinois is studying abductees, including some who filled out the questionnaire, to determine how fantasy-

prone they are. "Four percent of the population is particularly prone to fantasy," says CUFOS's Mark Rhodiger. "Are abductees in this group? Our study will get at the answer, since fantasy-prone people can often be identified with a test."

Working on a similar theme, Ohio University psychologist Steven Jay Lynn is using the questionnaire to see whether the UFO abduction experience is rooted in modern myths. To do his study, Lynn tells his subjects that after they see some mysterious lights in the sky, they are driving down a road in a car when they become aware of an episode of missing time. Then he asks them to pretend they have been hypnotized as he records the yarns they spin. Half the subjects are shown the Omni questionnaire prior to the mock hypnosis session, and half are not. Lynn's aim is to see whether those who glimpse the questionnaire will come up with a greater number of UFO abduction scenarios than those who do not. "Can those given minimal hints spin out full-blown abduction stories?" Lynn wants to know. "If so, it would suggest that alien images are inherent in our culture."

Hopkins doesn't believe Lynn will prove his hypothesis true. The questionnaire, Hopkins says, has already "proved what I feared it would—that there are lots of people who seem to have genuinely had the experience and who have scrupulously avoided the trick question, 'what they were in no position to understand?'"

To judge for yourself, you might be interested in reading a written report produced by Swasek and his fund. To obtain information, write to the Fund for UFO Research, Inc., Box 277, Mount Rainier, MD 20712. **DO**

## CREDITS

Page 4: *abductees* from Indiana left: Mike Mitchell, Kenny Moore, Graciano Galarza; Don Schneider (see Holland, Wilkins & West, from the Blue Moon International Bond Award Competition, page 16, The Omni, page 16, 6/25/87; page 16/7; page 16/8; page 16/9; page 16/10; page 16/11; page 16/12; page 16/13; page 16/14; page 16/15; page 16/16; page 16/17; page 16/18; page 16/19; page 16/20; page 16/21; page 16/22; page 16/23; page 16/24; page 16/25; page 16/26; page 16/27; page 16/28; page 16/29; page 16/30; page 16/31; page 16/32; page 16/33; page 16/34; page 16/35; page 16/36; page 16/37; page 16/38; page 16/39; page 16/40; page 16/41; page 16/42; page 16/43; page 16/44; page 16/45; page 16/46; page 16/47; page 16/48; page 16/49; page 16/50; page 16/51; page 16/52; page 16/53; page 16/54; page 16/55; page 16/56; page 16/57; page 16/58; page 16/59; page 16/60; page 16/61; page 16/62; page 16/63; page 16/64; page 16/65; page 16/66; page 16/67; page 16/68; page 16/69; page 16/70; page 16/71; page 16/72; page 16/73; page 16/74; page 16/75; page 16/76; page 16/77; page 16/78; page 16/79; page 16/80; page 16/81; page 16/82; page 16/83; page 16/84; page 16/85; page 16/86; page 16/87; page 16/88; page 16/89; page 16/90; page 16/91; page 16/92; page 16/93; page 16/94; page 16/95; page 16/96; page 16/97; page 16/98; page 16/99; page 16/100; page 16/101; page 16/102; page 16/103; page 16/104; page 16/105; page 16/106; page 16/107; page 16/108; page 16/109; page 16/110; page 16/111; page 16/112; page 16/113; page 16/114; page 16/115; page 16/116; page 16/117; page 16/118; page 16/119; page 16/120; page 16/121; page 16/122; page 16/123; page 16/124; page 16/125; page 16/126; page 16/127; page 16/128; page 16/129; page 16/130; page 16/131; page 16/132; page 16/133; page 16/134; page 16/135; page 16/136; page 16/137; page 16/138; page 16/139; page 16/140; page 16/141; page 16/142; page 16/143; page 16/144; page 16/145; page 16/146; page 16/147; page 16/148; page 16/149; page 16/150; page 16/151; page 16/152; page 16/153; page 16/154; page 16/155; page 16/156; page 16/157; page 16/158; page 16/159; page 16/160; page 16/161; page 16/162; page 16/163; page 16/164; page 16/165; page 16/166; page 16/167; page 16/168; page 16/169; page 16/170; page 16/171; page 16/172; page 16/173; page 16/174; page 16/175; page 16/176; page 16/177; page 16/178; page 16/179; page 16/180; page 16/181; page 16/182; page 16/183; page 16/184; page 16/185; page 16/186; page 16/187; page 16/188; page 16/189; page 16/190; page 16/191; page 16/192; page 16/193; page 16/194; page 16/195; page 16/196; page 16/197; page 16/198; page 16/199; page 16/200; page 16/201; page 16/202; page 16/203; page 16/204; page 16/205; page 16/206; page 16/207; page 16/208; page 16/209; page 16/210; page 16/211; page 16/212; page 16/213; page 16/214; page 16/215; page 16/216; page 16/217; page 16/218; page 16/219; page 16/220; page 16/221; page 16/222; page 16/223; page 16/224; page 16/225; page 16/226; page 16/227; page 16/228; page 16/229; page 16/230; page 16/231; page 16/232; page 16/233; page 16/234; page 16/235; page 16/236; page 16/237; page 16/238; page 16/239; page 16/240; page 16/241; page 16/242; page 16/243; page 16/244; page 16/245; page 16/246; page 16/247; page 16/248; page 16/249; page 16/250; page 16/251; page 16/252; page 16/253; page 16/254; page 16/255; page 16/256; page 16/257; page 16/258; page 16/259; page 16/260; page 16/261; page 16/262; page 16/263; page 16/264; page 16/265; page 16/266; page 16/267; page 16/268; page 16/269; page 16/270; page 16/271; page 16/272; page 16/273; page 16/274; page 16/275; page 16/276; page 16/277; page 16/278; page 16/279; page 16/280; page 16/281; page 16/282; page 16/283; page 16/284; page 16/285; page 16/286; page 16/287; page 16/288; page 16/289; page 16/290; page 16/291; page 16/292; page 16/293; page 16/294; page 16/295; page 16/296; page 16/297; page 16/298; page 16/299; page 16/300; page 16/301; page 16/302; page 16/303; page 16/304; page 16/305; page 16/306; page 16/307; page 16/308; page 16/309; page 16/310; page 16/311; page 16/312; page 16/313; page 16/314; page 16/315; page 16/316; page 16/317; page 16/318; page 16/319; page 16/320; page 16/321; page 16/322; page 16/323; page 16/324; page 16/325; page 16/326; page 16/327; page 16/328; page 16/329; page 16/330; page 16/331; page 16/332; page 16/333; page 16/334; page 16/335; page 16/336; page 16/337; page 16/338; page 16/339; page 16/340; page 16/341; page 16/342; page 16/343; page 16/344; page 16/345; page 16/346; page 16/347; page 16/348; page 16/349; page 16/350; page 16/351; page 16/352; page 16/353; page 16/354; page 16/355; page 16/356; page 16/357; page 16/358; page 16/359; page 16/360; page 16/361; page 16/362; page 16/363; page 16/364; page 16/365; page 16/366; page 16/367; page 16/368; page 16/369; page 16/370; page 16/371; page 16/372; page 16/373; page 16/374; page 16/375; page 16/376; page 16/377; page 16/378; page 16/379; page 16/380; page 16/381; page 16/382; page 16/383; page 16/384; page 16/385; page 16/386; page 16/387; page 16/388; page 16/389; page 16/390; page 16/391; page 16/392; page 16/393; page 16/394; page 16/395; page 16/396; page 16/397; page 16/398; page 16/399; page 16/400; page 16/401; page 16/402; page 16/403; page 16/404; page 16/405; page 16/406; page 16/407; page 16/408; page 16/409; page 16/410; page 16/411; page 16/412; page 16/413; page 16/414; page 16/415; page 16/416; page 16/417; page 16/418; page 16/419; page 16/420; page 16/421; page 16/422; page 16/423; page 16/424; page 16/425; page 16/426; page 16/427; page 16/428; page 16/429; page 16/430; page 16/431; page 16/432; page 16/433; page 16/434; page 16/435; page 16/436; page 16/437; page 16/438; page 16/439; page 16/440; page 16/441; page 16/442; page 16/443; page 16/444; page 16/445; page 16/446; page 16/447; page 16/448; page 16/449; page 16/450; page 16/451; page 16/452; page 16/453; page 16/454; page 16/455; page 16/456; page 16/457; page 16/458; page 16/459; page 16/460; page 16/461; page 16/462; page 16/463; page 16/464; page 16/465; page 16/466; page 16/467; page 16/468; page 16/469; page 16/470; page 16/471; page 16/472; page 16/473; page 16/474; page 16/475; page 16/476; page 16/477; page 16/478; page 16/479; page 16/480; page 16/481; page 16/482; page 16/483; page 16/484; page 16/485; page 16/486; page 16/487; page 16/488; page 16/489; page 16/490; page 16/491; page 16/492; page 16/493; page 16/494; page 16/495; page 16/496; page 16/497; page 16/498; page 16/499; page 16/500; page 16/501; page 16/502; page 16/503; page 16/504; page 16/505; page 16/506; page 16/507; page 16/508; page 16/509; page 16/510; page 16/511; page 16/512; page 16/513; page 16/514; page 16/515; page 16/516; page 16/517; page 16/518; page 16/519; page 16/520; page 16/521; page 16/522; page 16/523; page 16/524; page 16/525; page 16/526; page 16/527; page 16/528; page 16/529; page 16/530; page 16/531; page 16/532; page 16/533; page 16/534; page 16/535; page 16/536; page 16/537; page 16/538; page 16/539; page 16/540; page 16/541; page 16/542; page 16/543; page 16/544; page 16/545; page 16/546; page 16/547; page 16/548; page 16/549; page 16/550; page 16/551; page 16/552; page 16/553; page 16/554; page 16/555; page 16/556; page 16/557; page 16/558; page 16/559; page 16/560; page 16/561; page 16/562; page 16/563; page 16/564; page 16/565; page 16/566; page 16/567; page 16/568; page 16/569; page 16/570; page 16/571; page 16/572; page 16/573; page 16/574; page 16/575; page 16/576; page 16/577; page 16/578; page 16/579; page 16/580; page 16/581; page 16/582; page 16/583; page 16/584; page 16/585; page 16/586; page 16/587; page 16/588; page 16/589; page 16/590; page 16/591; page 16/592; page 16/593; page 16/594; page 16/595; page 16/596; page 16/597; page 16/598; page 16/599; page 16/600; page 16/601; page 16/602; page 16/603; page 16/604; page 16/605; page 16/606; page 16/607; page 16/608; page 16/609; page 16/610; page 16/611; page 16/612; page 16/613; page 16/614; page 16/615; page 16/616; page 16/617; page 16/618; page 16/619; page 16/620; page 16/621; page 16/622; page 16/623; page 16/624; page 16/625; page 16/626; page 16/627; page 16/628; page 16/629; page 16/630; page 16/631; page 16/632; page 16/633; page 16/634; page 16/635; page 16/636; page 16/637; page 16/638; page 16/639; page 16/640; page 16/641; page 16/642; page 16/643; page 16/644; page 16/645; page 16/646; page 16/647; page 16/648; page 16/649; page 16/650; page 16/651; page 16/652; page 16/653; page 16/654; page 16/655; page 16/656; page 16/657; page 16/658; page 16/659; page 16/660; page 16/661; page 16/662; page 16/663; page 16/664; page 16/665; page 16/666; page 16/667; page 16/668; page 16/669; page 16/670; page 16/671; page 16/672; page 16/673; page 16/674; page 16/675; page 16/676; page 16/677; page 16/678; page 16/679; page 16/680; page 16/681; page 16/682; page 16/683; page 16/684; page 16/685; page 16/686; page 16/687; page 16/688; page 16/689; page 16/690; page 16/691; page 16/692; page 16/693; page 16/694; page 16/695; page 16/696; page 16/697; page 16/698; page 16/699; page 16/700; page 16/701; page 16/702; page 16/703; page 16/704; page 16/705; page 16/706; page 16/707; page 16/708; page 16/709; page 16/710; page 16/711; page 16/712; page 16/713; page 16/714; page 16/715; page 16/716; page 16/717; page 16/718; page 16/719; page 16/720; page 16/721; page 16/722; page 16/723; page 16/724; page 16/725; page 16/726; page 16/727; page 16/728; page 16/729; page 16/730; page 16/731; page 16/732; page 16/733; page 16/734; page 16/735; page 16/736; page 16/737; page 16/738; page 16/739; page 16/740; page 16/741; page 16/742; page 16/743; page 16/744; page 16/745; page 16/746; page 16/747; page 16/748; page 16/749; page 16/750; page 16/751; page 16/752; page 16/753; page 16/754; page 16/755; page 16/756; page 16/757; page 16/758; page 16/759; page 16/760; page 16/761; page 16/762; page 16/763; page 16/764; page 16/765; page 16/766; page 16/767; page 16/768; page 16/769; page 16/770; page 16/771; page 16/772; page 16/773; page 16/774; page 16/775; page 16/776; page 16/777; page 16/778; page 16/779; page 16/780; page 16/781; page 16/782; page 16/783; page 16/784; page 16/785; page 16/786; page 16/787; page 16/788; page 16/789; page 16/790; page 16/791; page 16/792; page 16/793; page 16/794; page 16/795; page 16/796; page 16/797; page 16/798; page 16/799; page 16/800; page 16/801; page 16/802; page 16/803; page 16/804; page 16/805; page 16/806; page 16/807; page 16/808; page 16/809; page 16/810; page 16/811; page 16/812; page 16/813; page 16/814; page 16/815; page 16/816; page 16/817; page 16/818; page 16/819; page 16/820; page 16/821; page 16/822; page 16/823; page 16/824; page 16/825; page 16/826; page 16/827; page 16/828; page 16/829; page 16/830; page 16/831; page 16/832; page 16/833; page 16/834; page 16/835; page 16/836; page 16/837; page 16/838; page 16/839; page 16/840; page 16/841; page 16/842; page 16/843; page 16/844; page 16/845; page 16/846; page 16/847; page 16/848; page 16/849; page 16/850; page 16/851; page 16/852; page 16/853; page 16/854; page 16/855; page 16/856; page 16/857; page 16/858; page 16/859; page 16/860; page 16/861; page 16/862; page 16/863; page 16/864; page 16/865; page 16/866; page 16/867; page 16/868; page 16/869; page 16/870; page 16/871; page 16/872; page 16/873; page 16/874; page 16/875; page 16/876; page 16/877; page 16/878; page 16/879; page 16/880; page 16/881; page 16/882; page 16/883; page 16/884; page 16/885; page 16/886; page 16/887; page 16/888; page 16/889; page 16/890; page 16/891; page 16/892; page 16/893; page 16/894; page 16/895; page 16/896; page 16/897; page 16/898; page 16/899; page 16/900; page 16/901; page 16/902; page 16/903; page 16/904; page 16/905; page 16/906; page 16/907; page 16/908; page 16/909; page 16/910; page 16/911; page 16/912; page 16/913; page 16/914; page 16/915; page 16/916; page 16/917; page 16/918; page 16/919; page 16/920; page 16/921; page 16/922; page 16/923; page 16/924; page 16/925; page 16/926; page 16/927; page 16/928; page 16/929; page 16/930; page 16/931; page 16/932; page 16/933; page 16/934; page 16/935; page 16/936; page 16/937; page 16/938; page 16/939; page 16/940; page 16/941; page 16/942; page 16/943; page 16/944; page 16/945; page 16/946; page 16/947; page 16/948; page 16/949; page 16/950; page 16/951; page 16/952; page 16/953; page 16/954; page 16/955; page 16/956; page 16/957; page 16/958; page 16/959; page 16/960; page 16/961; page 16/962; page 16/963; page 16/964; page 16/965; page 16/966; page 16/967; page 16/968; page 16/969; page 16/970; page 16/971; page 16/972; page 16/973; page 16/974; page 16/975; page 16/976; page 16/977; page 16/978; page 16/979; page 16/980; page 16/981; page 16/982; page 16/983; page 16/984; page 16/985; page 16/986; page 16/987; page 16/988; page 16/989; page 16/990; page 16/991; page 16/992; page 16/993; page 16/994; page 16/995; page 16/996; page 16/997; page 16/998; page 16/999; page 16/1000; page 16/1001; page 16/1002; page 16/1003; page 16/1004; page 16/1005; page 16/1006; page 16/1007; page 16/1008; page 16/1009; page 16/1010; page 16/1011; page 16/1012; page 16/1013; page 16/1014; page 16/1015; page 16/1016; page 16/1017; page 16/1018; page 16/1019; page 16/1020; page 16/1021; page 16/1022; page 16/1023; page 16/1024; page 16/1025; page 16/1026; page 16/1027; page 16/1028; page 16/1029; page 16/1030; page 16/1031; page 16/1032; page 16/1033; page 16/1034; page 16/1035; page 16/1036; page 16/1037; page 16/1038; page 16/1039; page 16/1040; page 16/1041; page 16/1042; page 16/1043; page 16/1044; page 16/1045; page 16/1046; page 16/1047; page 16/1048; page 16/1049; page 16/1050; page 16/1051; page 16/1052; page 16/1053; page 16/1054; page 16/1055; page 16/1056; page 16/1057; page 16/1058; page 16/1059; page 16/1060; page 16/1061; page 16/1062; page 16/1063; page 16/1064; page 16/1065; page 16/1066; page 16/1067; page 16/1068; page 16/1069; page 16/1070; page 16/1071; page 16/1072; page 16/1073; page 16/1074; page 16/1075; page 16/1076; page 16/1077; page 16/1078; page 16/1079; page 16/1080; page 16/1081; page 16/1082; page 16/1083; page 16/1084; page 16/1085; page 16/1086; page 16/1087; page 16/1088; page 16/1089; page 16/1090; page 16/1091; page 16/1092; page 16/1093; page 16/1094; page 16/1095; page 16/1096; page 16/1097; page 16/1098; page 16/1099; page 16/1100; page 16/1101; page 16/1102; page 16/1103; page 16/1104; page 16/1105; page 16/1106; page 16/1107; page 16/1108; page 16/1109; page 16/1110; page 16/1111; page 16/1112; page 16/1113; page 16/1114; page 16/1115; page 16/1116; page 16/1117; page 16/1118; page 16/1119; page 16/1120; page 16/1121; page 16/1122; page 16/1123; page 16/1124; page 16/1125; page 16/1126; page 16/1127; page 16/1128; page 16/1129; page 16/1130; page 16/1131; page 16/1132; page 16/1133; page 16/1134; page 16/1135; page 16/1136; page 16/1137; page 16/1138; page 16/1139; page 16/1140; page 16/1141; page 16/1142; page 16/1143; page 16/1144; page 16/1145; page 16/1146; page 16/1147; page 16/1148; page 16/1149; page 16/1150; page 16/1151; page 16/1152; page 16/1153; page 16/1154; page 16/1155; page 16/1156; page 16/1157; page 16/1158; page 16/1159; page 16/1160; page 16/1161; page 16/1162; page 16/1163; page 16/1164; page 16/1165; page 16/1166; page 16/1167; page 16/1168; page 16/1169; page 16/1170; page 16/1171; page 16/1172; page 16/1173; page 16/1174; page 16/1175; page 16/1176; page 16/1177; page 16/1178; page 16/1179; page 16/1180; page 16/1181; page 16/1182; page 16/1183; page 16/1184; page 16/1185; page 16/1186; page 16/1187; page 16/1188; page 16/1189; page 16/1190; page 16/1191; page 16/1192; page 16/1193; page 16/1194; page 16/1195; page 16/1196; page 16/1197; page 16/1198; page 16/1199; page 16/1200; page 16/1201; page 16/1202; page 16/1203; page 16/1204; page 16/1205; page 16/1206; page 16/1207; page 16/12

Seeing is disbelieving. High-tech illusions that use light and mirrors to create images in your mind

# GAMES

By Spot Morns



Pictured above is Red Flower, a light-emitting diode (LED) display sculpture created by Massachusetts artist and computer engineer Bill Bell. Before you plug it in, all you'll see is a green circuit board out in the shape of a flower. Turn it on and eight red lights flicker in a column. Nothing too remarkable about that.

If you look away from Red Flower you may see a word out in space for just an instant: HOLLYHOCK. Looking back at the light stick, you have the distinct impression that you just saw the word "seen" on someone's forehead.

What's going on here? To understand how it works, think of one of those electronic news signs, like the one in New York's Times Square, where words travel across a panel. The lights are, of course, stationary, set in several dozen columns, each column containing about eight bulbs.

Imagine what happens in one single column of lights as the letter "s" appears in the first millisecond all eight lights are on. In the

next millisecond, only light two is lit. Then only light three, and so on until finally all eight lights flash again—and then no lights for an instant, corresponding to the space between the "s" and the next letter. If the next letter is "t," then all eight lights are lit first, then only lights one, four, and eight, and so on.

If you look straight at this column, you will see only random flickering. But if your eyes are moving during the fraction of a second that the flashes (keep in mind that the angle of the light hitting your eyeball changes each millisecond), the letters map out on the back of your retina, and you'll see the word projected somewhere in space.

We are used to having to focus on an object in order to see it clearly, but that was before Bell's light stick (patent no. 4,470,004) the first thing in history that can be seen only by moving eyes.

Bell's largest work, called *Triple Eye*, is on permanent display at the Explora-

torium in San Francisco. Hung high above the entry way, the eight-foot-tall sculpture has 6,400 red and green LEDs. Visitors sometimes see a human eye—with lids and a pupil. At other times, when they look away, they see the word eye written in space. When they look straight at the light stick they see only a vertical strip of light—the letter "l."

Another recent creation by Bell was made for the Raeburn H. Fleet Space Center in San Diego for its exhibit on "FACES." Programmed into the light stick are 96 different faces, including the Mona Lisa, George Washington, and Bugs Bunny. The museum staff is used to hearing conversations like, "Wow! I think I just saw Einstein!" "You're crazy, that was Marilyn Monroe!"

Red Flower is available for \$299 plus shipping and handling from Star Magic, 275 Amsterdam Avenue, New York, NY 10023. To contact Bill Bell, write to 56 Perry, MA 02148. Yes, that's his full address!

## IT'S DONE WITH MIRRORS

Shown at far right is "Mirage," familiar to those who visit science museums or magic shops. Lisa Savaris appear just below the top hole of this saucer-shaped object. But try to grasp the candy and your finger touches—nothing. The candy isn't there.

"Mirage" consists of two concave mirrors that face each other. The real Lisa Savaris are at the center of the bottom saucer. The optics of the inside surfaces produce an image of the candy right at the hole.

Now there's "Grand Mirage," the next generation of the double-mirror principle. Units cost about \$5,000 each, so you won't see them in private homes soon, but you will start seeing them at trade shows and amusement parks. Magician Doug Henning has bought nine of them to install at Vekoma—the theme park he is building in India with Maharajah Mahesh Yogi (the Beatles' childhood guru). "It's my favorite optical illusion!" Henning boasts.

"It looks like real magic!"

In "Grand Mirage," the hole is an eye-level rectangle, 12 by 18 inches. Inven-tor Steve Weick explains the effect: "If you sit inside the cabinet with your head back and look straight up into the mirror, the people in the room would see your face in the window, and you'd see them looking at you. Point your finger straight up and the spectators will get the impression

#### MAGIC METALS

When naturally occurring magnets were first discovered, these lodestones as they were called, were considered magic stones—no one knew why bits of metal stuck to them. The new version of this trick is Newton's Folly, a square frame inside which the law of gravity seems canceled



that your hand was coming toward them. They may reach into the window to touch you, and their hands will seem to pass through your head."

"Mirage" is available for \$35 plus \$5 postage and handling from Optigone Associates, Box 8176, Van Nuys, CA 91409. For "Grand Mirage" write to 1322 White Oaks Road, Campbell, CA 95008.)

A steel ball hovers there in midair as shown. It's not an illusion; it's really there—an apparent impossibility.

How does it work? An electric eye beam connects the sides of the frame. When the ball drops below this line, the electric eye completes its circuit, turning on the electromagnet in the top of the frame. This pulls the ball up, which breaks the light beam, turn-

ing off the electromagnet.

The ball drops, turning the magnet back on again and so on. If you look closely you can see the ball vibrate and rotate, but from a few feet away it appears perfectly motionless.

(Newton's Folly is available from Markline 1-800-992-8600 for \$99.)

#### RASPBERRY EYES

At the low end of the dignity scale is my report on technological illusions is the Bronx Cheer Bulb. As far as I can determine, it is a brand-new optical illusion described here for the first time, and there is only one public display of it—at the Exploratorium.

Jim Meador created the illusion—a clear light bulb that glows on a pedestal. Exploratorium visitors are instructed to stand about ten feet away and to give the bulb a rousing raspberry. When I tried it, the bulb seemed to shudder and wiggle. When I hit one

particular note, the bulb stopped wiggling: an illusion within an illusion. I was going to try to hit that note again when I saw the irony of trying to get a bulb—which wasn't wiggling in the first place—to quit wiggling. I decided not to blow another raspberry.

The bulb's elements have two parts that alternately flash on and off 60 times per second. When you stick your tongue out and buzz, your entire skull vibrates including your eyes. Most of your visual field gets blurry when you do this, but if you are looking at something that is vibrating at about the same rate as you are, you see it distinctly.

You can get a similar effect at home. Try looking at your TV from across the room and buzzing. Meador says, "The screen will appear rubberlike, alternately expanding and contracting." **DD**



## VIDEO SCANS

# GAMES

It's a place where Jeff Bridges goes to work, Steven Spielberg to dream, and Mick Jagger to rehearse—and to perform a two-and-a-half-hour private concert for employees. George Lucas's Skywalker Ranch provides a creative halfway for all kinds of Hollywood people.

Clustered in the hills north of San Francisco, the ranch's fantasy buildings could be transplants from Disneyland. Films are edited in a vast brick "winery"; employees lunch in a glass-walled Victorian saloon. And in a quaint, rough-hewn English stable house, the designers and programmers of Lucasfilm Games devise computer entertainment.

Lucasfilm Games has been a part of the Lucas empire since the early post-Sher Wars days, a sign of his personal belief in the future of interactive entertainment. In the beginning the games were technologically advanced, even when they weren't much fun to play.

The company's emphasis, however, soon shifted from technological tricks to commercial realities, and programmers began producing marketable games. Now Lucasfilm Games is hitting its stride with releases that go beyond the teen-targeted fly-and-shooters that tend to dominate video games.

*Battlehawks 1942*, a simulation of World War II naval air combat, soars to the next level of visual reality in flight simulation



Instead of the geometric landscapes seen from the computerized cockpits of other games, *Battlehawks* pilots—flying for either the Japanese or the American forces—view animated, digitized images of Japanese Zeros, American dive-bombers, aircraft carriers, and cruisers.

Understanding the merits and limitations of your plane are the keys to success in air combat. The game's producer, Noah Falstein, provides a few suggestions on how to triumph in a *Battlehawk* simulation.

1. Never give up the

advantage of altitude without using it to the utmost. If you have two enemies to attack (one at your altitude and one lower), start with the one at your altitude.

2. On the Japanese side use your maneuverability to stay away from the American guns. On the American side use your superior firepower and durability to ignore enemy fire and go in for a kill.

Unlike the simulated reality of *Battlehawks*, *Zak McKracken and the Alien Mindbenders* is a spoof of the "Man Eats Foot" craze of tabloid newspa-

pers. Zak is a reporter (or is that fiction writer?) for *The National Investigator*. While covering UFO sightings on Mount Rainier, he discovers that Earth is being taken over by intergalactic morons.

To get human intelligence down to their own level, the aliens blast Earthlings with Stupid Ray guns. Fortunately, these Space Age underachievers are easy to spot. They've infiltrated human society by disguising themselves with nose glasses. As a result they look like a race of exterminated Groucho Marxes.

Zak fits firmly into the genre of graphic adventure, but playing the game is very much like controlling the outcome of a motion picture. You guide the on-screen figures of Zak and other characters as they wander through the game's far-fung locales in search of a way to defeat the aliens.

From tabloid journalist to intergalactic espionage agent, Zak and his computerized colleagues must overcome interplanetary gliness to survive. Lucasfilm Games project leader David Fox offers some hints for solving the game's off-the-wall puzzles.

1. If Zak bends the butter knife, he can sell it to the pawnbroker at a large profit as sculptured art.

2. When mapping the Mayan maze, you can light various combinations of the torches (two per room) to help mark your way through the torches with the airplane seat cushion.

—Bob Lindstrom



# LAST WORD

By Terry Runté

● Flipper became a joke in the Hollywood community, reduced to pathetic appearances on *The Merv Griffin Show*, where he performed tricks from his earlier days as a big television star. ●

They called him Flipper. Flipper—bigger than lightning. No one, you see, was smarter than he. He was a young, gifted, bottle-nosed dolphin with a jet center door and his face on every magazine cover in the country. He had it all—a lovely sea pen in Coronado Mar, a stable of noble girl dolphins who squealed at his every move. He even had a recording contract. He lived in a world full of wonder. Now at age 23, he's just another has-been animal actor.

"Sure, I'm bitter. I'll admit it," he told me recently at The Grace Bottom Boat Hotel, where he's wrapping up a tour of his one-dolphin show "Orca." Critics have lambasted Flipper for his performance as the legendary killer whale. Although he put on half a ton by using Robert De Niro's *Raging Bull* diet and had his skin dyed black in places, he doesn't have the presence to convincingly portray the famous "Wolf of the Sea." One critic said he looked more like a toothless bull walrus than a killer whale.

"Hollywood directors did this to me," he says, lounging at poolside with his trademark cigar and a bottle of Old Smuggler. "They hypocritized me from the start. I wasn't content to play a happy-go-lucky dolphin for the rest of my life. But people want to see the same damn weak act over and over—Flipper stands on his tail, Flipper makes that creepy laughing sound, Flipper battles an alligator with his nose until he can't see straight. Give me a break already. How about Flipper gule the girl for a change? How about the King of the Sea gets to do a little acting? I had to take control."

"The Flipperin buckled the system," says longtime friend Lancelet. "Look himself a famous cheap actor who is now a major executive at New Line Cinema." "God, how we admired him. He started out as an actor on *Halls, Down There* and never looked back."

Flipper shocked the entertainment world when he walked out on his hit TV series for a new life in stage and film. He also walked out on his long-standing live-in trainer, Susan P. Macklesberry. Macklesberry never got over the shock.

"When I found him, he was half dead in some fisherman's net," she says. "I nursed him back to health and got him involved with an improvisational hoedown-jumping group. Those were good times. Everyone loved him. When he left, he didn't even leave a note. He just grabbed his tail and swam away with it. The next day I read about it in *The Hollywood Reporter* like everyone else."

Flipper signed a multipicture deal to produce and direct three movies, but he made one poor choice after another. His all-dolphin production of Samuel Beckett's *Waiting for Godot* has become a camp classic on college circuits, screening alongside such bombs as *Plan Nine from Outer Space*. Rumors

persist that he turned down the Butch Lincoln role in *The Swimmer*, a part that many still believe was written with Flipper in mind.

Meanwhile, his personal life deteriorated. Gentle Ben, the lovable TV grizzly, remembers Flipper's legendary temper. "He obviously had a drinking problem—and there's nothing more pathetic than a bottle nose hitting the bottle. One night at a yacht party we noticed this paparazzo swimming around the boat. Well, Flipper flipped. He bashed the poor guy with his nose until he went belly-up. But that was Flipper—just a little too quick with that nose."

Flipper was found guilty of second-degree manslaughter and sentenced to 60 days in jail, which was scheduled around his film appearances. When he was released from prison, he found he had lost his job and his friends, too.

"He was pissed," says horse-actor-turned-producer Furr. "I offered him a part in *Hot Tub Gophers*, but he was too pissed to even audition."

Too scandalous for television and too weird for film, Flipper turned to the stage. Bomb after bomb sent his career spinning wildly out of control. His reputation became a joke in the Hollywood community, reduced to pathetic appearances on *The Merv Griffin Show*, his heartlessly performing tricks from his television days.

Now with a disastrous "Orca" as his own song, Flipper faces premature retirement. "They'll put me out to sea," moans Flipper, sprawled at poolside as the last stub of his nose burns out. "This stupid killer whale makeup is permanent; you know, so once the real ones get a load of me I'm as good as dead." A tear wells in his eye, and he kindly tries to wipe it with a tail. Flipper. A gentle genius and underdog. It's time for Flipper to leave. For this once-proud superstar, it's time to return to the sea and almost certain death.

As Flipper struggles to open his cage with his nose, the phone rings. It's his agent. "Flip, baby, we just signed you to thirty-two weeks on prime time. Are you ready for this contract? You and Flip Wilson, Flipper and Flip. He's a weekly bag, you're his sentient sidekick! We're sitting on a gold mine here. Pack your bags, we start shooting Monday!"

Flipper puts his little fin over the mouthpiece. "Do you mind? I'm taking business here. Out, get out! Wait a minute—give me a check of heling from that bucket. Right, now get out, or I'll call security." As I pack my tape recorder, Flipper starts opening and closing his mouth, spraying me with water until I'm drenched. For the moment, at least, Flipper is a celebrity again. ☐

Terry Runté, a Chicago humor writer, can communicate with others using a complicated language of clicks and squeals.