OMNI

02484
JANUARY 1980 $2.00

DESIGNING THE 21st CENTURY:

THE GOOD LIFE UNDERGROUND

SPEEDMOBILES, FAST TRAINS, AND SUPERCYCLES

CITIZEN 2000: THE BIOENGINEERED CHILD

THE INCREDIBLE HUMAN CARROT

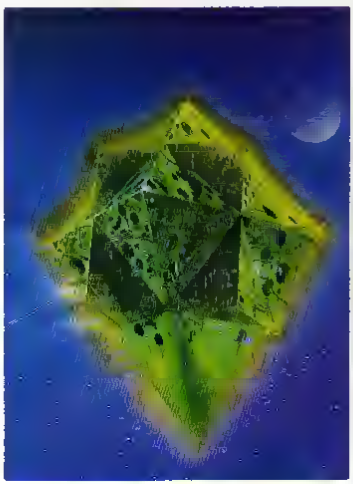
PLUS:

SCIENTIST JACQUES VALLEE ON THE PSYCHOLOGY OF UFOs

FUTURE GRAFFITI, BACKYARD SATELLITE TRACKING

OMNI
JANUARY 1980

CONTENTS



Entitled Humming Ship, *this month's cover is a painting by British artist Tim White, whose interests range from astronomy and technology to science fiction. Working within the scope of science fantasy, White has completed more than 80 book-cover designs*

OMNI (ISSN 0149-2711), U.S. Volume 2, Number 4. Published monthly in the United States and simultaneously in Canada by OMNI Publications International Ltd., 909 Third Avenue, New York, N.Y. 10022. Tel. (212) 593-3301. Printed in the U.S.A. by Meredith Printing Corp. and distributed in the U.S.A., Canada, U.S. territorial possessions, and the world (except the U.K.) by Curtis Circulation Company, 21 Henderson Drive, West Caldwell, N.J. 07006. Distributed in the U.K. by SM Distribution Ltd., 16–18 Trinity Gardens, London SW9, England. Subscriptions U.S., APO—$24.00 one year. Canada and elsewhere—$30.00 one year. Single copies $2.00 in U.S., Canada, and APO. Address changes, etc. to OMNI Magazine, PO Box 908, Farmingdale, N.Y. 11735. Postmaster: Send form 3579 to Farmingdale address. Tel. (516) 420-1894. Second class postage paid at New York, N.Y. and at additional mailing offices.

BEI
BO

"The overpowering grandeur of a giant rocket climbing into the sky on billowing tongues of flame is the closest to a religious experience many of us have ever come."

[illegible] by 1985, the space shuttle will fly into orbit this year. While at first the only people aboard the shuttle will be trained astronauts, a, quickly as possible the shuttle will become a practical, workaday space transportation system, carrying nonastronaut passengers into orbit to perform a wide variety of scientific, technical, and commercial missions.

So why shouldn't we have a chance to fly in it? Once the shuttle receives FAA certification for carrying civilian passengers, why shouldn't ordinary citizens get a ride into space and back?

In the September issue of *Omni*, reader Roberta Gluzband suggested a Space Lottery (Communications, page 142), whereby people could buy lottery tickets at $10 apiece, the proceeds to go directly to fund the space program. Gluzband suggests that if 10 million people purchase tickets, there's a $100-million gain for the space program, at the cost of lofting the sole winner of the lottery into orbit.

But, in a very real sense, U.S. taxpayers have *already* paid for the space program, and for the shuttle. Why should we have to dip into our pockets again to get a lottery ticket if we want to ride into space? After all, it is *our* shuttle.

We paid for the shuttle through our taxes. What could be fairer, and more poetically just, than to use our income-tax forms for a National Space Lottery?

Have the blessed IRS print a small statement on each federal-income tax form: "I would like to ride on the space shuttle." Follow that statement with a box. If the person filling out the tax form checks that box, that taxpayer's name (or identifying number) is placed in the hopper for the National Space Lottery. With each shuttle mission, a name is drawn from the lottery; the winner gets a free ride aboard the shuttle. One taxpayer per shuttle mission.

Gluzband's proposal was aimed at raising some additional funds for the space program. But a National Space Lottery in which *all* taxpayers can participate would produce much more than a paltry $100 million per mission.

The interest and suspense stirred by a National Space Lottery would help to promote public awareness of the space program in general and the shuttle in particular.

It is a fact that most people who have taken the trouble to travel down to Cape Canaveral to witness a major rocket launch have come away from the experience as dedicated supporters of our space program. There is something about seeing a launch—the electric excitement of it, the overpowering grandeur of a giant rocket climbing into the sky slowly, inexorably driven on [illegible] by billowing tongues of flame—that is the closest thing to a religious experience that many of us have ever had.

Hardened skeptics break into tears. When you see a 50-story-tall column of intricate machinery detach itself from this planet and carry not only a few astronauts but also all the hopes and dreams of the human race outward toward the infinite universe, you can never view your own life, the world, or the space program in the same old way again.

Imagine what the winners of the National Space Lottery would feel. They would be aboard the shuttle, part of the crew participating firsthand in the adventure, learning through their own eyes and other senses just what our astronauts are doing in orbit, and why.

Most of the National Space Lottery winners would return to their home communities enraptured by their experience. They would become ardent supporters of the space program, fervent evangelists of the space age. Their enthusiasm would help to make their neighbors understand the worth of our space efforts.

If there's one thing our space program needs, it is support at the grass-roots level: eager, active support, the kind that is felt by Congress and the White House. Space operations require billions of dollars, not millions; and without strong grass-roots support our democratic government will not invest the billions that are necessary to keep our space program on course.

Perhaps we couldn't have a National Space Lottery on every shuttle mission. But there should be one as often as possible. Such a policy would prove to everyone in the world that the U.S. space program has entered a new era of usefulness and practicality. It would show the world that the shuttle has opened the skies to everyone.

Without a National Space Lottery our space program will be in continual fiscal straits. There are riches waiting for us in space: wealths of energy and raw materials, new industries, new jobs, new profits. Our present space program is not geared to go out and grasp the economic benefits that can make us all far richer and safer than we are now.

Our program today is overly cautious, underfunded, and lacking in goals. A National Space Lottery could help to change all that. Some people will wince at the thought of mixing "gambling" with the space program, but in a sense we are already gambling with the space program, risking the future of every American on a weak and timid space effort. And there is a name for the gambling game we are playing today in space—Russian roulette. ∞

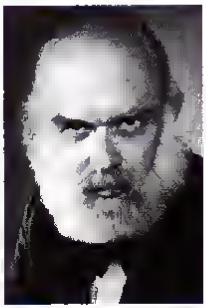
CONTRIBUTORS

OMNIBUS


STINE


LINDEN


COLANI


RANDI


NAHIN

With the twenty-first century just around the corner many of us are peering beyond the next two decades and speculating on the technological wonders to come And yet some are unsure that humankind can even survive until C-21 With this in mind *Omni* contacted Algirdies Eunan Olgierd-Huth the best of all possible communicators on the century ahead Allie as she is better known was the first person born in the twenty-first century A so-called test-tube baby created by in vitro fertilization Allie is now one hundred years old Thanks to the miracles of life extension, she is good for at least another 200 years We asked her to trace for us the revolutions in medicine education government and personal freedom brought about by electronics and bio- and psychotechnology Allie consented and told the whole story to writer G *Harry Stine* We call it "The Life of Allie" and it begins on page 44

"Thousands of Americans are moving bag and baggage down into the dirt—and loving it!" writes *Michael Edelhart* formerly an editor of *Mother Earth News* "There are at least 3,000 underground homes in the United States right now, and that figure is expected to double in the not-too-distant future" Edelhart's interest in energy prompted him to visit the home of Andy Davis designer and owner of a "cave house" There he found that underground architecture both pleases the eye and offers feasible solutions to the energy shortage "In some instances" Edelhart writes "energy savings can be as high as 75 percent" Thinking of buying a new home? Better read "The Good Life Underground" first (page 50)

Talking gorillas? The idea isn't as ridiculous as it might seem According to author *Eugene Linden* members of the ape family already possess vocabularies of up to 600 words In his article "Talk to the Animals" (page 88) Linden reports that these new simian skills may even find their way back to the wild "Laboratory experiments" he writes "indicate that in the near future colonies of language-trained gorillas and chimps may appropriate these language skills and pass them along to their offspring" Linden began his writing career as an investigative reporter in Vietnam His first book *Apes, Men and Language* was published in 1974 His second, *The Alms Race* appeared in 1976

"I'm free I'm one of the most independent men in the world I can shatter whole industries." These are the words of *Luigi Colani* German engineer/sculptor/architect and at age fifty-one one of Europe's foremost industrial designers Colani's clients include the biggest firms in Europe for which he designs everything from kitchen utensils to supertankers "Every problem that was given to me had to be solved by nature in a fantastic and nearly perfect way," he says This month *Omni* pays tribute to the master designer with a stunning pictorial display of his more popular and abstract creations Witness the shape of the twenty-first century on page 74

James Randi presents "Lesson One" his first fiction story in this month's issue Randi a world-famous television and theater personality is founder and chief investigator of the Committee for Scientific Investigation of Claims of the Paranormal His book *The Magic of Uri Geller* was a penetrating exposé of the former Israeli psychic superstar and he has coauthored *Houdini His Life and Art* Randi doesn't think much of claims of paranormal powers but he says it's a favorite fantasy of his that there just might be something to them after all "There just might be a Santa Claus too" he adds "Certainly there's more evidence for Santa than for psi" See page 68

Other works of fiction this month include "The Box" (page 84) *Paul J Nahin*'s comical tale about equal opportunity and "Fat Farm" (page 100) *Orson Scott Card*'s incentive program for potential dieters

In the past 12 years more than 8,000 cattle and livestock have been systematically mutilated throughout the United States *Harry Lebelson* a New York–based UFO investigator reports on this mystery for *Omni*'s UFO Update Join him as he probes the circumstances surrounding this bizarre phenomenon and the events that have led to a nationwide federal investigation "Death on the Range" starts on page 28

LETTERS

COMMUNICATIONS

Goddess of Life

The article "Venus Glow" [October 1979] accepts the conventional view that Venus has no life and can have no life. This may be true, but it certainly hasn't been proved.

At the altitude of the cloud tops on Venus the atmospheric pressure and temperature are not very different from our own. The clouds must contain a chemical soup of elements boiled off the hot surface of the planet, and updrafts must be constantly mixing these elements into varying combinations. The carbon dioxide and strong sunlight above the clouds should sustain any plant life that has evolved.

The only thing that is not found is water. Most of the water apparently is found in combination in sulfuric acid. Still, the clouds over our East Coast are now composed of dilute sulfuric acid, and our atmosphere is still full of microscopic life forms.

It surprises me that people will consider Jupiter as a place where life might have evolved but are so quick to write off Venus. None of the Venus probes has even carried life-detecting equipment.

Eugene Marquis
James Park, N.B. Canada

Devilish Games

I would like to express my appreciation of the unknown person who realized that "all work and no play makes Jack a dull boy [and Jill a dull girl]." I like the fact that the Games pages are printed with a pale yellow background; it makes them easier to find. "The World's Hardest Crossword Puzzle" would look good on those pages. Although I realize that judging competitions can be time-consuming and mentally exhausting, I was visibly (you should have seen me) upset when I found no tricky devilish little questions in the February and July 1979 issues. I also find it unnerving to see the Games answers appearing before the Games themselves. I feel a twinge of guilt at being tempted to take advantage of the situation. I tried to rationalize that an intelligent person would take advantage of an opportunity as it presents itself, but it didn't work. I realized that that line of reasoning in context is for half-wits, crooks, and advertising executives.

Charlotte S. Somerlock
Baltimore, Md.

Light Pollution

As a reader of *Omni* and an amateur astronomer and having read your Space column "Nightlight" by Mark Chartrand III [September 1979], I wish to comment on the astronomical dilemma caused by light pollution.

It is widely accepted among concerned members of the astronomical community that many of the sources of light pollution not only are creating a serious degradation of the night sky but also are a form of energy that is both misdirected and wasted. This applies to overabundant artificial outdoor illumination in excess of what is required for safety and security purposes. The pros and cons of this issue are apparent, but one important point clearly remains. If the present growth of light pollution is not curbed, the dark night

CONTINUED ON PAGE 122

IN MEMORIAM

Dr. Christopher Evans, *Omni*'s contributing editor abroad, died of cancer on October 10, 1979. He was forty-eight. As a journalist and psychologist, Dr. Evans was exceptionally skillful at bridging the gap between scientists and nonscientists. His books, from *Cults of Unreason* to *The Mighty Micro*, reflect an abiding concern for the social consequences of science and the relationship of scientific method to personal belief.

Chris Evans was strikingly energetic, both physically and intellectually. He had a rare ability to combine skepticism with sympathy for heterodox ideas. This attribute led him to welcome so enthusiastically the appearance of *Omni*. His influence as a contributing editor will be missed by readers and staff members alike.

DIALOGUE

FORUM

In which the readers, editors, and correspondents discuss topics arising out of Omni and theories and speculation of general interest are brought forth. The views published are not necessarily those of the editors. Letters for publication should be mailed to Omni Forum, Omni Magazine, 909 Third Avenue, New York, N.Y. 10022.

Sentimental over Whales

I wish to respond to Doug Alemanne's letter [Communications, October 1979] regarding Ken Brower's article on whales. Alemanne states that there was "something drastically lacking" in Brower's article, and so there was: sentimental anthropomorphism. For example, to describe whales as people, as Alemanne does, is to stretch the conceptual categories of our language to the point of meaninglessness.

Beyond that semantic point, there are some philosophical and biological errors involved. One cannot credit any animal, human or nonhuman, for an action it has no choice but to perform. We cannot applaud ourselves because we obey the laws of thermodynamics; we have no choice in the matter. Similarly, Alemanne errs in describing whales as 'more sophisticated than humans in that they coexist with their environment instead of changing it.' The whales' lack of an ocean-transforming technology is not their choice but is imposed on them by their anatomy. Whales, for example, do not have opposable thumbs or even appendages with which to manipulate tools.

Alemanne should also reflect on the fact that all carnivorous and omnivorous species prey on other species. I doubt that he finds it distressing that cats kill mice, even when they do so in sport and leave the carcass unconsumed. Therefore, there is nothing inherently "unnatural" in man's killing for food or sport.

This is not to condone the indiscriminate killing of other species. Man, as the most technologically and morally advanced animal, has a responsibility to all species (including his own) to exercise good judgment in the killing or nurturing of other animals. Call it stewardship if you will. Thus, while I agree with Alemanne's implication that we must become more responsible stewards of nature, I must deplore his sentimentalism.

Joseph Andorfer
Kansas City, Mo.

Almost Human

The article "Intelligent Machines" by Thomas Hoover [October 1979], presented a slightly unrealistic picture of artificial intelligence.

It is a common error to view computer hardware as the limiting factor in machine intelligence, the premise being that the larger and faster machines equipped with a variety of sensory devices will eventually result in a viable pseudohuman machine. A more realistic limitation lies in the software, which instructs hardware to simulate thinking. Even the most sophisticated computer languages are extremely limited in their scope of conceptual expression. Attempting to encompass the realm of human consciousness by using a vocabulary of mathematical formulas and algorithms is roughly analogous to attempting to explain interplanetary navigation in aboriginal Javanese.

Although it is true that several science-fiction standbys of the past have since proved true (or at least feasible), the myth of an independently thinking machine is, by the nature of the computer itself, totally impossible. Computers are not clever; occasionally the people who program them are. Thus, when the layman sees a clever program like Weizenbaum's computerized therapist, he is impressed and thinks, "It seems almost like a human now. Therefore it will truly be human soon."

Unfortunately, the imitation of intelligence is not individual consciousness. And the fact that a programmer can manipulate an electronic puppet to simulate thinking does not indicate that the puppet can survive or reason on its own. Anyone with even rudimentary programming experience can testify that (outside of infrequent hardware errors) everything a computer does is predetermined by the person(s) who programmed it. Promising the public that a computer will ever express a personality or intelligence other than that of its programmer(s) is fostering a myth that simply cannot be fulfilled.

Geoffrey James Sickler
Los Angeles, Calif.

PhiX-174

You report, in the September 1979 Continuum ["Viruses from Outer Space"], that two Japanese scientists are examining the gene sequences of the bacterial virus PhiX-174 for coded extraterrestrial messages.

The suggestion is as full of holes as the proverbial Swiss cheese. Any virus that could survive irradiation during a voyage of light-years' duration, infect a terrestrial bacterium for countless generations, and still retain a genetic message unaltered by mutation is a virus that violates much of what we already know about viruses, genes, and evolution.

We know that viruses are inert packages of nucleic acid and proteins that come to life only when they can commandeer their host's cellular machinery to manufacture themselves. Each virus species has a so highly evolved, compact, and specific arsenal of molecular weaponry that it usually can infect only one kind of host. PhiX-174, for instance, can infect a single type of bacterium found only in human intestines.

In other words, an extraterrestrial virus would have as much chance of adapting to terrestrial life forms as a man would have of evolving gills by jumping into the water.

No, I do not think an advanced civilization has sent us greetings in PhiX-174, and I don't know whose intelligence is more insulted by the suggestion, theirs or ours.

Deborah Katz
New York, N.Y.

Usually the Best

I have read a lot of fiction, both good and bad, but have found that *Omni*'s fiction is usually the best. The only problem is there

CONTINUED ON PAGE 126

THE INHABER AFFAIR

EARTH

By Kenneth Brower

Last February in *Science* Dr Herbert Inhaber an adviser to the Atomic Energy Control Board of Canada (AECB) published an article entitled "Risk with Energy from Conventional and Nonconventional Sources." Dr Inhaber summarized an earlier technical report of his, AECB-1119. His conclusions were counterintuitive in an engaging way. They caught the attention of the press and other summaries appeared in *The Wall Street Journal*, *The Washington Post*, *Nuclear News*, *Energy* and Britain's *New Scientist*. Inhaber reported that "nonconventional" energy technologies such as windmills, solar heating, and methanol were riskier than many "conventional" technologies such as nuclear power. Safest, said Inhaber, were natural gas and nuclear. Riskier were those systems that derived energy from wind, wood, and sun. Riskiest of all were coal and oil.

This surprising news was encouraging to a struggling nuclear industry which immediately spread the word. It was also unfortunately substantially in error. Inhaber's report made many foolish assumptions, faulty interpretations, bad omissions, conceptual errors, and mistakes in arithmetic. Its appearance in *Science*, our most prestigious scientific journal, was a shocking failure of the referee system designed to keep such error out of scientific publications.

If *Science*'s referees had failed, then its letters department did not. The response to Inhaber's assertions was heavy and ran over several issues. Richard Caputo, of the Jet Propulsion Laboratory, wrote, "I found Inhaber's article to be surprisingly at odds with my own similar study of electric-energy systems. About half of his source material and the methodology he claimed as his own [are] taken from work I technically directed or had contracted at the Jet Propulsion Laboratory. . . . His estimates of total health risk compared to those in the JPL final report were a factor of about 15 greater for coal, a factor of about 100 greater for solar thermal electric, and a factor of about 100 greater for solar voltaic." A letter from Rein Lemberg, a Canadian consultant who had been commissioned by the AECB to review Inhaber's study, pointed out flaws in the methodology. Lemberg noted that Inhaber's nonconventional energy systems included backup in the form of conventional energy, "for wind, solar thermal, and solar photovoltaic, the energy backup systems contribute the majority of risk." Inhaber is not truly comparing conventional and nonconventional.

The longest of the rebuttals—one of the lengthiest, most technical, and angriest letters ever published in *Science*—came from Dr. John Holdren, of the University of California, and two of his colleagues. Professor Holdren, a member of the Steering Committee of the National Academy of Sciences Study of Nuclear and Alternative Energy Systems, is a leader in the new field of energy-technology risk assessment. A report coauthored by Dr. Holdren was the source of 30 of Inhaber's 163 citations in AECB-1119. Holdren was dismayed at what he felt was Inhaber's misreading and misuse of his materials. Holdren's entry into the Inhaber controversy, however, was reluctant. "I waited a long time," he says. "I first saw Inhaber's report in September 1978. A quick look was enough. At that time I thought it was so clear [that] it was garbage that it wouldn't be a problem. Then the thing surfaced in *New Scientist* and in *Energy*. It became clear that the thing was extraordinarily dangerous. Completely erroneous findings were being widely accepted. . . . Several countries Inhaber's thing has been influential in policy making—a prospect I find terrifying."

The AECB, in response to criticism from Holdren and others, replied that no scientific study was error-free. Inhaber's report was "no more or less than food for thought." The AECB could not repudiate the report, it said, because it had never endorsed it. The report, meanwhile, continued to circulate.

"I didn't decide to do a long critique until the inadequate response from Inhaber and the AECB," says Holdren. "There were five or six errors per page! Nobody should have to tackle that."

But tackle it Holdren did. His critique coauthored by four of his graduate students and a colleague, runs 232 pages. I asked the professor recently whether the pride of authorship in such a critique is anything like pride in a more positive piece of science. "Not at first," he answered. "One can't ordinarily take much pride in demolishing a faulty piece of work, but the need for rationality in the energy debate required that it be done. Now I take more pride in it. The first chapter is almost an introductory chapter to a book on risk assessment."

The success of that chapter John Holdren owes to Herbert Inhaber. Inhaber's contribution, if Holdren is right, has been to stumble into every possible pitfall that confronts students in the field. One section of the chapter entitled "A Catalogue of Mistakes" paints all the signposts on the road best untaken: "A. Inconsistencies. B. Conceptual Confusions. C. Inappropriate Selection of

CONTINUED ON PAGE ***

For Dr. Inhaber, nuclear is safer than solar

THE BODY ELECTRIC

LIFE

By Dr Bernard Dixon

One of my treasured possessions is an improved magnetoelectric machine for nervous diseases. About 100 years old, it is a superb piece of Victorian craftsmanship—a fine wooden box containing a huge, impressively powerful magnet between the poles of which a spindle carries two velvet-covered coils of wire. When you turn the handle, the brass mechanism sets the coils whirring and this generates an electric current (as Michael Faraday first demonstrated). Delivered through hand-held electrodes, the ensuing tingle was supposed to cure anything from toothache to tic douloureux.

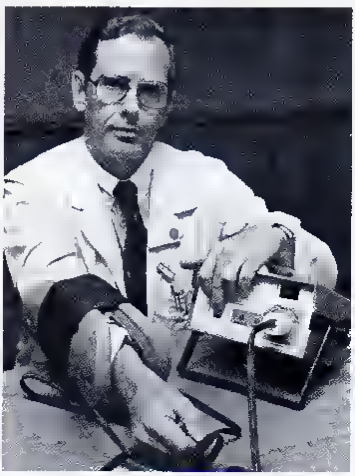
The idea that electricity could combat disease was an enticing and popular one earlier in this century. But the successes were so few, and the quackery so abundant, that serious interest in it declined almost to extinction a few decades ago. That may all be changing now as a result of research conducted at Columbia University in New York City. There Dr Andrew Bassett and his colleagues are pioneering in the use of electromagnetism to promote the healing of fractures. Their 'noninvasive' technique—so-called because it does not involve surgery—is of particular value in cases when bones do not knit together. Such intractable fractures are the bane of the orthopedist's life. Vast resources have been plowed into seeking ways to deal with them. The rewards have been meager.

Dr Bassett may have the answer. His interest was triggered by discovering that when bone is subjected to mechanical stress—during walking, for example—it becomes electrically polarized, generating a tiny current. Although vanishingly weak, this electricity is sufficiently strong to affect living cells. It was a long shot from this discovery to the proposition that such currents, when artificially induced, might help broken bones to reunite. In the first attempts, electrodes were implanted into the limbs of animals, and direct currents were passed through them. But although positive results were achieved, there were serious shortcomings in applying this procedure to the treatment of human patients, notably the pain and the increased risk of infection that result from implanting electrodes directly into tissue.

Hoping to overcome these drawbacks, Bassett turned to the idea of inducing electricity at a distance. As in my Victorian gadget, an electric current begins to flow in a wire if it is moved between the poles of a magnet. Likewise, if bone is substituted for the wire, electricity should then be induced inside the bone.

This is precisely what happens. Bassett has found he can induce currents in the bones of an arm or leg by carefully positioning a pair of electromagnets on opposite sides of a fracture. Clearly the bone cannot be rotated, like the coils in my machine. However, an equivalent effect can be achieved by delivering a time-varying rather than constant magnetic field. In other words, the bone functions just like chunks of iron in a transformer.

The results have been very impressive. A recent review of 285 patients treated in New York and elsewhere in the United States and in Europe shows that 76 percent of intractable fractures were completely healed. A further 10 percent of the fractures had partially reunited. These successes were achieved with patients who had very serious problems. Many of their fractures were infected, and the afflicted limbs had been scheduled for amputation; most of the patients had already undergone surgery that had failed to help. Among the small number showing no progress, there were understandable reasons in about half, such as the patient's obesity or lack of cooperation.



Bassett demonstrates bone-healing technique using electromagnetic coils and control box.

In practice, the technique is simplicity itself. Initially the coils must be precisely located in relation to the fracture by positioning them with the aid of an x-ray screen. Afterward the patient can put the coils in their correct place on the plaster cast. The apparatus is then left switched on from 12 to 16 hours a day. At first, Bassett employed currents similar to those generated by a healthy leg during normal walking. He has since improved upon this, having found that specific pulses of low frequency are the most effective. Laboratory tests show that some types of pulses are more effective than others in stimulating bone to absorb calcium, but the relevance of this to healing is not yet certain.

Describing his own experience with the technique in the British journal *Pulse*, orthopedic surgeon W.J.W. Sharrard recently reported that of 12 patients who completed their treatment, 9 are using their arms normally, their fractures having knit completely. Again, these were people with very severe conditions—difficult fractures, incurred at least a year earlier, that had not knit together despite the best of conventional medical attention.

Professor Sharrard recently—and accidentally—found that he was also able to correct an inequality in leg length in a young patient suffering from the condition known as congenital pseudarthrosis. This success raises the possibility that electromagnetism may have a much wider range of applications than envisaged so far. After a false start a century ago, the science of electrotherapy may be about to take off in a big way.

SKY FIRE

SPACE

By Mark R. Chartrand III

Our atmosphere, the thin membrane that separates Earth from space, is a remarkable geophysical laboratory. In it are synthesized the fascinating colored lights known as auroras, one of nature's most splendid phenomena. Now that the sunspot cycle is reaching its peak, we can expect auroras to light up our night skies with greater frequency.

A dramatic account of man's early encounter with the aurora borealis, or northern lights, is provided by the Romans. On a night in A.D. 37, they saw a red glow on the horizon in the direction of the bustling port of Ostia. Thinking the entire city on fire, they rushed to its aid, only to find the city intact and the "fire" still in front of them. Earlier accounts tell of "flaming spears" seen in 503 B.C. and of a night sky "glowing in flames" above ancient Carthage several hundred years later.

The word *aurora*, Latin for "dawn," was applied to this phenomenon by French astronomer-philosopher Pierre Gassendi after he had witnessed a bright aurora on November 12, 1621. The southern lights, or aurora australis, were named by Captain James Cook during a voyage in the South Pacific in 1773.

An auroral display can take many forms. The simplest is a sheet of faint light, whitish or reddish, covering part of the sky. More spectacular are the vast curtains, rays, arcs, and coronas of a full auroral show. Light can dart quickly about the sky, changing shape and color in short order. The curtains may be pleated, forming a shape called the rayed arc. If you are directly underneath such a curtain, the aurora may appear as a corona. Arches are another common shape. The lambent light cast on the ground by a bright display can rival the light of the full moon. It is more than 250 times as bright as the band of the Milky Way arching across the summer sky.

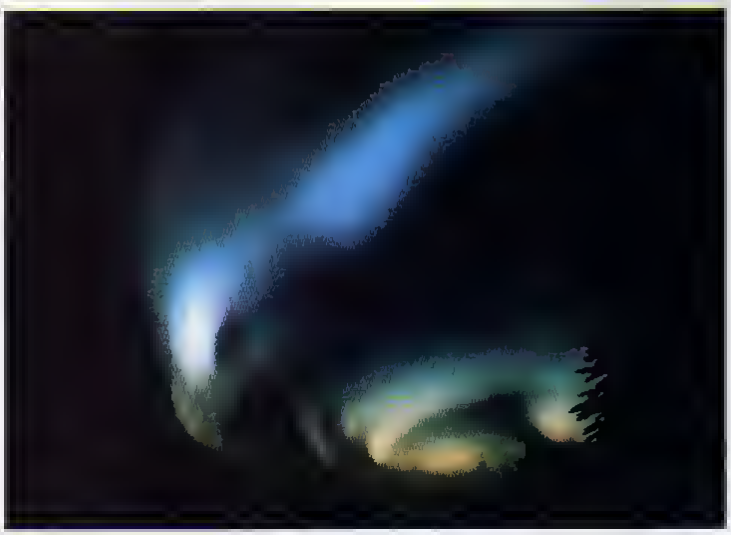
On the average, about five auroras are seen over the northern United States and southern Canada each year. Perhaps once a year an aurora is visible over the southern United States. In times of great solar activity, auroras are more common and sometimes get even farther south. They have been seen—rarely—even in Mexico City. The peak auroral activity seems to come about two years after the sunspot peak. Since we are just now reaching the peak, the next two years should be ideal. The number of auroras is also related to the season. There are more in the spring and fall.

The Space Environment Services Center (SESC), in Boulder, Colorado, keeps tabs on the interaction between the sun and the earth's magnetic field. When unusual solar activity is likely to produce a big auroral display, the SESC notifies the wire services. If you are technically minded, you can listen to the National Bureau of Standards's radio station WWV on frequencies of 2.5, 5, 10, 15, and 20 megahertz. Although the station's primary job is to give accurate time signals, other information is tucked in with the ticking of the atomic clock. At 18 minutes past each hour, WWV gives a brief report on Earth's magnetic field and solar activity. You'll need some references to decipher the information. If you don't have a shortwave radio, you can call 303-499-7111 and listen to the three-minute report.

To the Australian aborigines, auroras were the dances of the gods. Inhabitants of the Outer Hebrides were of similar mind. *Na fir chlis* ("the merry dancers") is what auroras are called there. In the view of northern Germanic tribes, auroras were reflections in the shields borne by the Valkyries. Greenlanders believed they were spirits playing ball with the head of a walrus. The Tlingit of Alaska thought they were the dance fires of tribes farther north.

We know that an aurora is produced by high-energy particles coming from the sun and falling through Earth's magnetic field. These particles strike the upper atmosphere and cause the atoms and molecules there to glow. Some geophysicists have compared the upper atmosphere to the screen of a giant television picture tube. In this analogy, the

CONTINUED ON PAGE 121



Oxygen and nitrogen, excited by solar radiation, formed these spectacular Alaskan auroral bands.

JEFFERSON IN THE TUNE-INN

OFFICIAL CIRCLES

By William K. Stuckey

Marvin MacFarland and I were jumping up and down and waving our arms in the Tune-Inn—Capitol Hill's best bar for political talk, women, insults, and jumping up and down—when Silverberg shambled in with the skinny man.

Marvin paused in mid-bounce.

"It *looks* like him," said MacFarland, who, when he isn't jumping up and down with the powerful and the pitiful of the Tune Inn, is division chief for science and technology at the Library of Congress. MacFarland squinted at the newcomer. "Yup," he said. "tall, sandy-haired, abstracted, blue eyes, crippled wrists from horse-riding accidents. But I'd have to hear him talk before I could be certain."

The skinny man was deep in conversation with Silverberg (Robert, the splendid SF author and best writer on time travel since H. G. Wells).

"Mine, after all, may be a utopian dream," the skinny man murmured in a low and melancholy voice, "but, being innocent, I have thought I might indulge in it till I go to the land of dreams and sleep there with the dreamers of all past and future times."

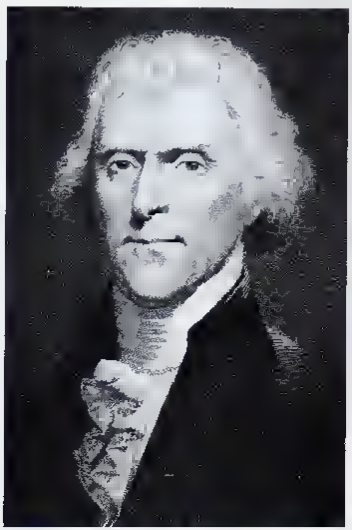
"By God, it *is* him!" Marvin exclaimed. I rushed over, excited. "Exactly what dream are you talking about, sir?" I asked.

"The dream of the conquest of science and liberty over barbarism and despotism, of the emergence of a natural aristocracy of merit and talent over the pseudoaristocracy of inherited wealth, of the end to tyranny over the mind of man," the skinny man replied.

"Welcome back to Washington, Mr. Jefferson," I said. "Would you like to talk some politics?"

My question might strike you as silly. Unfortunately, it wasn't. In Washington these days, genuine political conversations have joined the ranks of endangered species. The political thinkers at the Tune-Inn—congressional staffers, such as Moynihan's people, Long's people, Tip O'Neill's people, plus assorted librarians, lobbyists, computer people, poets, supertanker captains, janitors, social security drunks, and high-class floaters—are rather burned out on government. To them, the 1980 presidential election hardly matters (no candidates of any stature), and all that is left is inflation, demoralization, Russification, and the coming psychic strangulation of an Orwellian 1984. We needed a shot in the arm. One day MacFarland, while defaming the President, the Irishman from Massachusetts, Texans, assorted Californians, and any other candidate who came to mind, began to scatter tidbits about the Sage of Monticello (the study of whom is MacFarland's private passion).

The third President of the United States emerged as the sponsor of the nation's first space program (the Lewis and Clark Expedition to the then newly acquired Louisiana Territory), the first true patron of the Library of Congress (he donated his own private collection of some 10,000 volumes to it), architectural genius, author of a pioneering scientific book (*Notes on the State of Virginia*), founder of the University of Virginia (and designer of its then revolutionary science-heavy and religion-light curriculum), friend of Priestley and Lavoisier, lover of mathematics, inventor, meteorologist, archaeologist, agricultural innovator, student of a dozen ancient and modern languages (including Indian dialects), foe of organized religion but deep admirer of Jesus, doughty political infighter and author of Western Civilization's finest piece of political propaganda, the Declaration of Independence. Where, oh where, are there candidates like that anymore?



The Sage of Monticello, clad in Silverberg's jock strap, ended up in Joe Nardelli's bar.

If only there were some way to go up the line and bring him back and bask in the pleasure of his political company for, getting, for a moment, peanuts and crap!

Silverberg figured it out in his brilliant novel *Up the Line* (a phrase meaning "backward in history" as opposed to going into the future or down the line.) One simply straps on a Silverberg timer, which is something like a jockstrap with a clock on it.

I gave President Jefferson my favorite barstool in the corner by the front window, where, if you bend forward, you catch glimpses of his own Library of Congress and the Capitol dome. Intensely political Tune-Inners crowded in, and Joe Nardelli, the owner and one of the few West Virginia Italians, brought a round of screwdrivers.

To make the Sage feel at home, Marvin belted out a loud version of his 1801 campaign song:

Rejoice, Columbia's sons, rejoice,
To tyrants never bend the knee
But join with heart and soul and voice
For Jefferson and liberty.

A faintly sardonic smile flickered across Jefferson's thin lips. He had invented most of the now-familiar political tricks—the first campaign biography, slogans, puffery planted in friendly newspapers.

The philosophical side of Jefferson dominated, however, and is suggested by the reading program he once proposed for a young lawyer:

"Till eight o'clock in the morning employ yourself in agriculture, chemistry, anatomy, zoology, botany, ethics, and natural religion, religion sectarian, natural law. From eight to

CONTINUED ON PAGE 115

THE ARTS

By James Delson

Step up and greet the future. This Christmas season will be the most electronics-packed one yet, but few gift-givers will have heard of what could be the ultimate gift for gadget-minded *Omni* persons: a backyard satellite receiving station that picks up TV signals directly from orbiting satellites.

For a mere $15,500 ($18,500 in some areas of North America), plus a do-it-yourself installation charge, almost anyone with a backyard that has good southern exposure can take his pick from two dozen different television stations whose programs are transmitted via RCA's communications satellite.

Fred Hopengarten, who founded and now runs Channel One, the nation's first supplier of home satellite receiving equipment, explains: "Two-thirds of this country is going without programming available by satellite because they don't have access to a local cable television system. If you live as little as one mile from the end of a cable line, it's very difficult to persuade the local station to run that wire out to your house unless you can guarantee another thirty to sixty subscribers per mile of cable laid.

"There are a lot of places in this country where there are not enough homes in an area to merit the laying of a cable trunk line. So those people have to do without the wide variety of programming now available to the rest of us. For them, whether they're farmers, suburbanites, cattlemen, oil men, or in the entertainment industry, or even if they just want a bigger choice of stations than they now have or better reception than they've ever seen, Channel One is what they're looking for."

Did you know you were watching satellite-relayed television when you saw that commercial-free film on cable television? Since 1975, many stations throughout the country have been fed signals via RCA and Western Union satellites. The signals come in clear every time because the stations that own ground-based receivers aim at the orbiting transmitter and pull their shows directly out of the air, not through wires over long distances. Hopengarten, a lawyer, Harvard Business School graduate, and former law clerk to the chairman of the Federal Trade Commission, began working on his enterprise when a friend suggested selling similar setups to individual homeowners in August 1978.

No one had ever tried it before, as far as I knew. Hopengarten said: "I looked into the idea, and the more I learned about it, the more sense it seemed to make." Soon after he went into business, he was proved correct because Neiman-Marcus began offering the same setup through its catalog. "Of course theirs is twice my price," Hopengarten added. "Neiman-Marcus installs the concrete base for you, and I don't have the same type of overhead they have."

There's very little overhead at all, really. Hopengarten works out of his home in Newton, Massachusetts. He doesn't have to keep in stock the items he sells. "They have been shipped from somewhere to somewhere, so they might as well be shipped from the manufacturer's warehouse direct to the installation site. I meet the truck driver who has driven to the location with the equipment, and in four hours the purchaser is watching television. Though I'm operating out of my home, I'm no rookie. We just can't justify spending the money on office space.

"I spent my money and time trying to figure out how an equipment setup could be sold for minimum cost and yet still deliver the same kind of studio-quality image that is available when you're receiving things by satellite. . . . I think of it as 'son of cable.'

"While I was figuring out how to put it together, I started looking into the legal aspects of the operation. After a lot of reading and asking questions, I became convinced that it was all right. The Department of Justice has said, 'Existing laws do not require an FCC license to use a device that simply receives radio communications. If you're engaged in mere passive reception of a signal, it's a legal setup. It's when you broadcast to other television sets that the trouble arises, and that's not what I'm selling.'"

CONTINUED ON PAGE 118

Fred Hopengarten stands near the dish antenna of a backyard satellite receiving station

Stevie Wonder

"Journey Through The Secret Life of Plants"

A deluxe two-record set.

Available now.

On Motown Records & Tapes

THE ARTS

By Lloyd Biggle, Jr

Analog—formerly *Astounding Stories of Super-Science* formerly *Astounding Stories* formerly *Astounding Science Fiction*—*Analog*—is fifty years old

Half a century of a magazine's life is measured by more than time. Its years may be counted in millions of words or in thousands of stories and installments of novels and scientific articles. Or they may be calculated in shelf space—about 20 feet, depending on how tightly the issues are packed. The lucky collector with a complete set isn't going to pack them. Those fragile early pulp magazines that cost 20 cents on the newsstand in 1930 are now worth dollars. A copy of Vol. 1, No. 1 may go for $100 or $200, and up depending on its condition and on how much the purchaser wants it.

The most important measurements are not tangible ones. *Analog/Astounding* has played a significant role in the education of generations of strange young people and became a springboard to soaring flights of imagination that will endure in readers' memories for a lifetime. The magazine has also been the most significant influence on the phenomenal growth of American and world science fiction and now contains annually in the United States alone more than twice as many printed words as *Analog/Astounding* has accounted for in its entire existence.

The cornerstone of such an enduring edifice should be laid with appropriate ceremony and only after careful planning. *Astounding Stories of Super-Science* came into being as a technological accident and an economy measure. Clayton Publications, proprietor of a chain of pulp magazines, owned 13 titles that spanned the entire range of such publications. Its printing press had a capacity to process 16 gaudy four-color covers simultaneously. The three blanks were a production extravagance that had to be eliminated, so editor Harry Bates proposed a new publication in imitation of a trio of fledgling magazines that offered stories about fantastic machines and improbable monsters. Their contents so defied classification that one of them called it scientifiction, but the potential for attention-grabbing cover art was infinite. Every pulp-magazine tycoon knew that the covers sold the magazines.

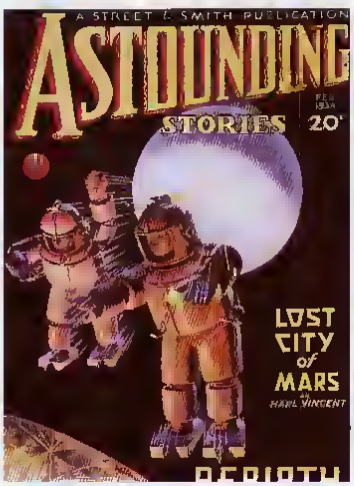
Astounding Stories of Super-Science was born at the end of 1929, shortly after the stock-market crash, with the January 1930 issue. Surely no edifice ever had a more uninspired and badly timed cornerstone laying. But from the first issue there was a sense of mission. Bates editorialized. "Your children—or their children—are going to take a trip to the moon. They will be able to render themselves invisible. They will be able to disintegrate their bodies in New York and reintegrate them in China—and all in a matter of seconds," Astounding Bates declared, but not impossible. After all, television would have been almost unthinkable a mere ten years before.

The early cover blurbs described interplanetary and interstellar adventures, but the tone for the cover art was set by the giant beetles displayed on the first issue. Earthlike settings with a pronounced predilection for wildlife. There were enormous insects, giant octopuses, apes, mutated crocodiles, an entire zoo. It may be no coincidence that the next magazine Clayton Publications launched, filling one more blank space in that array of pulp covers, was *Jungle Stories*.

The Clayton Empire collapsed in 1933. Another pulp chain, Street & Smith, bought *Astounding Stories* and returned it to the stands after a brief hiatus, marking the beginning of a spectacular success that changed and matured all of science fiction. The new editor, F. Orlin Tremaine, mixed awesome fantasy with his science fiction, and he also brought serious science articles to the magazine, expanded it, and attracted the best-known writers—all for that original price of 20 cents, which was a nickel less than the competing magazines charged. In a mere six months *Astounding* had outdistanced its competition in quality, quantity, and circulation.

Tremaine's greatest contribution to *Astounding* came in 1937, when he was promoted. He hired as his successor a brilliant and popular young science-fiction

CONTINUED ON PAGE 116



Analog magazine began half a century ago under the title Astounding Stories

DEATH ON THE RANGE

UFO UPDATE

By Harry Lebelson

It began quite mysteriously on September 9, 1967, in Alamosa, Colorado. On that day Snippy, a three-year-old palomino saddle horse, was found mutilated near the edge of a clearing in the bush on the Harry King ranch. From Snippy's shoulders up, all traces of hide and flesh were gone. Only the skeleton of her head and shoulders remained. Subsequent examination by a Denver pathologist revealed that the flesh had been cut with such precision as to preclude the use of a knife. The examination also excluded the possibility that predators had been responsible for the animal's death. Further examination revealed that all of the animal's vital organs had been removed except for the brain. However, the brain fluid and the blood had been drained from the body.

Snippy's bizarre death was to precipitate a climate of bewilderment and fear concerning the inexplicable pattern of livestock mutilation that was to continue far into the next decade. Over the past 12 years at least 8,000 cattle have been systematically mutilated with surgical precision in an estimated 1,28-million-square-mile area, roughly one third of the total land area of the United States.

Extensive research in affected areas from Alabama to Oregon has failed to provide any conclusive evidence as to who are the perpetrators. Qualified investigative agencies such as law enforcement bodies, scientific organizations, and independent UFO investigative groups have not been able to offer any reasonable explanation of this curious phenomenon. At best, these agencies have furnished only circumstantial evidence.

Senator Harrison Schmitt, of New Mexico, recently said, "One of the most extraordinary facts of this problem is that the group or groups responsible for the mutilation killings have shown almost unprecedented discipline. There have been no leaks or informants to assist the state and local law-enforcement officials in their investigative efforts, at least so far as I am aware."

Concurring with Senator Schmitt is Howard Burgess, a retired radiation-instrumentation scientist from New Mexico, now assisting the New Mexico State Police investigating mutilation cases. "The important thing is to be open-minded," says Burgess. "It has to be something with a lot of technique and a lot of money. I'm just trying to view it from a scientific or objective viewpoint and just face facts. We do keep getting data, and yet none of it fits together."

Because of the fragmentary nature of the clues regarding mutilations, various theories have been advanced to explain these mystifying occurrences. These theories can best be summed up as representing three distinct points of view: saucers, Satanists, or the CIA. The "solution" may lie with any of these or perhaps with none. Whatever the case, there is a subtle complexity that prevents the mutilation phenomenon from being as simple as some observers would have us believe.

Indeed, UFO activity has been reported both before and after mutilations have occurred. Physical traces of undetermined origin at many mutilation sites would tend to suggest an alien presence. Most of the state agencies investigating the phenomenon have turned up fragments of evidence that, if viewed collectively, could lend support to the "little green men" theory. Bearing in mind the lack of tracks seen at the mutilation sites, the absence of the "perpetrators," the fact that there were no reports of noise or disturbances, the failure of dogs to bark, and the surgical removal of selected organs and the blood of the animals, one tends to ponder on the degree of perfection of the methods employed.

Sheriff Harry L. Graves, of Logan County, Colorado, said, "I don't really give a damn who solves this problem as long as it is solved. My office will cooperate fully with an honest investigation into the matter, but I refuse to put up with the runaround we've received in the past from federal agencies that keep insisting it's a predator problem. There's absolutely no evidence that the 'mute' [mutilation] deaths were caused by predatory animals. In fact, the lack of visible footprints or tracks seems to

CONTINUED ON PAGE 116

Mutilated cow lies in New Mexico field; its blood drained and its tongue surgically removed.

The first collection worthy of the name Mozart

TIME LIFE RECORDS

Introducing the most complete Mozart collection ever assembled in America!

Truly, this is the ultimate feast for Mozart lovers! Now, in one of the most ambitious recording ventures of the decade, TIME-LIFE RECORDS introduces a record collection that does long-overdue justice to the genius of Mozart. A series so monumental in scope that it encompasses *all* of the many musical forms Mozart mastered. And includes literally hundreds of his works.

Own all of Mozart's symphonies, concertos, sonatas, chamber music. Plus his greatest operas, sacred music, dances, divertimentos and concert arias.

Never before has a single series offered you the delights of such an incredible range of Mozart masterpieces. From *The Late Piano Concertos* to *The Late Symphonies*, *The Late String Quartets*, *Don Giovanni*, *The Middle Symphonies*—each of these five-record albums captures another brilliant facet of Mozart's astounding virtuosity.

Hear Mehta, Bernstein, Sutherland, de Larrocha, Solti, Horne, von Karajan, Ashkenazy and more!

You could never put together a collection like this on your own! These landmark albums feature legendary Mozart interpretations by the outstanding performers of our time. Each selection has been painstakingly chosen from the superb recorded repertoire of London Records, enriched by the most brilliant Mozart recordings of Telefunken, Argo, EMI/Angel, Columbia, RCA and L'Oiseau Lyre Records. Many new performances are included, some recorded expressly for this project.

TIME-LIFE RECORDS, Time & Life Building, Chicago, IL 60611

YES, I would like to audition *The Late Piano Concertos* as my introduction to MOZART. Please send me this five-record stereo album along with the 244-page book, *Mozart: The Man, The Musician*, for 10 days' free examination and enter my subscription to MOZART. If I decide to keep *The Late Piano Concertos*, I will pay in installments of $12.47 the first month and $12.48 the second month, a total of $24.95 ($29.95 in Canada) plus shipping and handling, and the accompanying book will be mine at no extra cost. I then will receive future albums (each containing five stereo records) in the MOZART series, shipped one album at a time approximately every other month. Each album will cost $24.95 ($29.95 in Canada) plus shipping and handling (billed to me in two monthly installments) and will come on the same 10-day free-audition basis. There is no minimum number of albums that I must buy, and I may cancel my subscription at any time simply by notifying you. If I do not choose to keep MOZART: *The Late Piano Concertos* and the accompanying book, I will return the complete package within 10 days, my subscription for future albums will be canceled and I will be under no further obligation.

☐ I prefer five Dolby-encoded tape cassettes ($5.00 extra, also to be billed in two monthly installments) RYACR9

Name _____

Address _____ Apt _____

City _____ State (or Prov.) _____ Zip (or Code) _____ RWAC00

Listen to *The Late Piano Concertos* for 10 days free as your introduction to this definitive Mozart collection.

Start with the incomparable perfection of *The Late Piano Concertos*. Each has its own unforgettable personality. Listen to this first exquisite album for 10 full days without obligation or risk. If you are delighted, you may keep the album for only $24.95 plus shipping and handling. You will then enjoy free auditions of future albums in the Collection. To order, mail card or coupon to TIME-LIFE RECORDS, Time & Life Building, Chicago, IL 60611.

Also available on tape cassettes.

UNIVERSAL PICTURES and COLUMBIA PICTURES Present
An A Team Production of
A STEVEN SPIELBERG FILM

DAN AYKROYD · NED BEATTY JOHN BELUSHI · LORRAINE GARY · MURRAY HAMILTON · CHRISTOPHER LEE · TIM MATHESON · TOSHIRO MIFUNE · WARREN OATES · ROBERT STACK · TREAT WILLIAMS
NANCY ALLEN · EDDIE DEEZEN · BOBBY DICICCO · DIANNE KAY · SLIM PICKENS · WENDIE JO SPERBER · LIONEL STANDER · Director of Photography WILLIAM A. FRAKER A.S.C. · Screenplay by ROBERT ZEMECKIS & BOB GALE
Story by ROBERT ZEMECKIS & BOB GALE and JOHN MILIUS · Music by JOHN WILLIAMS · Produced by BUZZ FEITSHANS · Executive Producer JOHN MILIUS · Directed by STEVEN SPIELBERG

Read the Ballentine Book

Original Soundtrack Album on ARISTA Records and Tapes

NOW AT A THEATRE NEAR YOU.

CONTINUUM

SCIENCE CENTERS IN TROUBLE

Boston's *Museum of Science* draws more visitors than any other public paid attraction in that city except the Red Sox. *The National Air and Space Museum*, in Washington D.C. only three years old is already as popular as Disney World: it outdraws every other Smithsonian institution by a margin of two to one. The *Ontario Science Center*, in Toronto, has become one of the leading visitor attractions in all of Canada. American science centers are spawning look-alikes in Paris and Peking, Caracas and Hong Kong. Nationwide, visits to science centers more than doubled from 14.4 million, in 1973, to 36.5 million in 1975. And the numbers are still growing. More than one third of all people who visit museums visit science museums.

All this is encouraging. Science centers are the one public forum where people can familiarize themselves with present and future technology. Unlike traditional museums, they cater not to the comforts of fossils but to the curiosity of the general public. Instead of putting science on a pedestal or under a microscope, they bring the microscopes out where people can discover nature for themselves. Because science centers are not in the business of preservation, they can encourage participation and play. Science centers are grown-up Sesame Streets, where the playthings are comets and crystals, momentum and music, aerodynamics and energy alternatives.

Only five years ago science centers were scrounging for publicity and public acceptance. Today there are long lines at popular exhibits and long waiting lists for popular programs. Public support is at an all-time high. But the coffers are often empty.

And that is discouraging news indeed.

Turning the general public on to science and technology is no longer kid stuff. Science is a fact of life. Yet the early Greeks probably understood as much about the world around them as does the average educated American.

For 35 million Americans each year, science centers help bridge the gap between scientist and layman. To do so, they have developed innovative "hands-on" approaches that are cropping up in all kinds of educational settings. They have reached outside their walls, bringing science to shoppers in Philadelphia, for example, through the *Franklin Institute's Museum on the Mall*. *Lawrence Hall*, in Berkeley, California, has pioneered public education in computers. *The Exploratorium*, in San Francisco, is a science museum with artists in residence, biweekly music concerts and explanatory signs written by poets. It has proved that there are no real boundaries between art, science and nature.

Yet despite the popularity of science centers, they receive less than 5 percent of funds allotted to museums by the federal government. They are not formal enough to be considered educational institutions or "cultural" enough to qualify for most museum support. Even the National Science Foundation (NSF) has no program exclusively for science centers.

And the situation is getting worse. The support that science centers have received from the National Endowment for the Arts (NEA) and the National Endowment for the Humanities (NEH) is in danger. NEA is planning to restrict future grants to projects that are primarily "artistic." NEH is worried about congressional charges of "overlap"—that too many different sources are supporting science centers already.

In a way, NEH is right. Science centers stitch together a precarious patchwork of funding. "They have no one place to go to for money," says Michael Templeton, director of the Association of Science-Technology Centers. "Science centers get a little by stretching the guidelines. But it's completely on the fringes."

In a time when we turn increasingly to science and technology for the solution of society's problems, science centers are holding bake sales to stay alive. Understanding contemporary problems is impossible without an understanding of contemporary science. Yet of the $55 million NEH spends annually on "promoting public understanding of the humanities," only about $500,000 goes to science museums. The NSF spends no more than that on science centers through its Public Understanding of Science program. And as for NEA, a spokesman there recently spelled out his position uncomfortably crudely. "I understand the apprehension of science museums, natural-history museums, zoos, snake farms, and the rest." But the word at NEA is out: "Science museums need not apply."

Science centers have proliferated not because some federal agency or philanthropist said, 'Let there be a museum,' but because the public has clamored for them. That is both their weakness and their strength. But now that the public has been heard, it's time for the funding sources to follow.—*K. C. COLE*

CONTINUUM

YAWN

Darwin noted that people did it when they were afraid Doctors of the nineteenth century dismissed it as an impulse caused by 'bad air" in the lungs But according to Dr Heinz Lehmann professor of psychiatry at McGill University in Montreal yawning signals anything from hunger to empathy

"If I yawn while speaking at a meeting, those who 'catch it and begin yawning can usually be counted on to take my side on an issue" Dr Lehmann claims

This subtle reflex can denote boredom, but often it indicates a desire to focus one s attention The yawners in an audience are at least struggling to stay awake

Similarly psychiatrists are frequently encouraged when patients yawn Such behavior conveys that psychotics are in an accessible mood Should a schizophrenic yawn, it's understood he s still in touch with reality Lehmann explains that yawning rarely occurs in schizophrenics

Cats do it Dogs do it Even crocodiles do it People do it when they re afraid But schizophrenics and the chronically ill rarely do it

Likewise, chronically ill people never yawn while their condition remains serious Nurses recognize yawning as a sign that a patient has passed the critical point

Despite yawning's universal nature—cats, dogs and crocodiles do it, too—little research has been conducted on the subject Most scientists agree however that yawning boosts flagging brainpower by improving the circulation This happens when the face and neck muscles contract

If you find yourself stifling a yawn right now blame the subject matter The tendency to do it is so strong simply thinking or reading about yawning triggers it —Stella Iner

MOLECULE MADNESS

By herding molecules with electricity one chemist inventor believes he has developed a technique that could revolutionize everything from manufacturing drugs to healing injuries

The inventor New Jersey researcher Norman Haber calls his process electromolecular propulsion or EMP for short While he hasn t revealed full details about it to protect his patent he has already performed some intriguing demonstrations

EMP is based in part on the charge-transfer theory which holds that when two different substances are mixed, the subatomic particles in the atoms of their molecules are shared In effect the electrons and the protons hop back and forth between molecules

Norman Haber and his EMP device Everyone is interested

Haber claims he can interrupt this exchange with a chemical barrier called a semiconductive medium It momentarily cuts off the supply of subatomic particles to a molecule that for a brief moment, has a minute positive charge By using an electric current, Haber can then control the direction of the molecule

These moments of control come at a stuttering off/on rate but they happen with such blinding frequency that there are enough "on moments to tease different molecules apart very quickly In one demonstration Haber managed to separate out in five seconds one food dye and two ink samples that had been mixed together

By customizing the semiconductive medium to specific substances Haber believes he could come up with a quality-control system for drug manufacturers sorting out chemical impurities He says he could also make healthy cells migrate to injured parts of the body or remove impurities from precious metals

Some scientists are skeptical of Haber s EMP and others are excited about it but everyone is interested For the moment most are taking a wait-and-see attitude —Douglas Colligan

"It is all bunkum Lemmings just don't do what they are supposed to do The only animal that regularly commits mass suicide is Homo sapiens

—Philip Howard

SOLAR KILLS!

A number of scientists have determined that at least several hundred persons will die each year if there

Installing solar equipment on White House. Killer collectors?

is a national commitment to solar energy.

With deadpan seriousness, experts have concluded that solar deaths would result from a wide range of activities. Installers would fall off roofs while putting up solar collectors; miners would die from extracting the copper and aluminum needed to make the collectors, and truckers would be killed in accidents while transporting the solar equipment.

Estimating the risks from various energy technologies has become a controversial subject. A recent study by a scientist working for the Atomic Energy Control Board of Canada deduced that nuclear reactors would cause only half as many deaths as wind generation would, and only a tenth as many deaths as solar energy sufficient to produce the same amount of power. Other studies by the Washington, D.C.–based Resources for the Future and by a scientist at the University of California at Berkeley concluded that the risks from nuclear and solar power are about the same, with solar having only a slight safety edge. (For more details on the controversy, see Kenneth Brower's Earth column, page 14.)—Stuart Diamond

---

"Great spirits have always encountered violent opposition from mediocre minds."

—Albert Einstein

A REAL FEINBERG

A "feinberg," as *Star Trek* fans know, is the tiny salt-shaker–like device Dr. Leonard McCoy used to diagnose instantly what was ailing any sick person. Dr. McCoy would pass the hand-held feinberg over the person's body and, presto, he'd know what was wrong.

Now science has caught up with science fiction—again. George Rinard, Dale Steffen, and Ronald Sturm of the Denver Research Institute have invented the closest thing to a feinberg that the medical world has yet seen.

The trio has proposed building a battery-powered, hand-held vital-signs monitor using hybrid integrated-circuit technology they recently invented. Its anticipated final form, Rinard says, will be no bigger than a large conventional, hand-held calculator—maybe 7 by 18 by 3 centimeters—and would weigh about the same. It would have three chest electrodes as well as a temperature-monitoring thermistor.

The monitor's LCD display would show any one of four functions: body temperature (in either degrees Centigrade or Fahrenheit), heart beat rate (per minute), breathing rate (per minute), and blood pressure.

Rinard says the actual hand-held device hasn't been built yet, because he and his two colleagues weren't contracted to do that. "Right now though," he adds, "the institute is talking with several companies interested in commercially producing the monitor."

—Joel Davis

Dr. McCoy: At last, his feinberg may become a reality

HUMAN CARROT

Scientists in Lund, Sweden, have accomplished a remarkable feat. Loosely speaking, they've crossed a human being with a carrot.

To be precise, researchers at the Institute of Molecular Cytogenetics have fused human cells with carrot cells. "Many people think this is a dramatic experiment," says the institute's Professor Antonio Lima de Faria, "but the differences between humans and plants aren't as great as generally believed."

Using special enzymes, the research team was able to remove the carrot's thick cell walls in order to achieve the carrot-human cell fusion.

The experiment was part of the institute's research into chromosome organization and also helps to elucidate the problems of cell differentiation. Since cancer is essentially a disturbance of the cell-differentiation process, these experiments might prove valuable in combating the disease.

Lima de Faria points out that animals and plants have many similarities. "Chromosomes in plants and animals have the same basic structure."

What's more, although plants have no breasts, they still have the sex hormones found in humans. The urine of pregnant women, for example, contains estrone and estriol, which are also found in palm trees and willows.—Don Hinrichsen

---

"If it ain't broke, don't fix it."

—Sam Rayburn

CONTINUUM

DISAPPEARING MOUNTAINS

On Earth mountains take tens of millions of years to rise and fall. But the moon

Russian lunar globe shows mysterious Montes Sovietici

has just undergone a much more violent geological upheaval. An entire mountain range has vanished, only 20 years after it was first discovered.

It all began in October 1959 when the Russian space probe *Luna 3* looped around the hidden side of the moon and relayed photographs back to Earth. The images were blurry and washed out, but they did show some hitherto unknown features, such as the Moscow Sea and the giant crater Tsiolkovsky. Although some skeptics proclaimed that the Russian photos were a hoax, subsequent U.S. probes confirmed their essential accuracy.

Well, not completely. On the *Luna 3* photos a prominent linear feature was proudly labeled the Soviet Mountains (Montes Sovietici). But later U.S. probes with better cameras, revealed that the area was in fact quite flat and that what had been interpreted as a towering mountain range was only a smear on the original blotchy photo. But the Russians refused to concede their error and as late as November 1978 they were still issuing lunar maps and charts with the Soviet Mountains firmly anchored in bedrock.

The issue came to a head at the seventeenth general assembly of the International Astronomical Union in Montreal last August, with American space scientists digging in their heels against the Soviet scientists' insistence on official international blessing for the phantom mountain range.

When the Russians showed up, their maps no longer carried the name of the Soviet Mountains. Someone in Moscow seems to have decided it was a lost cause in the face of unsympathetic American scientists with suitcases full of Apollo photos of a flat, cratered plain where the mountain range should have been. But the Russians were not to go home empty-handed. They presented a list of eight new craters for the lunar far side, including one named Lipsky.

"Their maps show a nice, round, rimmed depression there," one American moon mapper remarked. "So we checked our photos again. Nothing—there's no crater there at all! Maybe we'll call it the Lipsky Plains or something." Whatever the fate of the crater named Lipsky, the massive Soviet Mountains have evaporated into the mist of politics from which they originated.

—James Oberg

LEAP SECOND

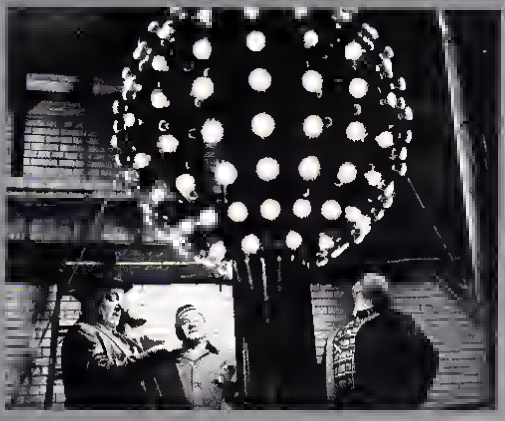
If you thought you had more time than usual last New Year's Eve, you were right. Scientists added an extra second, as they have for the past six years, so the world's clocks would continue to match the spinning of the earth.

The earth has been slowing down for several centuries. Thus our clocks are really moving faster than the earth's rotation. While the extra five minutes or so that we're off so far doesn't make much difference, the sun would rise at noon in a few thousand years if the situation were not adequately corrected.

So, every New Year's Eve the clocks used as world standards add one second to the 31,536,000 they have already ticked off for the year. The extra second will be the last second—it will come at the stroke of midnight. When you are watching the Guy Lombardo show or the ball at Times Square this December 31, wait one more second to break out the champagne if you want to celebrate the New Year with scientific accuracy.—S.D.

Give me an underground laboratory, half a dozen atom smashers, and a beautiful girl in a diaphanous veil waiting to be turned into a chimpanzee, and I care not who writes the nation's laws.

—*S. J. Perelman*



Workmen examine the Times Square "falling ball" that descends at midnight. New Year's Eve. Watch this year for that extra second.

ANXIOUS SEX

Relax has been a sex-therapy byword since the first troubled lovers sought help professional or of us are closet sadists or masochists? No says Wincze One possible explanation is that the physiological similarities between fear and lust (rapid heartbeat, rapid respiration and adrenaline rush) may transform anxiety into desire

Terror scene from an Alfred Hitchcock thriller For men, it was more stimulating than an X-rated movie but women just got depressed

otherwise Now a Brown University psychiatry professor reports an odd turnaround It seems that *anxiety* not its antidote, turns us on

In a study at Providence Veterans Hospital in Rhode Island sexually normal men and women were shown erotic film clips immediately after viewing some anxiety-provoking scenes (automobile accidents and grisly segments of Alfred Hitchcock thrillers)

The result? Subjects were more aroused by the terror-then-sex sequence than by the X-rated scenario alone according to the study s author John P Wincze

Does this mean that all

A more likely reason though is that the erotic is especially titillating when it spells relief Wincze points out that Homer recorded this "contrast effect' in the eighth century B C *Iliad* warriors were depicted as being particularly amorous right before or after battle

Men and women in the study appeared equally stimulated by anxiety The only difference lay in what made them anxious Women became anxious during the accident film depressed during the Hitchcock episode (which showed an ax poised to chop off a character's fingers) while their male counterparts had the opposite reaction Depression unlike a healthy dose of anxiety is an antiaphrodisiac says Wincze

The implications for treating sexual dysfunction? Wincze suggests that sex therapists aim not to eradicate anxiety but to merely deflect it from performance apprehension

—Judith Hooper

EDIBLE PLANTS

Ever eaten a tamarind? How about a buffalo gourd? Or a cocoyam a tarwi or an amaranth leaf salad?

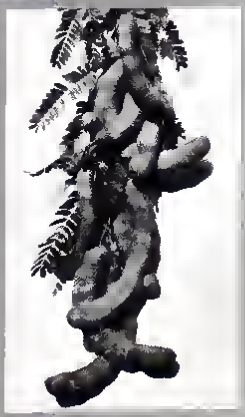
These are among the thousands of edible plants that have never been widely grown but that could supply needed protein to people throughout the world Recent reports by the National Wildlife Federation and the National Academy of Sciences (NAS) say that in many poor nations such plants could feed the hungry millions

About 80 000 of the 350 000 plants in the world are edible, the Wildlife Federation says But only 3 000 have been used for food by humans and less than 30 plants supply 95 percent of the world s calories The NAS says that 54 more new plants—most of them cultivated to a limited extent around the world—could be grown in the United States

The tamarind tree for example produces a pleasant-tasting sweet-and-sour fruit that can be eaten raw or made into jam, drinks, candy or seasoning The flowers are a source of honey the bark is a source of gunpowder

Buffalo gourd is a small round green-and-orange fruit that thrives on semiarid land, its seeds are 35 percent protein Tarwi a bean similar to soybean can be made into cooking oil and margarine It resists frost drought and pests Cocoyam a potato-sized root can be baked boiled fried or ground into flour Amaranth produces a high protein grain and a leaf that can be used as a spinach substitute

Especially attractive for wide cultivation is the carob tree known for the chocolatelike candy sold in health-food stores The pealike carob pods contain more sugar than beets and sugar cane do The trees are also good for shade spreading like maples but keeping their foliage year round —S D



Tamarind fruit It can be made into jam drinks seasoning or candy

CONTINUUM

URBAN LEGENDS

In ancient times they had the *Aeneid* In the Middle Ages it wes the Holy Grail and the Knights of the Round Table And in modern times it's dead mice in Coke bottles and french-fried breaded rat

The Holy Grail of urban legends A woman buys a popular brand of fast-food chicken She eats it in a dark room and then discovers

That's the stuff of which modern urban legends are made, says University of Minnesota sociologist Gary Fine Over the past few years he's been collecting and investigating the truth of such stories

Many of these, he says tend to revolve around fast-food chains and food conglomerates 'With our fear that impersonal corporations are changing our society and will do anything for a buck, the conditions are ripe for fear and alienation, ' explains Fine And some of the stranger urben legends are symptoms of that fear such as the rumors about spider eggs being found in Bubble Yum or those about McDonald's wormburgers—worms being used as filler in the fast-food burgers These are untrue, according to Fine, who painstakingly checked out every story (The wormburger legend was promptly dismissed when one hamburger-store owner pointed out that a pound of worms costs more than a pound of ground beef)

A check of appeals-courts records, however, did turn up the fact that dead mice says Fine, *have* been found in Coke bottles as well as in soda-pop bottles of other brands He has documented cases, from the years 1914 to 1976 of 45 dead mice found crammed inside bottles Nearly all the appeals cases were against Coca-Cola mainly because sales of Coke are so widespread

Urban legends explains Fine, originate with those who use a product are reported in the news media—usually as a denial—and from there spread like wildfire, with everything but the denial remembered by the public And by processes he calls leveling and sharpening only the gruesome points of the case survive

Fine is now in search of his own Holy Grail of urban legends, french-fried rat The story? A woman eats it while watching TV in a dark room The facts? "Still checking " says Fine —D.C.

ENVIRONMENTAL DECLINE

Despite strong environmental laws and billions of dollars in antipollution expenditures, the nation s environment has worsened considerably in the last ten years, according to the National Wildlife Federation

The federation, the world's largest environmental group, rates seven key areas each year air, water, soil, wildlife minerals, forests, and living space Out of a possible total score of 700—100 apiece—the federation gave a combined score of 395 in 1969 and 340 last year, a drop of 14 percent

Only one category improved air, from 35 to 36 Forests stayed the same, at 75 The biggest decline was in minerals, from 50 to 37

Living space was next, dropping from 60 to 46 as suburban sprawl encroached on ferms and recreation areas

The annual loss of a billion dollars worth of topsoil from erosion contributed to the decline in soil from 80 to 70 And more than 2,600 towns and cities still dump sewage into the nation's waterways The decline in the water quality index 40 to 33

The increasing use of toxic chemicals and industrialization of the wilderness continue to endanger wildlife The wildlife index has dropped from 55 to 43

The National Wildlife Federation suggests a specific list of policies to halt the environmental decline Such a decline, it notes, eventually lowers the nation's quality of life not only from an aesthetic standpoint but in increased health costs —S D.

"Man is a complex being He makes deserts bloom— and lakes die "

—Anonymous

The wolf and other endangered wildlife dropped 12 points

SALVAGING HISTORY

John Ericsson the Swedish-American inventor (1803–1889) would have been pleased Two famous ships that bear his mark were the subject of celebrated salvage efforts during the past year They are the U S S *Monitor*, the Civil War ironclad that sank off the North Carolina coast during an 1862 storm and the *Indiana* a freighter that sank in Lake Superior in 1858

The *Indiana* found 75 miles from Sault Ste Marie Michigan in 1975 was powered by an Ericsson screw propeller which revolutionized shipping in the mid-nineteenth century Divers last summer retrieved the propeller and also the ship s power plant an engine a preheater and a three-ton 13-foot-tall boiler with a firebox still filled with wood

The components are in such good shape because they lay in fresh cold water in an area without strong currents The *Monitor* designed completely by Ericsson was not as lucky Lodged in fast-moving saltwater 16 miles offshore it is badly rusted and riddled with holes Most of the ship s upside-down hull has collapsed and was damaged some experts believe by depth charges that were dropped nearby during World War II

Last summer a major salvage effort concluded that many of the *Monitor* s components would disintegrate if divers attempted to raise them the 210 feet to the surface But numerous artifacts of historical significance have been recovered – among them a brass lantern base U S Navy mustard bottles and a porcelain soap dish and a leather book binding from the captain's cabin Divers have also retrieved a walnut —S D

The crew of the Monitor cooks a meal on deck While the ship has not been raised numerous historical artifacts have been recovered

Aristotle calls man the rational animal All my life I have been seeking evidence to confirm this '

— Bertrand Russell

PEACE SATELLITES

Satellites orbit the earth to monitor the weather scout for hidden energy resources and provide a myriad of communication and navigation services But some individuals are now calling for a new mission for these sensors—the search for peace

Howard Kurtz president of War Control Planners in Washington D C is seeking to blend space technology with world harmony

Kurtz has long walked the halls of Washington s bureaucracy calling for the United States to initiate a global-information-satellite service, plugging in all the world s countries Employing both military and civilian space hardware, his plan would provide environmental and economic as well as military intelligence with unlimited access to information

The project could provide a "grand vision of a world order ' says Kurtz NASA stays away from anything that smells of the military, to keep a pure white image while the Pentagon develops programs for space war The open world satellite idea is a missing element

The Peacesat concept has most recently gained the support of Senator Adlai Stevenson who is calling for the creation of an international Earth observation system subjecting the activities of all powers to observation by all other countries

A step toward the satellites-for-peace scheme might involve pulling back the security curtain that hides the use of military space reconnaissance a prospect President Carter is now evaluating

This idea is favored by renowned physicist Dr Edward Teller Teller urged the dissemination of all spy-satellite photographs taken from orbiting robot operatives arguing the point before Congress early last year

The effort would contribute to the peace and stability of the whole world claims the scientist —Leonard David

Edward Teller Urges the dissemination of spy photographs

We have never found anything that the Soviets have successfully hidden '

— Amrom Katz professional skeptic

CONTINUUM

HIGH-LEAD COPS

As if a police officer s job isn t hazardous enough now a team of investigators has found that cops have a

Woman cop fires away Endanger ing the central nervous system

whole new worry — lead poisoning

Dr Alf Fischbein and a team of researchers at Mount Sinai School of Medicine in New York City, found that police officers practicing at indoor firing ranges are routinely exposed to high levels of lead pollution

Minute particles of lead in the air and fumes of lead oxide can be real health hazards in poorly ventilated firing ranges In blood tests of 81 policemen the Mount Sinai team found over half (52 percent) absorbed unacceptably high amounts of the metal into their systems

Lead levels in the policemen's blood in some cases reached as high as 87 micrograms per deciliter According to government standards 40 micrograms per deciliter is the maximum safe level And in fact about a quarter of the officers reported central-nervous-system problems such as headaches nervousness and dizziness which are typical of lead poisoning Fire arms instructors had the worst symptoms

Better ventilation of firing ranges and periodic blood tests to check for levels of absorbed lead said the Mount Sinai group is the only way to prevent this indoor-pollution problem — D.C

NEW VITAMIN TEST

Blood tests for vitamin deficiencies have been around for several years But since they re processed through expensive radioactive counter machinery, doctors order them only for the seriously ill Now researchers at New Jersey College of Medicine have come up with a 12-vitamin test that s cheap accurate and simple

In this breakthrough test, different protozoa — which like the same vitamins we do — are used as the testing devices A protozoan that requires 12 vitamins for example is placed in a soup of all but one vitamin A patient s blood is then fed to the protozoan as the only potential source of the missing vitamin The extent to which the protozoan continues growing becomes a direct reflection of how much human vitamin is available This process is then repeated for each vitamin In each test the soup is basically the same mix except that the vitamin being tested is left out

At the New Jersey medical school hospital the test is done routinely on pregnant women on patients with severe digestive-tract diseases and on anyone suspected of having a nutritional deficiency As Herman Baker an originator of the test pointed out "Now we have a way to easily find out if someone is operating on all his sparkplugs

Dr Baker and his colleagues are working with the National Institutes of Health to develop training programs in the test s use It has already been exported to India and Brazil as a pinpointer for diseases afflicting undernourished people

If — for a $75 fee — you would like profozoa to work on your vitamin profile ask your doctor to write to Dr Baker for directions on how to send a blood sample The address New Jersey College of Medicine 88 Ross Street East Orange, N J 07018 — Caroline Rob

---

We patronize them for their incompleteness for their tragic fate of having taken form so far below ourselves And therein we err For the animal shall not be measured by man In a world older and more complete than ours they move finished and complete gifted with extensions of the senses we have lost or never attained, living by voices we shall never hear '

— Henry Benson

Everyone is ignorant, only on different subjects

— Will Rogers

When the U S Army wanted a fast way of moving large equipment the Lockheed Georgia Company came up with the "flatbed aircraft concept This airplane of the future says Lockheed will carry tanks and other gear on the outside of the craft

THE LIFE OF **ALLIE**

BY G. HARRY STINE

Reminiscing with the 21st century's first citizen

PAINTING BY PIERRE LACOMBE

We made it after all! The human race got through the twenty-first century without wiping itself out, without seeing the computers and intelligence amplifiers take over, without engaging in a major interplanetary war, without creating biological monsters, and without a thousand other doomsday forecasts coming true.

And I've seen it all. People throughout the solar system are now better off than they have been in all of human history. Not only is the species safer because we no longer keep all our eggs in one planetary basket, but the individual also is safer, thanks to the Covenants of Metalaw and the maturation of the social sciences.

I've been asked to recapitulate our general progress in Century-21 and to present an overview of how well I believe we are progressing toward the long-term goals of the human race, which were spelled out in the Agreement of Manila 100 years ago. In brief, these were: restoring the terrestrial environment; limiting population; educating every human being up to his or her individual potential; providing adequate food, shelter, and other basic survival requirements for all; eradicating disease, genetic defects, and physiological decay; extending life expectancy; providing enough valuable work for everyone; conserving brainpower; and opening our world to include the solar system and beyond. This is a tall order, and I'll have to tackle it from my own vantage point.

Most of you who were born before the beginning of this century will remember my name Algirdies Eunan Olgierd Huth. Most people know me as Allie Huth, born at 0001 Zulu Time on Monday 1 January 2001. I was the first person born in the twenty-first century, and it was planned that way.

Given the crude genetic mapping used in 2000, I was the best zygote that could be produced by combining the genetic material of Ryta Olgierd and Eunan Huth. A polar-body analysis of my genetic mother's ova was made, and the results were compared with the Gaussian distribution of a broad sample of my genetic father's sperm. Nondestructive sperm-mapping techniques were not developed until 2035, and so my inheritance from my genetic father was based on random chance.

I was informed that I came from a micropipette. I was created by in vitro fertilization to ensure success. This fact doesn't bother me in the slightest. My ego force was implanted just as if the conception had taken place in vivo. Back in the primitive twentieth century I might have been called a test-tube baby, an imprecise term even then.

The doctors and biotechnologists gave my genetic mother only a 42.4-percent chance of carrying me to term, because dimensional analysis of her pelvis indicated a high probability that parturition would have to be accomplished by Cesarean section. In other words, my genetic mother was slim-hipped. So a host mother carried me. Shortly after in vitro fertilization, the zygote that was "me" was implanted in my host mother's womb. According to the practice at the time, I do not know who my host mother was. I remember only my genetic mother, Ryta Olgierd-Huth.

Then, as now, some women's psychological lives revolved around bearing children. There has never been a shortage of host mothers. But today people carried to term by host mothers know who these surrogates are. We have discovered that there is absolutely no psychological trauma connected with knowing; in fact, there is more trauma involved with not knowing.

In 2044 the biotechnologists perfected the artificial womb. There were even some children born from these unnatural devices. We came full circle on this in C.21. Aldous Huxley's self-fulfilling prophecy in his classic *Brave New World* became reality but nobody wanted it! I think this was so because the artificial womb took away from us some of the basic factors that make a human being, such as the birth trauma. Yes, I have played back my own birth memories into my intelligence amplifier, and I volunteered the data to the Santa Cruz Clinic for comparison with the birth memories of the artificial-womb people. There's a difference, a subtle difference that has made those born in artificial wombs not quite people. When they were born, psionicists had not yet discovered that implantation of the ego energy in a fetus requires the assistance of the mother's nervous system acting as an "amplifier." Knowing what we know today in 2101 about the life aura, the partitioning of the cosmic consciousness, the hyperfrequency realm of intelligence, the long-suspected endurance of the ego force, and the resonances involved, the creation of a human child in an artificial womb is considered both immoral and unethical.

How strange it is to think back over the past 100 years and wonder at how far we have come! In my growing years, the solar system was still a frontier and the "terraforming" of Earth had only just begun. The long, hard task of educating all human beings up to their individual capacities to learn was just beginning.

This is very difficult to convey to the people of C-21, because we all take for granted the magnificent strides we've made in 100 years. Believe it or you can't: that education was once carried on by gathering students in a classroom, supplying them with paper books to read, and compelling them to write with graphite styli on sheets of paper. A single instructor was permitted to conduct them collectively down the tortuous path of human learning.

"I am 100 years old and good for at least 200 more years. Anybody alive in 2001 can expect to survive at least 300 years. Those born after that may live forever."

Now, of course, interactive holographic television allows a student to be a world away from his teachers, and this has compensated for the shortage of educators brought about by the communications/information revolution that began late in C-20. It also led to the removal of most of the worst teachers, who because of their own ignorance, hatreds, and biases should never have influenced the shaping of human minds in the first place.

But education was still incredibly crude and slow even when most students and acolytes worked with computerized learning machines. As recently as 2020 nearly one third of the people on Earth could not read or write their native language. Today, intelligence amplifiers and psionic enhancers can give a properly prepared student more information and programmatic input in 30 seconds than the older methods could in 30 years. Once research with psychochemicals taught us how the human mind works, and once we learned how to alter brain functions chemically and to couple instructive computers with the human nervous system, education took its greatest leap forward since the days of the first Academy in ancient Athens.

We are still a long way from supplanting the Neolithic Ethic, which says, "You stay in your village, and we will stay in ours. If your sheep come to eat our grass, we will kill you. We may kill you anyway if we need some of your grass for our sheep. Anybody who tries to make us change our ways is a witch, and we will kill him. Stay out of our village!" It has been equally hard to overcome the outmoded philosophy of materialism, which said that there is no God and therefore no meaning to our lives, that we know all there is to know about the universe, and that people are flesh-and-blood machines that can be controlled.

I think we are making real progress on the long-range educational mandate, thanks to the worldwide interactive comm/info network. But we still have a long way to go before we undo the basic hatreds and biases of the Neolithic Ethic and of materialism. Ask me again after another century has passed.

I am 100 years old and good for at least 200 more years. Every time I go to the clinic for rejuvenation therapy, the gerontologists have upped the estimate. "You are only an egg," they tell me. There are people among us from C-20 who are now more than 150 years old. I think that future historians will agree that anyone who managed to make it to the year 2001 could expect a life-span of at least 300 years, and anyone born after 2001 should be able to live forever if he wishes, barring accident.

Incidentally, the subjective, voluntary individualistic nature of longevity education, and the rest of high-tech culture on Earth is one of the things that most C-20 futurists missed entirely because they were so subservient to a centralized, bureaucratic control of individuals. I could pull the suicide switch tomorrow if I wanted to—not that I am about to do it. Things are far too interesting, and I am too concerned with how some things will turn out in 50 or 100 years.

There was another point the ancient futurists missed in their collectivist visions of the future. Birth control and population limitation did not degenerate into the issuance of licenses to have a baby, although that was tried for a time in some countries. There was a simpler solution to the problem: personal responsibility.

We take this for granted, but in C-20 a person could have as many children as possible and be given money by the government for producing them. It's a matter of being totally responsible for the human beings you conceive. With voluntary gene mapping and genetic engineering, a man and a woman can have the best child their genetic legacies are able to produce, and the world's population has decreased rather substantially.

Nobody starves today, but the food allotment isn't quite enough to keep you from being a little bit hungry. You can have all the

children you want but they are your responsibility. If you wish to raise them in squalor, that is your prerogative.

There is only one social demand. Every one of your children must be educated so as to fulfill his or her ability. A child does not need to be a genius, but each child must be able to fend for himself in the world. He must be able to compete, and competition takes place on the level of brainpower.

Even the most indigent mother can obtain the proper nutrients for prenatal and postnatal feeding — not the money and not the food itself, but proteins and injections that cannot be used for anything else. This is one of the few tax-supported welfare programs left, because scientific research, long neglected by C-20 altruists, definitely corroborated what we all now know. If you do not feed a child properly from three months after conception until three years after parturition, the baby simply cannot develop his brain and nervous system to their full genetic potential.

My husband, William Burton-Mbotu, and I have had four children, all conceived by using gene mapping and gamete selection. We put the fertilized ova into a zygote bank until we both had accumulated enough credit and achievement status to permit us to raise each child properly. I carried all four children to term myself, at two year intervals. It was only then that I felt justified in letting the biocosmeticians correct a stocky neck, breasts that were too small in proportion to the size of my torso, and hips that were too large for my liking. I also had injectors implanted to help me control the excessive emotional highs and lows I experienced as a result of my work.

The kids are doing fine. We don't see Euwen very much, because he's working on Ganymede as a chemical engineer. Beryl comes home from Island Asgard every year. She likes the blue sky, green grass and clouds, the feel of cool loam and the smells of Kirkland, Arizona, but she complains about Earth's gravity and does not like being confined on a planet.

Virgil is a teacher, a good one. This trait he inherits from his father, as we planned, but with the reinforcement of my genetic aptitude for management of large and complex programs. His comm/info studios in Lagos, Nigeria, produce some of the best educational programs in the world for both holo-TV and interactive-learning computers. Nerissa, our youngest, is working with me on my grand project.

You all know how far we've come in biotechnology in C-21. This can almost be called the century of biotechnology. C-22 has often been forecast as the century of psychotechnology, but this is incorrect. Psychotechnology made the first half of C-21 what it was.

Do you recall how antisocials were treated in C-20? They were called criminals and were locked away in steel rooms under heavy guard so they could not harm others again. Some were locked away because they did something contrary to the welter of

CONTINUED ON PAGE 91

MOTOROLA BROUGHT HOME PICTURES OF THE GIANT.

It's not for nothing that Jupiter is named for the mythological king of gods. It's the giant of the solar system, 1300 times the size of Earth. With over a dozen moons and a unique magnetosphere, it's almost a miniature solar system. It swarms with turbulent rivers of color that move at half the speed of sound.

ELECTRONIC LINK.

The flyby of Voyager 1 and 2 has given us the best look we've ever had of this fantastic world. And the only two-way communication link between the Voyager spacecraft and Earth is Motorola equipment: not only for transmitting the incredible pictures, but for receiving all commands sent to the spacecraft, relaying all scientific and engineering data, and serving as the spacecraft terminal for all tracking and navigation functions. And it's all designed to operate for over a decade on a comparative trickle of power from radioactive isotopes.

ELECTRONIC HISTORY.

Motorola has over twenty years' experience in this esoteric technology, extending back to the earliest unmanned space probes. For example:

America's first venture into space, Explorer 1, in 1958, sent its information to ground-based Motorola equipment.

Pioneer 5, in 1960, was tracked out to 22.5 million miles with specially-designed Motorola radio receivers.

Motorola's command receivers were on board Alan Shepard's Freedom 7 Mercury spacecraft for the first U.S. suborbital mission in 1961.

In 1965, Mariner 4 made a close flyby of Mars, snapping pictures all the way, and sent them to Earth by a Motorola transmitter.

For the Gemini series, in 1965-66, Motorola developed and produced the spacecraft's digital command system.

Neil Armstrong's historic "one small step for man" was relayed from Moon to Earth in 1969 by a Motorola S-band transceiver.

In 1971 the Lunar Rover, first car on the Moon, had a Motorola FM receiver.

The first color photographs from the surface of Mars, in 1976, came to Earth from the Viking orbiter via Motorola equipment.

IMAGINATIVE ELECTRONICS.

And now, the Voyager spacecraft, pursuing their boomerang trajectories around Jupiter and on toward Saturn. A long way indeed from the time when Motorola put radios into cars fifty years ago, and TV sets in America's living rooms. We no longer make home TV here at all, but we do make hundreds of models of two-way radios.

We have become one of the world's largest manufacturers devoted exclusively to electronics. We are one of the foremost designers of custom and standard semiconductors. Indeed we are one of the world's greatest innovators in electronic problem-solving.

A microcomputer, drawn larger than life

We have developed systems that cut automobile fuel consumption; systems that help keep ships from colliding; systems that allow telephones without wires; systems that help keep computers from giving up their secrets to the wrong people—and, of course, systems that bring home to Earth the true face of other worlds.

For further information write Public Affairs Office, Corporate Offices, Motorola, Inc 1303 E. Algonquin Road Schaumburg Illinois 60196

MOTOROLA

Making electronics history since 1928.

THE GOOD LIFE UNDERGROUND

Cool in summer, warm in winter, today's subterranean habitats range from Hobbit holes to entire cities

BY MIKE EDELHART

In Price and Sylvia Lierly's yard in Sapulpa, Oklahoma, it will always be spring. It will never rain. It will never be windy or cold. Even when it is snowing outside, the Lierlys' yard will be warm and bright, because even though it is outside their house, it is not *outside*.

It's about three meters underground. Covered with dirt. Encased in concrete. Buried, along with the house, in a huge, man-made cavern.

And yet trees grow there. Flowers bloom. Breezes blow. The air is fresh and suffused with sunshine.

The Lierlys' house was designed by a tough-talking Texan, Jay Swayze, who has created over the past few years some 18 of these underground dreamscapes. Swayze is one of a growing number of architects and homeowners who believe that habitations belong back in the earth.

As futuristic, or prehistoric, as it may seem, thousands of Americans are moving bag and baggage down into the dirt—and loving it. There are at least 3,000 underground homes in the United States right now, probably quite a few more. They range from Cape Cod to the California coast, from Hobbit holes to Swayze's Hollywood-style homes. One fellow is even selling cave-home construction franchises.

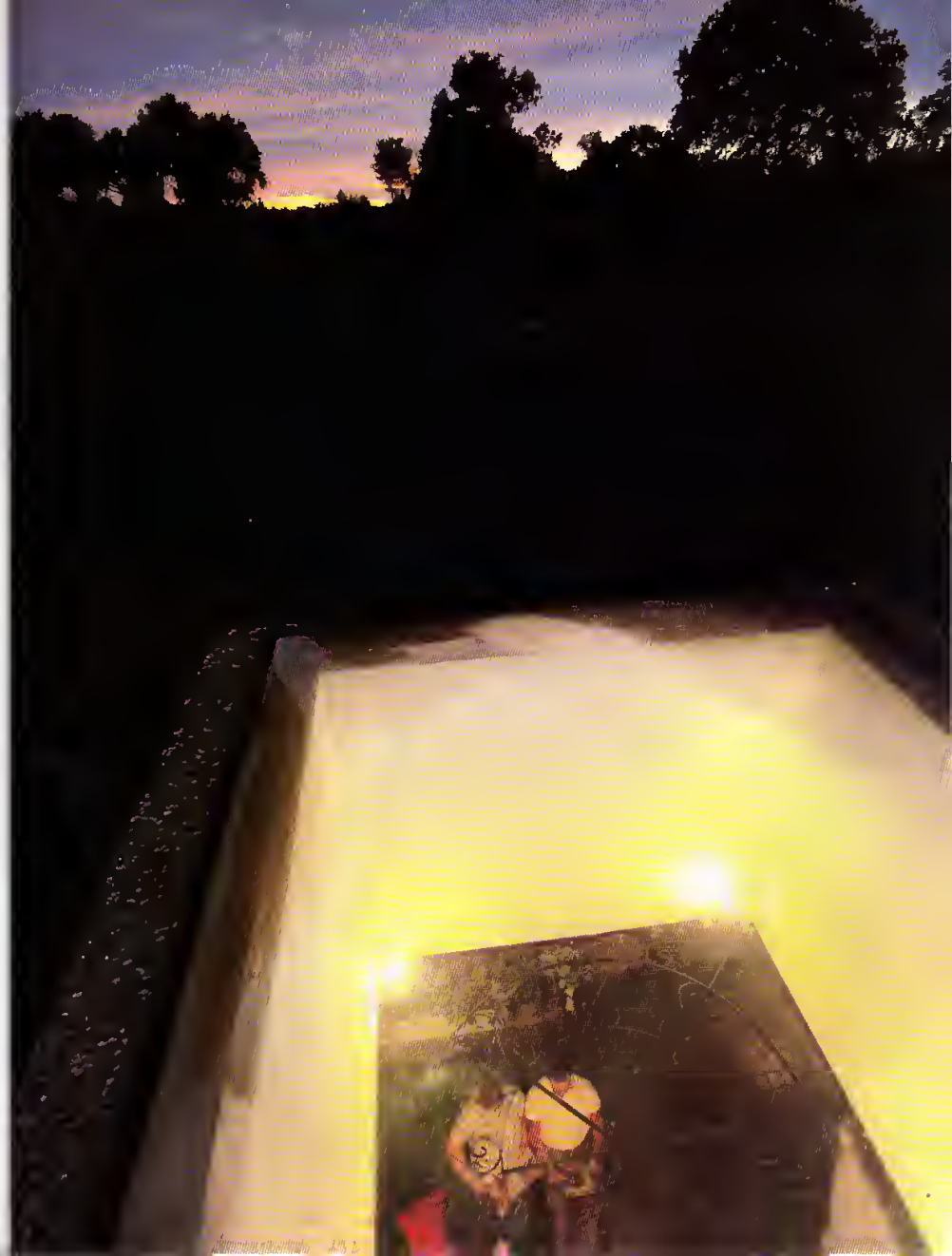
And individual homes are not solely involved in this burgeoning movement. Whole developments are going underground.

Hewn 50 meters into Iron Mountain, in the upper Hudson River valley, for instance, is Safe City, a subterranean complex that includes warehouses, archive vaults, and two-story office blocs. This development was built inside an old cement mine, with security in mind, and includes luxury apartments that wealthy tenants can occupy in the event of a nuclear attack.

Both more practical and more impressive is the vast commercial catacomb beneath Kansas City, Missouri—15 square kilometers of industrial park on two levels between 12 and 25 meters underground. This subsurface warren used to be a limestone quarry that was mined horizontally into the rock face, leaving behind huge "rooms."

Today more than two dozen companies use this space for everything from plush offices to

PHOTOGRAPHS BY DAN McCOY/RAINBOW



"Somewhere in our genes lurks an ancestor who lived surrounded by earth and who is happy to see us return."

factories, bringing some 2 000 workers underground each day. Tenants include the Inland Cold Storage Company, which can house in its refrigerated caves half a kilogram of frozen food for each American, and Brunson Instrument Company, manufacturer of the surveying equipment used on Apollo missions, which found the vibration-free underground atmosphere ideal for producing precision optical instruments.

Down the road, in Omaha, Nebraska, one of America's more staid companies, Mutual of Omaha, is going subsurface. Mutual's new office will be an ambitious three-story underground structure with a massive glass dome at the surface. Mutual is going down because going underground allows the company to use land that would otherwise become a parking lot. The 16 560-square-meter subsurface project economizes on space, and the street-level dome relieves the dowdy appearance of downtown Omaha. It's a development that seems to have made everyone involved happy.

Underground residential subdivisions are spreading their roots around the country, too. Projects are currently in the works in Texas, Michigan, Missouri, and Ohio, and more are on the way. The ultimate lure of subsurface subdivisions will be exurban greenery combined with suburban conveniences. Designers of one project near Dallas, for instance, plan to allot 86 percent of the development to greenery, compared with the 50 percent typical of surface residential subdivisions.

Despite its mushrooming success, the underground-housing movement is still plagued with a severe identity crisis. You might say it suffers from a case of "euphemismitis." Virtually everyone involved in the movement hates the word *underground*. They feel it brings to mind images of Neanderthals squatting on their haunches and sucking on boar meat or of bat-infested stygian depths. As a result, everyone has come up with a euphemism to soften the image.

Swayze has coined *geobuilding*. Vince Latona, a Kansas City underground architect, insists upon *earth-contact hous-*

(Preceding page) The Lierlys relax three meters down in their living room. (Left) The International Trade Center or "Subterropolis" in Kansas City, covers more than 344 acres. (Top) Andy Davis atop the mountains of earth dug for a new home that has an underground swimming pool.

ing. Others use *earth-sheltered housing*. The formal name for this type of architectural design is *tetratecture*: the sharing of surface and subsurface features.

Whatever it's called, though, the new earth-oriented style of architecture is burgeoning. The main reasons among architects for turning to the earth are environmental. Malcolm Wells, a Cape Cod architect who serves as a sort of preaching Saint Paul for the movement, has perhaps best expressed it: Underground architecture

- offers silent and vibration-free living, along with absolute privacy
- presents living land, instead of roofing materials, to the sun, with plants that give off oxygen and that even provide food, instead of the useless heat of typical roofs
- produces greenery and wildlife habitats in place of asphalt and urban blight, in keeping with the concept of planet Earth as the ultimate national park
- eliminates extremes of weather and temperature
- does away with (once rooftop greenery is in place) the waste of energy and time required for yard maintenance
- saves the precious rainwater surface homes waste, allowing it to percolate and feed the earth instead of running off and causing erosion
- allows the recycling and subsequent utilization of household organic wastes to increase the yield of the home's biosphere
- permits houses to be built closer together than they are in most modern suburbs, with less feeling of crowding and less impact on the land.

Among homeowners, however, the biggest advantage of underground housing is the extraordinary energy saving.

"We pay one third of what we would have paid in a regular structure," says underground-home owner Pat Clark, of Frosty River Falls, Wisconsin.

Mutual of Omaha figures the heating cost for its subsurface offices will be one fourth of what it would cost aboveground. Most of the offices' heat will come from bodily heat, lights, and kitchen waste steam.

Extensive studies by Dr. Thomas Bligh of MIT, a founder of the Underground Space Association when he was at the University of Minnesota, predicted a typical energy saving of 75 percent with an earth-covered house. Bligh states: "In no way can improved insulation on an aboveground building begin to compete with subsurface structures from an energy-conservation standpoint."

The reason underground housing saves so much energy is *not* because earth is a good insulator. In fact, as Wells notes, "earth is a lousy insulator. Urethane foam is perhaps ten to twenty times as good. But," Wells points out, "earth [...] is a great moderator of temperature change. Warm it up and it stays warm a long time."

Earth does not react as fast, or as severely, to temperature change as air does. This means that a house buried in earth has a much narrower band of temperature variation to cope with than a surface structure has.

If, for instance, air temperature on the surface ranges from 0° to 95° F, three and a half meters down the temperature of the earth will vary only from 50° to 65° F. The earth serves as a warmer in winter and as a cooler in summer, tremendously reducing the load on a home heating system.

There is an additional benefit, called the thermal flywheel effect. Because earth loses heat slowly, the coldest earth temperature will lag several months behind the coldest air temperature. This means that the earth around an underground house is still warm and slowly cooling in January and February. It hits temperature bottom only in April, by which time the need to meet the peak heating demand is past. The same goes for summer cooling. The earth doesn't hit peak temperature until the summer's heat is already waning.

Other enticing features of earth-covered homes include their incredible durability and stability. Jay Swayze notes that "it's nature that destroys shelter even with continuous maintenance. By putting dwellings underground, we are attempting to put shelter in harmony with nature. Protected from the ravages of weather, an underground house can last forever. Down beneath the surface, houses avoid the onslaughts of tornadoes, hurricanes, and other surface destroyers. They even stand up better to earthquakes than aboveground buildings, although they're surrounded by tons of dirt.

John Barnard, of Marston Mills, Massachusetts, perhaps the most influential underground architect, explains: "Underground houses fare far better in earthquakes because the biggest damage to surface buildings is caused by a whipping action. The earthquake twists the building and then whips it back, tearing it apart. Underground buildings can move only as far as the earth does. They can't whip."

The current interest in underground living as an American alternative may be new, but underground living itself is as old as civilization. The schoolbooks say humankind left the caves for good in search of new food supplies millions of years ago. But in reality, vast populations have lived beneath the earth in all eras and regions. As Wells has said: "I can just picture some smelly old brute, club in hand, surprised at seeing a cave for the first time. . . . It must not have been too many minutes later that underground architecture was born. Despite great advances in the techniques of building aboveground, man has never completely abandoned underground construction. Remains from every age on every continent prove that man has continued to avail himself of this most ancient of architectures."

Archaeologists have unearthed amazing subsurface settlements from the early days

of civilization. Five thousand years ago, for example, human denizens of the Negev Desert built their homes underground to avoid the broiling sun and the searing sand. In Tunisia the ancient Romans put street-level courtyards atop their cool subterranean living areas.

Some American Indian tribes lived in hollowed-out cliff faces or in earth-covered lodges, but the white settlers used the new continent's seemingly inexhaustible supply of timber to build houses on the surface. Abundant amounts of land and resources effectively dampened prosperous America's interest in subsurface dwelling until the land-and-energy-tight 1970s.

Except that is, for one Italian immigrant, who bucked the trend in spectacular fashion beginning in 1908. Baldasare Fortertiere spent 38 years carving an incredible seven-acre maze of 65 rooms, courtyards, grottos and gardens three to seven meters beneath Fresno, California. Light enters this subsurface wonderland through atriums and rooms strategically placed to receive the morning or afternoon sun. The sunken courtyards are rife with plant life, including one tree seven meters underground that bears seven kinds of citrus fruit on grafted branches.

No one is certain about why Fortertiere went to all the trouble. But his life's work—he was still working on it when he died in 1946—remains an uncanny presentiment of the future.

On a more practical plane, the military of America and other developed nations have built extensively underground. The North American Air Defense Command operates from a city of 11 buildings, some three stories high, built beneath Cheyenne Mountain in Colorado. The buildings are spring-mounted to ensure that they'll withstand the vibrations of an attack. The American wartime communications and command center is buried beneath Battle Mountain, near Washington, D.C.

Perhaps this long genealogy of underground living helps explain why modern Americans who are trying this alternative find it surprisingly natural and comfortable. Somewhere in our genes lurks an ancestor who lived surrounded by earth and who is happy to see us return.

People who move into underground houses don't suffer from claustrophobia, cabin fever or any of the negative effects you might imagine. Rather, "they just feel it's a natural way to live," says underground-housing expert Gordon Moore, of the University of Missouri at Columbia.

"That's true," agrees Barbara Webb, who, with her husband, Larry, has lived in an underground house near Drexel, Missouri, for about a year. "You don't feel closed in. You don't feel uncomfortable. It just feels right. Like a house where people live."

Primordial instincts aside, few people today would choose to live in a closed, unadorned cave. So tetratecture designers have concocted several plans that provide many of the benefits of total submersion with free access to the surface.

The most popular of these is the atrium house, first designed and championed by Barnard. "I'd been fascinated with underground housing since I was a boy," Barnard, who is sixty, explains. "My dad was an architect, and he would always say that if a house were deep enough in the earth, it would be sixty degrees all year round. So why not build houses down there?

"I mulled it over for a long time. My wife's response to trying an underground house was, 'I hope you and the mole you marry after I leave you will both be very happy.'

"Then, on a trip to Pompeii, we were sitting in a Romanesque café with an atrium. And it dawned on me that if it were all dropped ten feet underground, you'd have the best of everything. My wife bought the idea, so I went ahead and built the house."

The result was Ecology House, completed in 1973 as Barnard's vacation home. It features a living area that surrounds a sunken atrium. Light reaches every room in the house through walls facing the open courtyard. Every room has a view of the sky and the outdoors, yet the house as a whole retains most of the energy saving, privacy and silence of completely buried designs.

Initially, Barnard realized a 25-percent saving on construction costs over a similar-sized aboveground house. Since

CONTINUED ON PAGE 92

FICTION

ADVENTURE OF THE METAL MURDERER

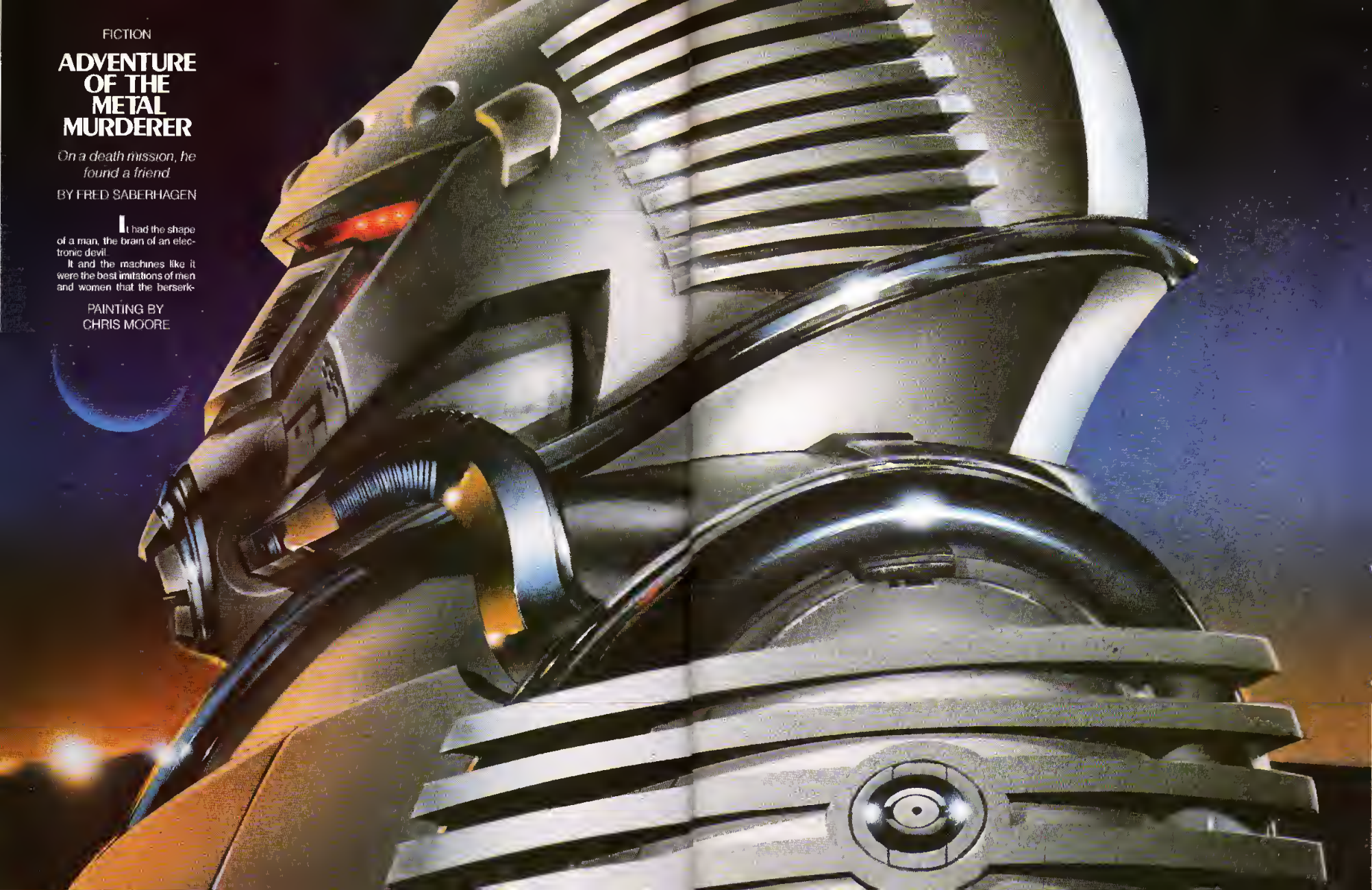
On a death mission, he found a friend

BY FRED SABERHAGEN

It had the shape of a man, the brain of an electronic devil.

It and the machines like it were the best imitations of men and women that the berserk-

PAINTING BY CHRIS MOORE



ers murderous machines themselves were able to devise and build. Still, they could be seen as obvious frauds when closely inspected by any humans.

"Only twenty-nine accounted for?" the supervisor of Defense demanded sharply. Strapped into his combat chair, he was gazing intently through the semitransparent information screen before him, into space. The nearby bulk of Earth was armored in the dun-brown of defensive force fields, the normal colors of land and water and air invisible.

"Only twenty-nine." The answer arrived on the flagship's bridge amid a sharp sputtering of electrical noise. The tortured voice continued. "And it's quite certain now that there were thirty to begin with."

"Then where's the other one?"

There was no reply.

All of Earth's defensive forces were still on full alert, though the attack had been tiny, no more than an attempt at infiltration, and seemed to have been thoroughly repelled. Berserkers, remnants of an ancient interstellar war, were mortal enemies of everything that lived and the greatest danger to humanity that the universe had yet revealed.

A small blur leaped over Earth's dun-brown limb, hurtling along on a course that would bring it within a few hundred kilometers of the supervisor's craft. This was Power Station One, a tamed black hole. In time of peace, the power-hungry billions on the planet drew from it half their needed energy. Station One was visible to the eye only as a slight, flowing distortion of the stars beyond.

Another report was coming in. "We are searching space for the missing berserker android, Supervisor."

"You had damned well better be."

"The infiltrating enemy craft had padded containers for thirty androids, as shown by computer analysis of its debris. We must assume that all containers were filled."

Life and death were in the supervisor's tones. "Is there any possibility that the missing unit got past you to the surface?"

"Negative, Supervisor." There was a slight pause. "At least we know it did not reach the surface in our time."

"Our time? What does that mean, babbler? How could . . . ah."

The black hole flashed by. Not really tamed, though that was a reassuring word and humans applied it frequently. Just harnessed, more or less.

Suppose—and, given the location of the skirmish, the supposition was not unlikely—that berserker android number thirty had been propelled, by some accident of combat, directly at Station One. It could easily have entered the black hole. According to the latest theories, it might conceivably have survived to reemerge intact into the universe, projected out of the hole as its own tangible image in a burst of virtual-particle radiation.

Theory dictated that in such a case the reemergence must take place before the falling in. The supervisor crisply issued orders. At once his computers on the world below, the Earth Defense Conglomerate, took up the problem, giving it highest priority. What could one berserker android do to Earth? Probably not much. But to the supervisor, and to those who worked for him, defense was a sacred task. The temple of Earth's safety had been horribly profaned.

To produce the first answers took the machines eleven minutes.

"Number thirty did go into the black hole, sir. Neither we nor the enemy could very well have foreseen such a result, but—"

"What is the probability that the android emerged intact?"

"Because of the peculiar angle at which it entered, approximately sixty-nine percent."

"That high!"

"And there is a forty-nine-percent chance that it will reach the surface of the earth in functional condition, at some point in our past. However, the computers offer reassurance. As the enemy device must have been programmed for some subtle attack upon our present society, it is not likely to be able to do much damage at the time and place where it—"

"Your skull contains a vacuum of a truly intergalactic order. I will tell *you* and the computers when it has become possible for us to feel even the slightest degree of reassurance. Meanwhile, get me more figures."

The next word from the ground came twenty minutes later.

"There is a ninety-two-percent chance that the landing of the android on the surface, if that occurred, was within one hundred kilometers of fifty-one degrees, eleven minutes north latitude, zero degrees, seven minutes west longitude."

"And the time?"

"Ninety-eight-percent probability of January 1, 1880 Christian Era, plus or minus ten standard years."

A landmass, a great clouded island, was presented to the supervisor on his screen.

"Recommended course of action?"

It took the ED Conglomerate an hour and a half to answer that.

The first two volunteers perished in attempted launchings before the method could be improved enough to offer a reasonable chance of survival. When the third man was ready, he was called in, just before launching, for a last private meeting with the supervisor.

The supervisor looked him up and down, taking in his outlandish dress, strange hairstyle, and all the rest. He did not ask whether the volunteer was ready but began bluntly. "It has now been confirmed that whether you win or lose back there, you will never be able to return to your own time."

"Yes, sir. I had assumed that would be the case."

"Very well." The supervisor consulted data spread before him. "We are still uncertain as to just how the enemy is armed. Something subtle, doubtless, suitable for a saboteur on the earth of our own time—in addition, of course, to the superhuman physical strength and speed you must expect to face. There are the scrambling or the switching mindbeams to be considered, either could damage any human society. There are the pattern bombs, designed to disable our defense computers by seeding them with random information. There are always possibilities of biological warfare. You have your disguised medical kit? Yes. I see. And of course there is always the chance of something new."

"Yes, sir." The volunteer looked as ready as anyone could. The supervisor went to him, opening his arms for a ritual farewell embrace.

> *"He blinked away some London rain, pulled out his heavy, ticking timepiece as if he were checking the hour, and stood on the pavement . . . like a man waiting for a friend."*

He blinked away some London rain, pulled out his heavy ticking timepiece as if he were checking the hour and stood on the pavement before the theater as if he were waiting for a friend. The instrument in his hand throbbed with a silent, extra vibration in addition to its ticking, and this special signal had now taken on a character that meant the enemy machine was very near to him. It was probably within a radius of fifty meters.

A poster on the front of the theater read:

THE IMPROVED AUTOMATON CHESS PLAYER
MARVEL OF THE AGE
UNDER NEW MANAGEMENT

"The real problem, sir," proclaimed one top hatted man nearby in conversation with another, "is not whether a machine can be made to win at chess, but whether it may possibly be made to play at all."

"No, that is not the real problem, sir," the agent from the future thought. *"But count yourself fortunate that you can still believe it is."*

He bought a ticket and went in, taking a seat. When a sizable audience had gathered, there was a short lecture by a short man in evening dress, who had something predatory about him and also something frightened, despite the glibness and the rehearsed humor of his talk.

At length the chess player itself appeared. It was a desklike box with a figure

seated behind it the whole assembly wheeled out on stage by assistants The figure was that of a huge man in Turkish garb Quite obviously a mannequin or a dummy of some kind it bobbed slightly with the motion of the rolling desk to which its chair was fixed Now the agent could feel the excited vibration of his watch without even putting a hand into his pocket

The predatory man cracked another joke displayed a hideous smile then from among several chess players in the audience who raised their hands—the agent was not among them—he selected one to challenge the automaton The challenger ascended to the stage where the pieces were being set out on a board fastened to the rolling desk and the doors in the front of the desk were being opened to show that there was nothing but machinery inside

The agent noted that there were no candles on this desk as there had been on that of Maelzel's chess player a few decades earlier Maelzel's automaton had been a clever fraud of course Candles had been placed on its box to mask the odor of burning wax from the candle needed by the man who was so cunningly hidden inside amid the dummy gears The year in which the agent had arrived was still too early he knew for electric lights at least the kind that would be handy for such a hidden human to use Add the fact that this chess player's opponent was allowed to sit much closer than Maelzel's had ever been and it became a pretty safe deduction that no human being was concealed inside the box and figure on this stage

Therefore

The agent might if he stood up in the audience, get a clear shot at it right now But should he aim at the figure or the box? And he could not be sure how it was armed And who would stop it if he tried and failed? Already it had learned enough to survive in nineteenth-century London Probably it had already killed, to further its designs—'under new management indeed

No now that he had located his enemy he must plan thoroughly and work patiently Deep in thought he left the theater amid the crowd at the conclusion of the performance and started on foot back to the rooms that he had just begun to share on Baker Street A minor difficulty at his launching into the black hole had cost him some equipment including most of his counterfeit money There had not been time as yet for his adopted profession to bring him much income so he was for the time being in straitened financial circumstances

He must plan Suppose, now that he were to approach the frightened little man in evening dress By now that one ought to have begun to understand what kind of a tiger he was riding The agent might approach him in the guise of—

A sudden tap-tapping began in the agent's watch pocket It was a signal quite distinct from any previously generated by his fake watch It meant that the enemy had

CONTINUED ON PAGE 94

An information scientist articulates the UFO phenomenon in bold new terms that put the burden of proof on our ability to rethink conventional concepts of reality

INTERVIEW

JACQUES VALLEE

Photographs by Michael Somoroff

When I was beginning my career in science," recalls Dr. Jacques Vallee, "the main argument against UFOs was that astronomers never saw them. I found that argument convincing." Then, in 1961, he and other satellite trackers at the Paris Observatory detected something odd overhead. Stranger still was what happened after that. The project director erased the data tape before an orbit for the unidentified object could be computed. "I thought, here we are at a renowned institution, seeing something we can't explain and destroying data for fear of ridicule. That, for me, reopened the entire question."

Since then, Vallee has pursued two careers. He is an innovative and successful information scientist. (He has a Ph.D. in computer science from Northwestern University and is a consultant and writer on data management and the creator of an electronic conferencing network.) He is also a researcher, lecturer, and writer (*The Invisible College, Anatomy of a Phenomenon*, and other books) whose articulation of the social and scientific aspects of the UFO controversy has inspired skeptics and believers alike to rethink their positions.

Unidentified flying objects, Vallee insists, are just that—unidentified—and he regards with equal skepticism the true believers and those committed to denial. What *is* unquestionable, he told the U.N. Special Political Committee in 1978, is that large numbers of people have crystallized their hopes for change—and their mistrust of authority—in terms of contact with alien intelligence. Vallee's own intermediate position allows him to take a detached, almost anthropological view of UFO cultists, many of whom are outraged by his willingness to consider the role of psychological distortion in their accounts. Vallee, however, is intrigued by the possibility that these distortions themselves are part of the contact experience.

A U.S. citizen since 1967, Vallee lives with his wife and children near San Francisco, where he had this conversation with *Omni* contributing editor the late Christopher Evans.

"We need a physical strategy to deal with the UFO stimulus . . . and a new kind of social assessment of what the UFO belief does to us as a culture. People are bored with the old UFO debates . . . They are looking for a new approach."

Omni You've recently published a book called *Messengers of Deception* (And/Or Press, Berkeley Calif.) a study not of UFOs but of the *belief* in UFOs. Your earlier research focused on the physical aspects of the question. Why have you changed your approach?

Vallee Until now there have been only two positions. One is held by people like Philip Klass and Jim Oberg, who claim that the UFO question is essentially nonsense, and the other is held by the UFO groups, who claim that we've been visited by some space civilization. I've now reached the point where I can't believe one or the other. I know that it's not all nonsense, because I've spoken to too many people who have seen something and whose testimony I respect. At the same time I can't really believe that we are simply being visited by extraterrestrials, because I can find no real evidence of that in the data. I kept asking myself, Why is it that we don't have the right methodology to study this problem after all these years? And I've come to realize that we've made the typical mistake of trying to look for *one* methodology for something that is a multiple phenomenon. There are really three phenomena: the *physical* phenomenon, the *psychophysiological* phenomenon, which is what happens to a witness when he's close to the physical stimulus, *whatever* it is, and the *social* phenomenon.

After many years of investigation, I've come to believe that this third aspect is much more interesting than the first two are. The public has now heard all the arguments *against* UFOs, and it has heard all the arguments *for* UFOs. The public is bored with these old debates. People are bored with both sides now; they are looking for a new approach.

Omni Why do you think people are bored?

Vallee While the public is becoming increasingly interested in the subject, it is bored with the obsolete question of whether UFOs are real or not. It's a little bit like asking if Jesus Christ existed or not. You can find ten scholars on any campus who will "prove" to you that Jesus Christ never existed, and you will find ten scholars who will "prove" to you, with the same documents, that he did exist. It's an interesting question for those few scholars, but it's not an interesting question for the rest of us, because—historically, socially, culturally and so on—Christianity has been a fact of life for centuries. In a particular society, if enough people believe in something, then that something exists. To paraphrase one of the founders of modern sociology, If men believe something to be real, then it is real in its consequences." The *expectation* is there. That's what I've called conditioning. Whether the conditioning comes from an outside source or whether it comes from Earth, from the old human culture, even from the collective unconscious, as Jung suggested, wherever it comes from, that expectation is there. We can expect social changes to come from this belief, maybe even historical changes. That's the new perspective I've tried to explore in this book, through a total departure from the methods I was using before.

I've spent several years talking to "contactees" and observing what has happened in the wake of this very strange movement here in America and in Spain, France and several other countries.

Omni Do you believe that there is some reality behind the UFO reports?

Vallee I am not saying that the experience is completely in the mind of the observers. I believe absolutely that there is a physical stimulus, although I don't know what it is. It seems to be a lot of electromagnetic energy in the form of microwaves in a small space, and an intense, colored light. But it must be something else, too, because of the very strange properties of the beams that are described. For example, these beams end abruptly or extend and retract. Have you ever seen a beam of light that was twenty feet long? So much for what we know about the physical stimulus. We are not in a normal scientific situation. We are dealing with a phenomenon that has a definite potential of intelligence. Since we are dealing with a phenomenon that has a potential of being more intelligent than we are—and that is one of the hypotheses we have to consider here—then the rules of research as we have been applying them should be modified.

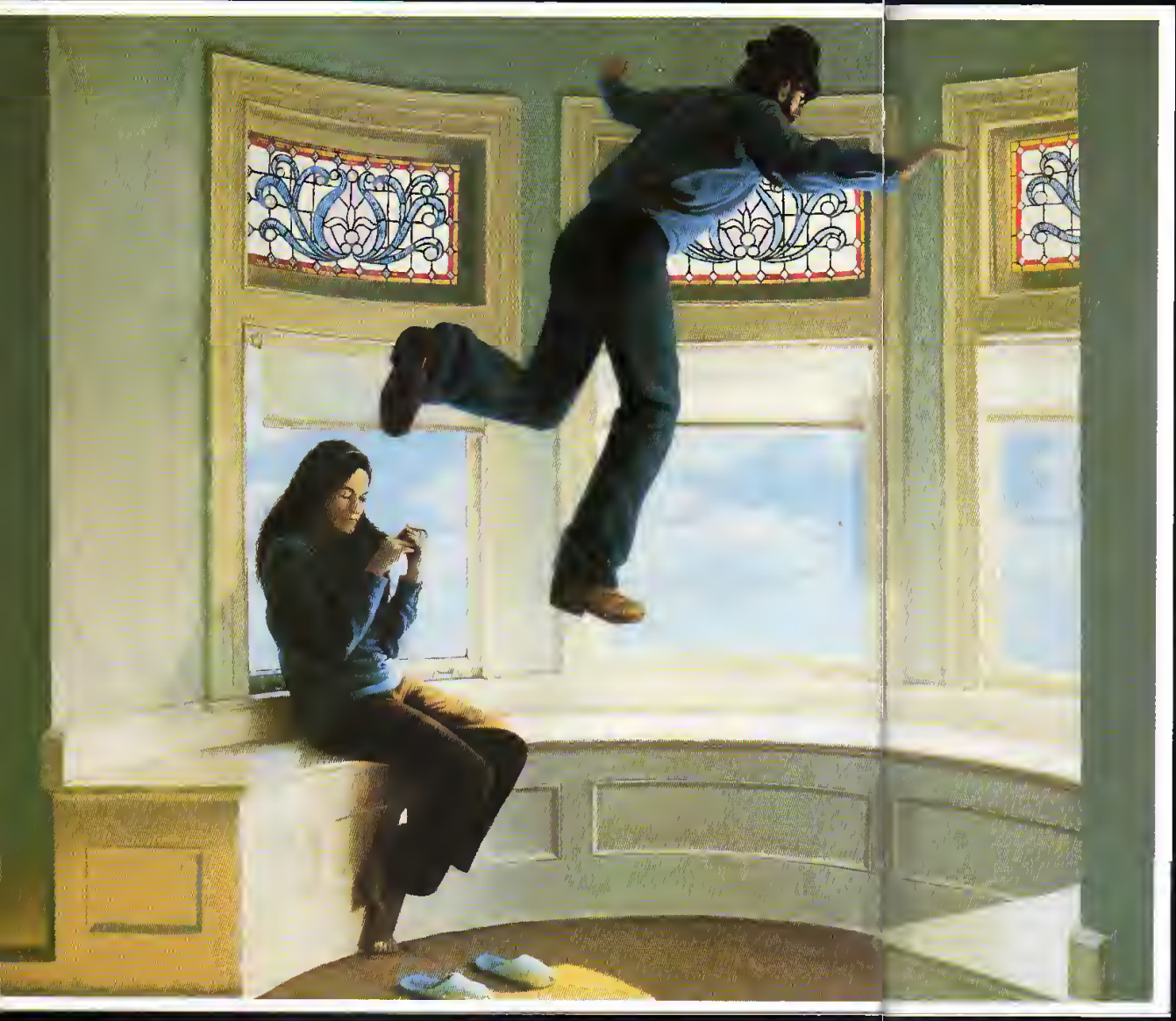
Omni I know you've looked at tens of thousands of reports of sightings. Are there any consistent features that seem to you to be solid evidence of physical stimuli of some kind?

Vallee In a recent computer study I conducted with the different elements of the witnesses' statements, a result that appeared repeatedly was that witnesses were not, at first, describing a craft; they were describing *colors*; they were describing *shapes* of lights. And those were significantly different from what you'd expect from natural phenomena, natural objects or known artificial craft. The witnesses were essentially describing a region of space about ten feet in diameter, either a disc or a sphere or a cylinder, from which electromagnetic phenomena were emitted. They described a variety of physical events in the vicinity.

Witnesses also described a whole range of physiological phenomena, including a "loss of time," disorientation and visual hallucinations. Now, when I talk to physiologists about that, some things come up immediately. If you could cause artificial epileptic seizures with a physical stimulus, you would be able to duplicate many of the things UFOs seem to be able to do. In addition, a loss of muscular control is widely reported, together with eye complaints that range from painful eyeballs to conjunctivitis to temporary blindness. Sometimes marks appear on the body.

There are other patterns in terms of space and time distribution of sightings. Most of the close encounters or landings

CONTINUED ON PAGE 95



FICTION

LESSON ONE

He was a master of illusion, while his student was obviously too naïve to learn

BY JAMES RANDI

The Great Rumson was quite accustomed to the excitement that usually went along with his entry into Flosso's Magic Emporium. The young students of conjuring—those who managed to persevere beyond the preliminary stages of finger exercises and card palming—would press him for autographs on scraps of paper and ask him the same set of inane questions that had been asked for the past five decades. Mounting the stairs to the shop, Rumson braced himself for the somewhat pleasant ordeal that went along with his position in the conjuring fraternity.

As he walked through the doorway, he noted with feigned surprise that only one youngster leaned across the counter in conference with old man Flosso, who was outlining the intricacies of a small wooden box that delivered a silver dollar when touched in the right way. A huge backpack was propped against the wall, and Rumson plopped into a chair beside it with a brief nod to Flosso. He noted that a copy of Marlo's book stuck out of the pack. It meant this boy had better taste than most of them, and he looked up just as the youth turned to meet his gaze.

Smiling when he recognized Rumson, he stepped forward to shake his hand. His name, he said, was Willie, and he had come from very far to visit Flosso's. As the older man listened, he heard something more behind the superficiality of

PAINTING BY THE BROTHERS HILDEBRANDT

the boy's words He wanted more than an autograph, Rumson knew And at last amid the shoptalk and polite inquiries came the Big Question

An hour later after earnest conversation over coffee Rumson and the boy were agreed that they had become teacher and pupil A wondrous chemistry seemed to have sprung up between them With total candor Willie admitted that he had been in trouble with the law Nothing serious but it had meant not graduating To Rumson the pattern was familiar His long-standing and often-confirmed claim was that people who entered this calling were misfits unable to find a proper fit with the rest of humanity—odd-shaped personalities with hard-to-accept ways of thought and behavior who carved their own places in society by synthesizing a fantastic environment of their own He recognized in the eager youngster the hunger that he himself had felt at that age—the need to learn and grow in this difficult business It was only done at the feet of a master, and as the two of them stepped into the huge house that the boy had only read about but had not dared to hope he might visit Rumson felt the weight of his suddenly acquired responsibility

There was the required tour of the place with pauses to examine the artifacts gathered over the years from all parts of the world They found the secret buzzer that opened the bookcase which revealed a locked door behind it They noted the strange wall clock with the numbers subtly transposed A clap of the hands—performed just so—flooded the house with *The Planets* of Gustav Holst from concealed speakers Rumson's venture into modern technology was manifested in the small television studio that occupied most of the cellar area, with racks of videotapes of the best TV performers in the trade, invitingly available

The questions spilled from the boy without pause and by the time they troubled to look it was past midnight The small room, the one with the sloping ceiling against the roof was assigned to the kid Meanwhile Rumson went about covering up the birdcages and latching the doors in the usual bedding-down routine Rumson wondered how this pupil would work out, but he gave up such speculation as premature It would be weeks before he would be able to answer that question

As he ushered the cat out of his den for the night he heard a small voice at the top of the stairs The boy outlined against the hall light, called him "Mr Rumson, do you ... do you know about the *real* magic, too?"

Rumson's heart sank as he heard these words He had been hesitant to broach that subject with the boy hoping that it would never come up Palmistry astrology all the usual claptrap he supposed The other student years back, had been like that always coming up with that kind of crap That one hadn't lasted long

"You'd better come down here and we'll talk awhile," Rumson said As the boy made his way down the narrow stairs Rumson began taking well-worn books from the ceiling-high cases There were the long rows of books that were marked with red dots on the spines Those were on conjuring Although there were many volumes on that subject, there were twice as many that bore blue labels—the group Rumson preferred to call the bullshit section From among them the older man chose several

The boy seemed rather apprehensive Perhaps he realized that he had hit a sore spot He couldn't help having heard about Rumson's constant battle against the paranormalists, his many articles and several books on the subject, and his frequent lectures delivered at places of learning all over the world Rumson had discovered that the boy knew his personal history quite thoroughly and that was part of what made him the Great Rumson

"Look, young man I've been poking about in this magic business twice as long as you've been alive Do you know what

"The boy ... called him "Mr Rumson, do you ... do you know about the real *magic, too?" The older man's heart sank. "You'd better come down here, and we'll talk awhile."*

magic really *means*? The dictionary says it's an attempt by man to control nature by means of spells and incantations Well I've tried spells and incantations They don't work Cheating works That's what you and I are involved in We're actors playing the parts of magicians But *real* magic? As the man said, No, Virginia, there is no Santa Claus

"I think you're wrong," the boy said very quietly There was a total stillness in the room broken only when Rumson took a deep breath and looked over his glasses at the boy who met his gaze confidently

"Well I may be And perhaps you can prove it But I very much doubt it" He put his hand on the small stack of books that he'd selected "I've confronted the authors of all these books—scientists, mind you—and I've beaten every one of them flat" He could not resist the dramatic gesture that suggested itself and with his index finger he toppled the stack across the table

"I've gone about for fifteen years now offering this check" he said, tossing into the boy's lap the thin black wallet that he'd waved before so many other audiences, payable to *anyone* who can produce just *one* psychic miracle for me Fifteen years And I never gave up a nickel"

They both waited Rumson's cat walked stiff-legged across the table, picking her way among the fallen books The huge clock on the far wall ticked thunderously Then the boy looked up at Rumson and spoke

"I've been doing some things I don't understand I came to the city to look for you because I thought you perhaps could tell me what it's all about I've been to some of the labs where they test these things" He touched one thick volume on the table "I spent a whole day with this guy He was a dummy Fell for everything Used to read magic magazines and thought he knew the whole thing Anything I did fooled him, and he wanted to stick me in a cage to test me" Looking a bit taller than before, the boy slid off the chair and stood up "But I didn't show him any of the real stuff because he thought he could stick it in a test tube"

"Go to sleep Willie We'll talk in the morning," Rumson said with a sigh And he thought silently in the morning either he'd convince him he was wrong or he'd be on his way The years that had passed had not faded the memory of his own battle against the irrationality that hinted of supernormal powers that seemed just out of reach, and he was not about to enter the lists again to fight that enemy

The boy climbed to the upper room followed by the fickle cat, and Rumson turned wearily to his own room and sleep

Like electricity No, more like the smell of a hot soldering iron It was a foreign sort of flavor in the air that Rumson could not label but that had brought him out of bed with a start A glance showed it was very close to sunrise, and there was a tingling presence all about that was not part of any experience he'd ever known It had to be the boy, he thought, and he headed for the stairs The door to the room was just barely open and the cat lay sphinxlike staring into the soft gray glow that came from beyond that door As he mounted higher the tingling and the tension he felt mounted too

He reached the landing Now he saw into the boy's room Willie was seated on the rug, forehead beaded with sweat, totally occupied with staring at a ball-point pen that lay before him The tip of the pen rose slowly and sank again Again it rose and it remained erect The entire pen rotated and then rose an inch, then two The boy was frozen in the effort Rumson walked into the room to the boy's side and he didn't know whether he made a sound He sank to the floor beside Willie He knew what he had to do

Together the pupil and the master put their wills to work on the object before them It rose strongly this time, steadily and surely

In the back of Rumson's mind a thought flitted He had not been a pupil in a long time This was real This was Lesson One

"... and if these demands are not met, your world will be destroyed"

DESIGN LUIGI COLANI

With the exotic materials of today, he engineers the shape of the 21st century

BY KATHLEEN STEIN

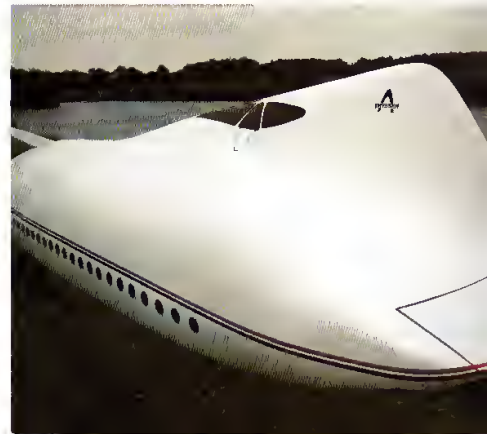
Careful observation teaches me that with the exception of crystals nothing in nature admits of a straight line. The universe itself is made up of curves, and I can only obey the laws of nature. My method of solving problems on this planet is applicable to Venus or Mars or any other cosmic body for that matter.' The speaker is Luigi Colani, a

Clockwise from below: Volkswagen Polo Turbo racing car has less drag than a Porsche; the Old Timer roadster; Colani with model of sports car GT 80 being built with backing from U.K. Ford; 2001-II large container-truck prototype

PHOTOGRAPHS BY MALCOLM KIRK

German engineer/sculptor/architect who has successfully avoided conventional straightedge styling to emerge as one of Europe's most visionary industrial designers. "What makes me so much stronger and surer than most designers is that I have behind me a butterfly and a tulip. This is more than the whole of IBM can ever build." Although Colani today is forging a revolutionary tradition for the future, there are precedents for his fantastic style. Had the art-nouveau genius Antonio Gaudí, for instance, known about jet-engine designs, plastics, and fiberglass, he himself might have fashioned the fluid lines and organic

Clockwise from above: piston-driven train (below right) Hamburg–Munich one-hour (700 kph) electromagnetic locomotive. Thyssen Group built track near Colani's castle to test this design. White Lady, two-story electromagnetic train.



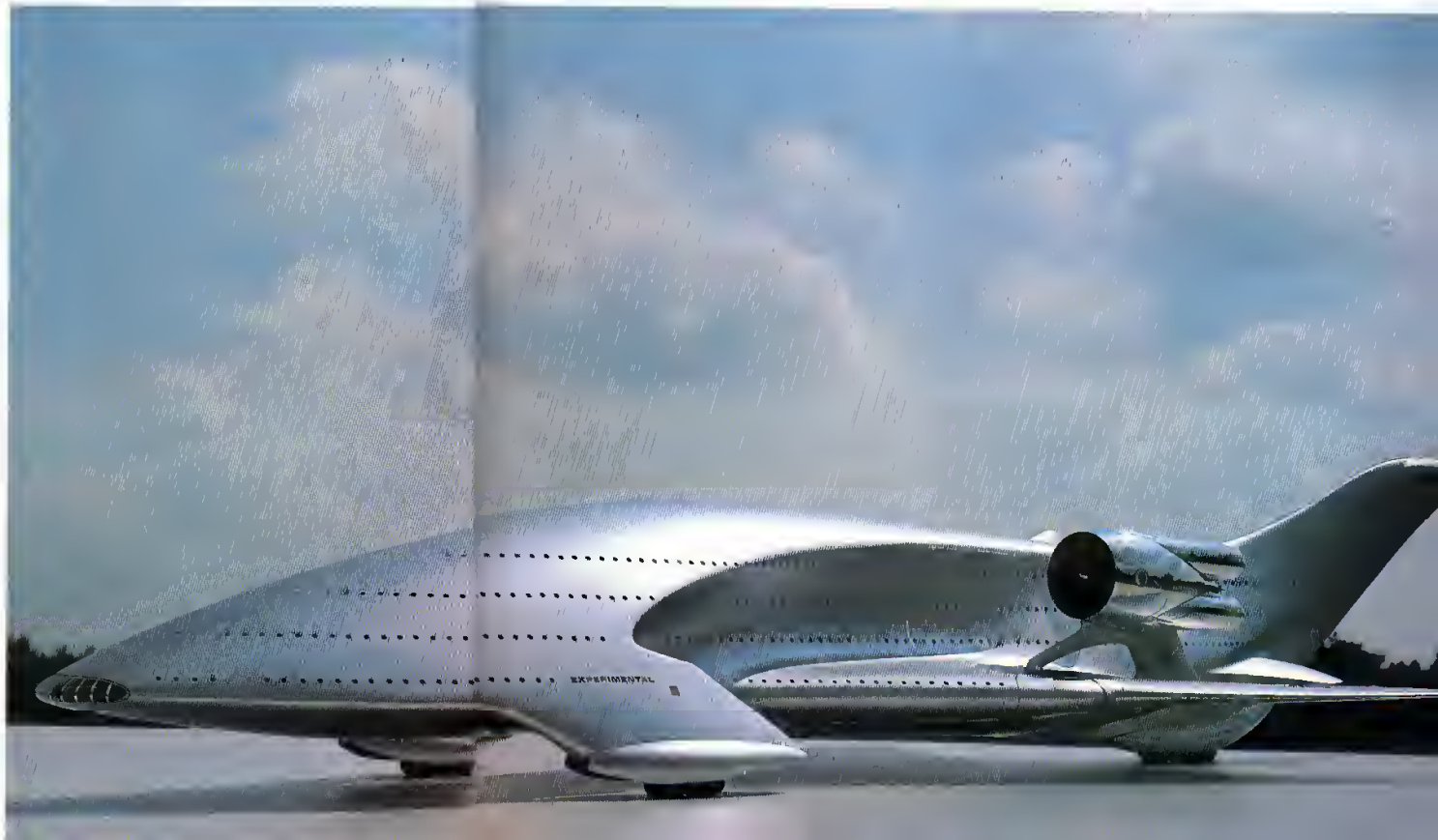
Everything that moves shapes itself; design must flow from inside to out.

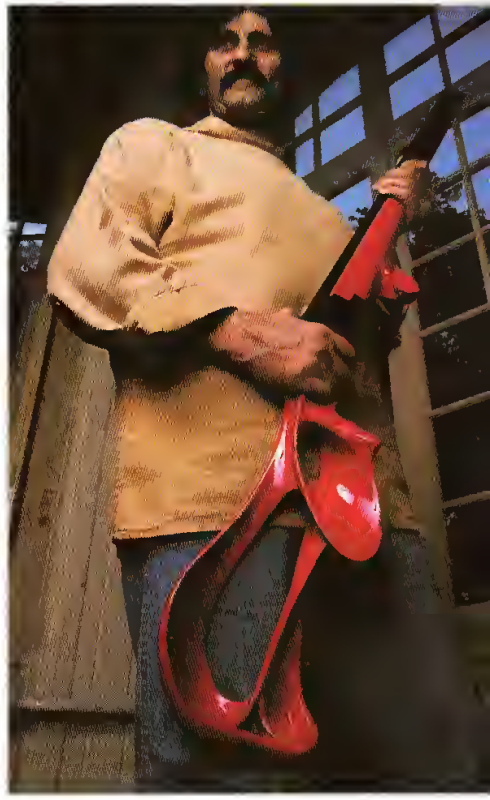
For faster aircraft, it's best to copy the hydrodynamic shapes of sea creatures

shapes that have become Colani's twenty-first-century trademark.

Twenty years ago, when Luigi was a junior aerodynamicist in a French aircraft factory, he was asked to get rid of puncture marks in commercial-aircraft flooring. "I found the softest spot in the small universe of the problem," he recalls, "it was the ladies' spike heels." Thereupon Colani quickly designed a new thicker heel that took Paris by storm. After shoes, he diversified into sanitary ceramics which with their vibrantly colored and curvaceous toilets, lavatories and bidets have liberated the European bathroom. That was just the beginning.

Clockwise from below: 1,000-passenger Megalodon aerodynamically designed on shark model, experimental STOL plane, speed-record breaking prop plane, Megalodon top view, Messerschmitt-Kawasaki Dragonfly helicopter



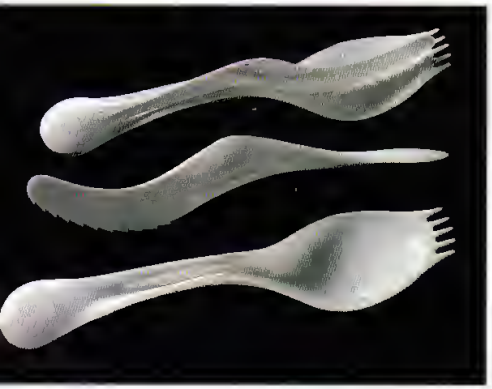


Today Colani s clients include more than 40 international firms for which he designs everything from forks and spoons to aircraft houses bridges and supertankers At the moment he is finishing a design for sleeping cars on the Trans-Siberian Railroad two-story wagons with upstairs sleeping quarters private bath and a hand-operated lift to and from the downstairs sitting section These cars are planned to carry Soviet citizens from Siberia to Moscow for the 1980 Olympics

Colani s car of the future has spherical foam-filled wheels able to turn 360 degrees under power on an inclined axis It will run silently be-

Clockwise from above fiberglass ski boot (newer design will feature one unit ski and boot) personalized gun TV with swiveling screen first of series of experimental motorcycles designed for BMW (note aerodynamic snap-up backrest)

Growing up beside Johannesthal Airport, I was infected by aerodynamics

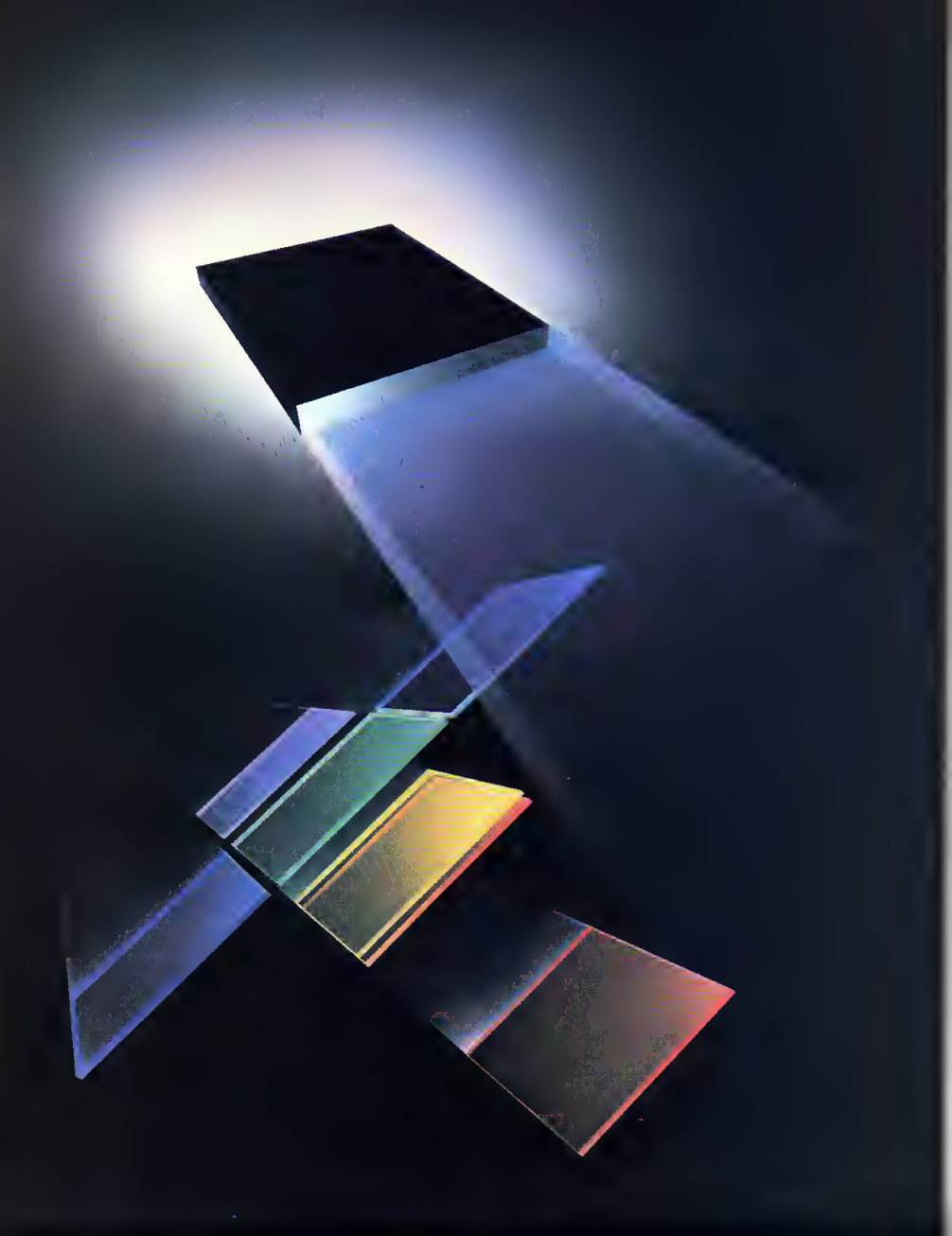


"I'm trying to play Mother Nature. How would she design an oil tanker?"

cause of its droplike shape and the wheels. It looks like a stone out of a river flattened by twenty million years of water streaming around it."

Approaching the zenith of his career, Colani at fifty-one has left his castle Harkotten near Münster for a winter in Spain, where he is redesigning an old yacht into fiberglass curves. He will sail the world in this floating studio, half hideaway, half meeting place for the industrialists of the world." He will squeeze in some design projects that interest him, such as plans for a Japanese consortium that intends to construct a Disneyesque amusement park with underwater hotels. ∞

Clockwise from below: model of Frog motorcycle (rider fits completely into cowl; motor is incorporated in revolving axle of rear wheel); personalized toothbrush; three-in-one eating utensils; gold wristwatch; form-fitting meditation stools



FICTION

He was an unlikely student, a terrible person, and a modern Frankenstein

THE BOX

BY PAUL J. NAHIN

Ambrose P. Talaylee was bad news. At least that's what everybody in the electrical engineering department of East Pascatawa University thought. Why the man was a dishevveled monster, with unwashed hair awry, filthy jeans, straggly beard strung with fragments of yesterday's lunch, and his argumentative manner. He showed no reverential fear in the presence of his betters, what with his leaping at every opportunity to argue with one professor or another. He told vulgar jokes and laughed too much. It didn't help that he was brilliant. And he smelled bad, too.

Ambrose had appeared with a master's degree, three months before, from a small college in Ohio. He'd passed the entrance exams at EPU, and so they'd had to let him in. But right from the start the faculty had the jitters about him. Scoring a perfect set of examination papers upsets the evaluation process, you see. Of course all the other grad students hated his guts since he'd made them look like klutzes. The next-highest man got a sixty-two.

At first they thought they could get rid of Ambrose by stalling him. As old Wingate, the chairman, had roared in

PAINTING BY
MICHEL GUERANGER

a department meeting. Let the guy take courses until hell freezes over. He'll get no degree without a research dissertation project! Anybody here want to be his adviser?" They had all chuckled at the silliness of such a thing.

But Ambrose zapped them by finding a long-forgotten rule in the Graduate School Catalog. All he needed were the signatures of seven assistant deans on a petition and he could go ahead with doctoral research on his own. The petition, dirty and torn at the edges, and covered with hideous-looking stains, made the rounds. Each A.D. had signed it just to get the strange, smelly person holding it out of his office.

No one really knew what Ambrose was working on. The petition just read: "Implementation of a Synthetic Neural Network." As that cocksure young assistant professor Simpson said in another department meeting: "Maybe he's making himself a new brain!" That brought the laughs, and Simpson glowed with joy at having pleased his betters.

For the next eighteen months Ambrose labored in the former double-sized closet (lit by a single, naked, flickering sixty-watt bulb) that they had assigned to him. Occasionally he'd be seen in the stockroom filling old paper bags with integrated circuit chips, capacitors, wire, and assorted nuts and bolts. He actually seemed to *live* in the closet, as some said they had heard strange noises coming from it late at night. The area around the closet door was constantly littered with paper trash like greasy pizza boxes, napkins smeared with catsup, and candy wrappers covered with chocolate stains. The man was a disgrace!

No one ever figured out where his money came from. Unlike the other graduate students, Ambrose had no teaching appointment in the sophomore labs.

And then one day Chairman Wingate called a special department meeting. "I have here a petition from Ambrose P. Talaylee for the setting of a date for his oral doctoral examination." He held with obvious disgust, between two fingers, a ragged and soiled piece of paper.

Associate Professor James, the department wise guy, quipped: "Christ, Wingate, it looks like something died on that petition. If you've got any cuts on your hand, you'd better get a tetanus booster shot."

Assistant Professor Simpson got his two cents in, too. "You mean he really got something done? Why, he hasn't talked to anyone in the department for advice or anything. All he's done is swipe the stockroom blind and smell it up something terrible!"

The chairman dropped the petition into a folder and gratefully pushed it aside. "Yes, but by the by-laws of EPU we must honor the request. If his work is a bust, we can deny his degree and run his butt out of here. So who wants to be on the committee? There must be six people, you know. Two of us and four from other departments."

In the end it was decided that Wingate and Simpson would be the electrical engineering representatives, while Professors Lardo, Hogson, Sweeney, and Vreeble from physics, biology, political science, and mathematics would be the others.

On May 17, at 1:30 PM, they all gathered in Memorial Hall, except for Ambrose, who came forty minutes later. When he finally swept into the room, the committee members nearest the door reeled in his wake. Wingate and Simpson, almost presciently, had sat as far away from the door as possible. Even so, they still experienced some momentary nausea.

No one knew what to make of it. Ambrose was pushing a cubical metal box mounted on casters to the front of the room. He spoke just two sentences and then sat down. "This is my research project, a synthetic neural network endowed with all of Man's knowledge, and the rules of logic, to allow it to synthesize new knowledge. You may address all your questions to the box."

The committee members sat stunned. A mockery was being made of the time-honored tradition of oral doctoral defense. Just what kind of nonsense was this?

"This is my research project, a synthetic neural network endowed with all of Man's knowledge, and the rules of logic. Address all your questions to the box."

But cagey old Wingate knew better than to make a scene. Otherwise Ambrose could file legal complaints, and then all hell would be on their necks if the press got hold of it. Better to humor this obviously deranged person, let him make a fool out of himself, and have a unanimous vote denying the degree. Wingate stood and walked up to the box. About two feet on an edge, its outer shell was of black, crinkly aluminum. A combination loudspeaker-microphone was visible on the front panel.

"Tell me," Wingate began, "what are the limits on the defining integral of the Laplace transform?"

With barely a pause, the box answered in a bell-like voice, "Lower limit is zero, upper limit is infinity."

Wingate appeared unshaken by the answer he heard. That was just a routine question. Any sophomore would have had that stashed away in his or her minuscule brain. A more impressive test would be to ask a partially ambiguous question to see whether the box could make plausible interpretations as a human might do. "Correct. Now what is the color of an electron?"

A slightly longer pause. "Color is the physiological sensation arising from a correlation between radiation wavelength and retinal response. Planck's law gives the relation between energy and frequency. To compute the color of an electron, it is necessary to know its total energy. Please input the physical environment of the electron, and then its kinetic and potential energies may be computed. This will define the frequency and wavelength, and hence the color."

Wingate stared at the box. "Umph! Well, I pass to one of the other members of the committee."

Simpson leaped to his feet, shouting at Ambrose. "What kind of stunt is this, anyway? Have you got a smart midget inside that thing, Talaylee?" He forgot himself and stalked over to Ambrose.

Ambrose laughed in Simpson's face. Simpson staggered backward as a blast of rancid fumes engulfed him. "Just ask it *anything* you want," Ambrose challenged.

Recovering, Simpson snickered to himself and decided to end this farce. "All right, box, try this on for size. Is there life after death?"

Quick as a wink came the answer: "Yes."

This disconcerted Simpson, but not for long. "Prove it," he yelled.

Back came the machine with a response showing it was indeed Ambrose's creation. "Drop dead, and see for yourself!"

Simpson was shocked. "Why, why—" he sputtered. "Such arrogance, such ungracious behavior is just intolerable."

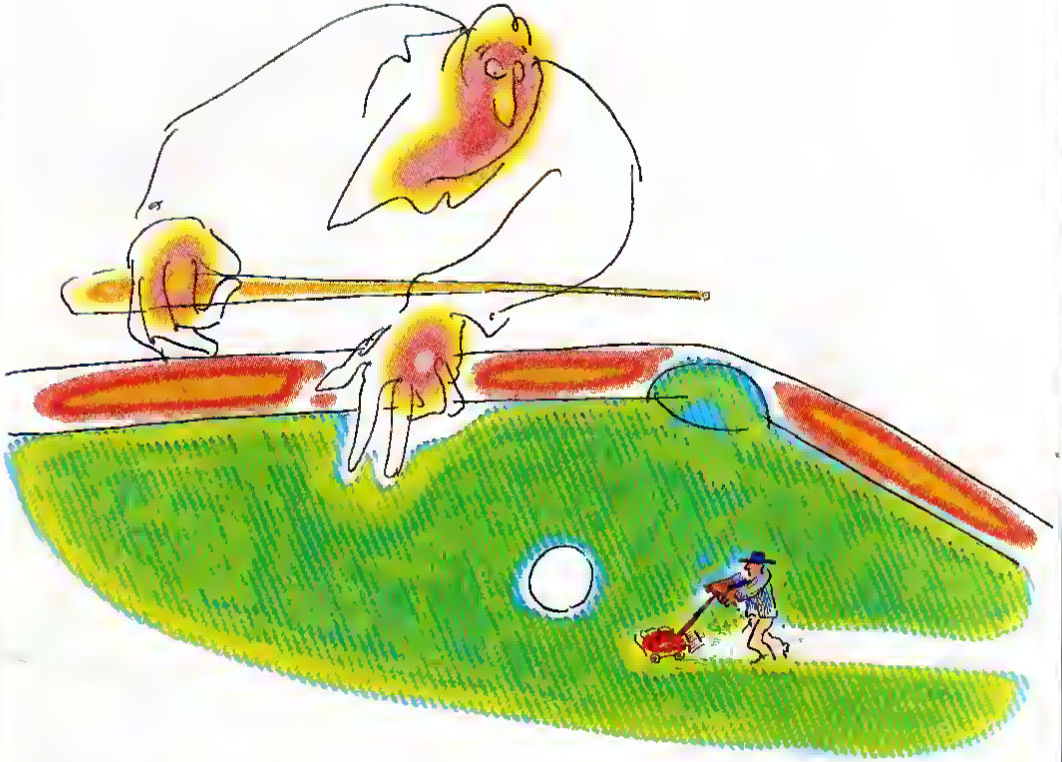
Ambrose laughed again. "I didn't say it, the *box* did!" The truth of that left Simpson speechless, and he sat down in defeat. The rest of the committee was reeling, too, but they retained enough of the committee instinct to go automatically into a huddle. They reached a unanimous judgment quickly and gave Wingate the pleasure of announcing it.

"Mr. Talaylee, we have concluded that this box of yours is a complete fake. Its premise is absurd, and its answers are too rapid and lacking in sufficient scholarship. We have no wish to embarrass you further. So we will not insist you show us the interior, where we are sure there is a radio transceiver linked to an accomplice elsewhere on campus. Therefore, it is our decision that, as regards your final oral doctoral exam, you fail! Good day, sir." With that, the committee marched out of the room in a column, with Wingate in the lead, like baby ducks following their mother.

Ambrose stood glaring after them, yelling, "You bastards! I'll sue you. I'll sue!" Now that kind of response impressed the committee, even though it did lack a certain polish.

That night there was a secret meeting of the committee. At first, the professors thought they could still dump on Ambrose by awarding the doctorate *to the box* (after all, it, not Ambrose, had answered all the questions). Too risky. Instead, they

CONTINUED ON PAGE 112



TALK TO THE ANIMALS

Using human sign language, talkative apes are now arguing for a theoretical revolution in psychology, linguistics, and ethics

BY EUGENE LINDEN

Like most of the offices in the psychology department, room 736 in the University of Oklahoma's Everett Dale Hall displays a collage of aphorisms and cartoons on its door. Two of the more arresting sayings are printed together on a little slip of paper. "Up yours, you jive turkey"—a myna bird at a Texaco station on Highway 94, between Battle Creek and Detroit, and "Baby in my drink'—Washoe.

The first quotation reveals only a gas-station owner's humor and a bird's gift for mimicry. The second may be one of the most important statements made in this century. Room 736 is occupied by Dr. Roger Fouts, a psychologist and the mentor of Washoe, a fourteen-year-old female chimpanzee that was the first animal to communicate with man by using a human language. The quotation on the door was her comment when a toy doll fell into her water. It was delivered in Ameslan, the American Sign Language used by the deaf.

Washoe is far from unique. Chimpanzees at university research centers around the country are being taught Ameslan, Yerkish, a sign language developed at the Yerkes Emory Regional Primate Facility, and other languages. And Stanford University's Penny Patterson is studying the use of Ameslan by gorillas. Washoe herself is teaching sign language to a baby chimp, Loulis, and she, Loulis, and Ali, another of Fouts's chimps, regularly chat in Ameslan.

These experiments have provoked one of the hottest controversies in psychology and linguistics today. Few scholars now deny that the great apes can understand

Koko, a sophisticated gorilla at Stanford, wields her 600-word vocabulary with biting humor

PHOTOGRAPH BY DR. RONALD H. COHN

symbols but many claim that chimps have failed to show any true language skills. Now that the euphoria over Washoe's dramatic success has died down, even some of the pioneers in primate communication are deciding that they have not, after all, proved that chimps and gorillas can use words in the grammatical way that gives spoken language its richness.

After four years of teaching Ameslan to Nim Chimpsky, Columbia University's Dr. Herbert S. Terrace declares that "much of the apes' behavior is pure drill" and that chimps can't seem to combine their words into meaningful sentences. The point is still being contested.

The trouble is that man has a tremendous stake in the idea that his ability to use language is unique. It is language that allows us to claim the right to use all of nature as a resource. Our philosophical and religious traditions argue that man is set apart from other animals by the divine gift of reason, manifested in speech, and that the rest of nature is just raw material at our disposal. This bias affects not only the way we treat animals but the way we study them.

Before Washoe, no ape had been able to speak more than five words. Many attempts to teach spoken language to chimps seemed to confirm George Gaylord Simpson's opinion that language is the single most diagnostic trait of mankind. "All normal men use language, no other living organisms do. So if you want to decide whether something is human, see whether it can learn a language."

But speech requires precise control over the lips and tongue. Chimps don't have it, and this motor deficiency has been consistently misinterpreted as intellectual backwardness. As early as 1748, a French philosopher suggested that apes might learn a manual language, and this idea surfaced periodically over the next 200 years.

In 1925, Robert Yerkes, the great primatologist, noted that although chimps were gifted mimics they never imitated human sounds. Yerkes writes: "Seeing strongly stimulates imitation, but hearing seems to have no such effect. Perhaps [chimps] can be taught to use their fingers, somewhat as does the deaf and dumb person, and thus be helped to acquire a simple nonvocal sign language." No one tried it for the next 40 years.

In the mid-1960s Allen and Beatrice Gardner, a husband-and-wife team of comparative psychologists, were watching films of a chimp named Vicki. The Gardners noticed that as Vicki struggled to form words she would also make a characteristic gesture. They also noticed that she was intelligible without the sound track. Her mouth was in the proper position, but she could not make her tongue produce the proper sounds. At that moment the Gardners decided to try to teach Vicki a nonvocal language.

They settled on Ameslan because it was an established language, and they hoped to compare Washoe's progress with language acquisition in both hearing and deaf human children. It turned out that data on human language acquisition were poor in general and almost nonexistent for the deaf. It took Washoe to spur interest in the way deaf children learn to speak.

CAESAR'S WIFE

Washoe's first word was *more*, a sign made by bringing the hands together flat in front of the body. It was an imperative she applied to her vocabulary as well as to treats and tickles.

Before Washoe moved with Fouts to Oklahoma, she had learned about 175 words, of which 132 satisfied the rigid criteria for reliability established by the Gardners. Like Caesar's wife, Washoe had to be above suspicion. The Gardners tested her with a slide projector, a tester who could see only what Washoe was looking at, and a recorder who could see only what Washoe signed when she viewed a slide.

While this prevented unintentional cueing, called the Clever Hans syndrome, after a horse that could supposedly perform simple arithmetic, the absurdity of the setup took its toll on Washoe's patience. Moreover, to be accepted as a reliable part of Washoe's vocabulary, a word had to be used without prompting on 14 consecutive days. As her vocabulary grew, such criteria soon became woefully cumbersome.

Still, this exactitude gave the Gardners unassailable proof that Washoe understood the symbols she used. In fact, it turned out that the Gardners' controls were far more strict than those used in collecting data on children. This led Allen Gardner to remark ruefully, "On the basis of hard data alone, the chimp appears to be better than humans at acquiring language."

The Gardners claimed very little for Washoe in their first experiment, but they immediately sent one theory up in flames. This was the word theory, summarized as "Animals signal, men symbolize."

Scientists skeptical of chimps' learning language, among them such eminences as Jacob Bronowski and Eric Lennenberg, retreated to the sentence theory, which holds that the uniqueness of language lies in grammatical laws that permit humans to form an infinite number of meaningful messages from a finite number of symbols. The Gardners subsequently released enough data on Washoe's two-word constructions—infant sentences—to set this idea to trembling as well. But it may be that the sentence theory is a false trail to begin with.

The debate over whether Washoe really spoke sign language developed into quite a furor in the early 1970s. As criticism after criticism backfired or proved premature, it became clear that behavioral scientists had been quite sloppy in studying primate communication because they were sure in advance that only man could use language. Allen Gardner noted sarcastically at one point that it was unfair of linguists to

CONTINUED ON PAGE 107

ALLIE

CONTINUED FROM PAGE 47

laws and regulations that a centralized government had the power to enforce

Today psychoelectronics has made it possible to alter neurological activity in the brain and to implant injectors for the control of violent actions. Today thanks to these developments, combined with the growing science of psionics/radionics prisons have become grisly museums similar to the dungeons of European castles.

Very few people realize how very close we came to letting all this get completely out of control. The weapons of people who crave power over other human beings as technologists crave power over things had progressed from clubs and spears through guns and forture instrumenfs, to the ultimate weapon: the file folder.

It it had not been for the great Andrew G. Haley and his First Principle of Mefalaw—"Do unto others as they would have you do unto them"—the fechniques of biotechnology and psychotechnology could have become the most terrifyingly potent tools of people control fhat politicians and bureaucrats could ever hope to acquire.

There were some countries where centralized governments totally regulated biotechnology and psychotechnology. The horrors these governments committed helped bring about their downfall in the last century. Faced with the comm/info networks (whose data banks must never be censored or "cleansed"), the potential dangers of bio- and psychotechnology and the appearance of problems too complex to be solved by enormous bureaucracies, these organizations disappeared.

By and large, computers have not received enough credit for eliminating these massive and unwieldy agencies. I don't mean the large, multipurpose time-sharing computers, buf the millions of microcomputers that, linked by the comm/info network, now permit all problems to be handled at the local level of authority.

The all-pervasive bureaucratic national governments of the twentieth century now seem as quaint and outmoded as the city-states of Greece. A planetary government can now operate with many very small modules—local governments—rather than with an increasingly vast and complex hierarchy of governmental bodies.

The old social institutions were superseded by new ones made possible by technology. Just as the Persian Empire of Cyrus the Great would not work worldwide—that approach was fried several times—centralized national governments could not work after the arrival of the worldwide comm/info network, universal education, and the first hard data on social organization from space-habitat experiments. The human race took the easy way out, as all biological entities do. The availability of new energy sources and methods of information storage, retrieval, and communication permitted the human race to convert these things into social structures that would keep most of us from killing most of the rest of us most of the time.

But it was close! Education won the race that H. G. Wells perceived between education and catastrophe. Well, there was really no acceptable alternative, was there?

How about our mandate from Manila to provide everyone with interesting work and to prevent anybody from subsisfing on the efforts of others? There is certainly plenty of work to be done. We have just begun the centuries-long job of restoring our home planet to the sfate of the Garden of Eden, the environmental condition that it enjoyed and that we evolved in during the lafe Pleistocene, after the retreat of the ice sheets.

And there is work to be done in the solar system. The hard-won macroproject of limiting world population has given us more work than there are people to perform. If you don't like what's available here on Earth, you can look to the solar system. But you had better be prepared to work very hard and perhaps die very horribly.

"Limiting population never degenerated into bureaucratic permits to have a baby. The responsibility is ours. If we want to raise many children in squalor, that's our decision."

We've provided that new frontier, too, as outlined in the Manila Convention. We did it in two ways. When we began to conquer space, we did not realize that a journey outward is always accompanied by a journey inward. Not only do we have fhe frontier of the universe beckoning us outward, the Great Diaspora, buf we also have the new frontier within us, which is slowly being explored with quite unanticipated results.

I don't need to review our progress in psionics/radionics. That's C-21 data we all already know. But we need to be reminded that only two or three centuries ago people who used sfrange mental powers were called witches and were burned at the stake and that as late as C-20 fhey were called charlatans and con artists.

It is as both Arthur C. Clarke and Robert A. Heinlein told us: One person's magic is another person's technology. Hieronymus De La Warr, Drown, and Puharich were plowing ground that would not bear its firsf harvest for more than a century. It took people like Obrenovič, Mofina, Joseph Gautama, and many others to bring this extraordinarily promising field to fruition.

We didn't really know about the life aura and the ego force until these pathfinders did some very dangerous research with intelligence amplifiers, consciousness-expanding chemicals, and symbolic machines. The human race is inextricably bound info a web of consciousness.

In C-22 we will develop fechnology that may surpass anything we can dream of doing wifh computers, television, or any of our physical sciences. If so, we will owe these developments to researchers who were ridiculed by the materialistic scientists of C-20.

There is one other fhing we have learned from the synthesis of knowledge. We are human beings. We will change the ways we fhink and behave because we are adaptable and can assimilate the powerful knowledge we are attaining through our own efforts. We will not evolve into hairless dwarfs with huge heads to enclose larger brains; our brains are already more than adequate to permit us to continue evolving mentally for centuries.

Because we are human beings, possessing sufficiently complex brains, we do not have to alter ourselves surgically, equipping ourselves with gills to breathe underwater, wings to tly through the air, pressure-tight carapaces to survive in space, or electronic connectors sticking out of our heads to work with our computer tools. We never adopted the cyborg because that direction was the direction of specialization, and the human being has spent millennia evolving into an unspecialized and highly adaptable organism.

We are just beginning to sense something else, however. We can set up a telepathic link with the inhabitants of Titan. The fechnology is still primitive, far less reliable than the comm/info network. We can mentally control the rate of radioactive disintegration, but even the primifive reactors of C-20 did a better job.

Yet out of this primitive technology we have started to get the first indications that we may not be alone in the universe. The old SETI (Search for Extraterrestrial Intelligence) programs found nothing in the way of intelligent transmissions in the electromagnetic spectrum, and we found only rudimentary forms of life on Jupiter, Mars, and Saturn. But some of our most sensitive psionics operators, such as my daughter, Nerissa, working with the most advanced psionics machines, have caught intermittent bursts of ego energy whose origin we cannot pinpoint. It may be that we are, for the first time, detecting the existence of another intelligenf life form in the universe.

This is one of the reasons why I have been asked to review for the record some of my thoughts about growing up in the solar system during C-21. Tomorrow Nerissa and I will leave to join the first taster-than-light ship, *Victory*. We're going to hunt for those faint bursts of ego force.

Our journey outward continues to be linked with our journey inward. ∞

GOOD LIFE

CONTINUED FROM PAGE 55

then, he has paid only one fourth as much for heat.

The atrium-style tetratecture house has gone on to become the most popular kind of underground design. Barnard is justifiably pleased. "Everybody in town thought I was crazy when I built it," he says slyly, "but electricity was 1.9 cents a kilowatt then. They don't think I'm crazy anymore."

Wells thinks the atrium design has major drawbacks. For example, he argues, the layout means "you just end up looking across at someone else's window." Wells prefers houses that are built into hillsides.

The hillside house is more cavelike than the atrium home, being recessed into a south-facing hillside. Only the front wall has any contact with the surface. The southern exposure orients the front wall, which usually contains a lot of window space, to strong sunlight, which fills the upper level of the house. The sunlight can also drive solar-heating units to warm the building.

Since earth flows around the hillside house, it literally becomes part of the landscape. In that sense the house becomes a living entity. As Wells once wrote of his old underground office near Philadelphia: "I don't know what color my office roof will be this fall. Last fall it was solid yellow, done in masses of wild sunflowers. It was so intense it seemed to pulsate. Then, a few weeks later, it turned a hundred shades of gold as frost after frost went to work on it."

Wells also argues that hillside homes create the best housing on the worst housing sites. "Eroded farmland or strip-mine sites would be good," he states. Valuable, rich flatland could be left free for parks, farms, and other uses, rather than for highways and apartment complexes.

The most unabashedly underground of the new designs are those of Jay Swayze, who works out of the small town of Plainview, Texas. Swayze describes his homes as "dreamworlds. A man's home is his castle, and we make it his dream."

To a large extent, Swayze lives up to his claim. He builds posh suburban estates inside gigantic underground caverns replete with space-age accoutrements. These create a never-changing Elysian environment that includes both an "inside" and an "outside" beneath the surface.

Swayze houses feature his patented air system, which provides a constant breeze around the house. Sophisticated skylights and fiber optics create an impression of sunshine and the feeling of day passing, much as a surface dwelling does. Sensitive environmental controls make it possible to grow plants, even trees, in the "front yard" of a Swayze design.

"In one of our houses," Swayze states, "you get the best of both worlds. You get the security and privacy and energy savings of living underground. And you get an improved surface world. On Earth you have seasons. But *in* the earth there's no reason why you can't have spring all year."

Swayze's houses are pretty far out, and acceptance has been slow but he waxes philosophical. "Whoever the guy was who invented the wheel probably had trouble getting people to [accept] it, too."

All the proponents of underground design see population growth and energy pressures ensuring an expanding future for earth-oriented buildings.

"Those of us experienced with it feel it's not just one of your little whims of architecture," says Wells. "We foresee green cities. But it's hard to do. You have to do it piece by piece.

"We'll always have high-rises, but all these miles and miles of low-rises! There's no reason we can't have efficient housing that [will] turn Earth into a park again."

Barnard feels underground design represents the natural path of the future. "I think very very definitely it's the way things will go. We're running out of land, and this is far better land use than what we have been doing. It provides the possibility of high-density housing with privacy for an increasingly crowded population."

Before underground architecture reaches its full potential, though, it must still pass through a long period of education and adjustment. Swayze points out that the suspicion of lending institutions toward this new housing form is only now being overcome. Underground-house owners are still sometimes required to pay more for mortgages, when they can find them, because of the style's novelty.

"Our number-one problem is education," Swayze states. "We have to inform the general public and the lenders. What I want to do is offer seminars through national realty chains and make the technology of underground housing available through local folks so people will trust it more."

As for pure speculation about the ultimate end of underground design, no one in the movement does better than Wells. In 1973 he wrote about combining futuristic prefabrication with subsurface buildings. "We'll simply unplug the school components, send them to the recycling center, and slide the hospital parts—completely furnished—into the shell. Now that's what I call architecture. With a lot of luck, the plug-in parts may even, someday in the not-too-distant future, be solar-powered [and] so well insulated they'll leak almost no heat in wintertime, they'll transform all our organic wastes into soil-enriching nutrients, they'll reuse all their water, and they'll free us from this architectural curse of building dead boxes upon living land. With even better luck we may someday learn to grow great earth shells the way we grow crystals in a test tube. Imagine huge, shimmering tetrahedrons growing thirty-meter and sixty-meter clear spans in the sides of hills! Talk about organic architecture."

MURDERER

CONTINUED FROM PAGE 59

managed to detect his detector. It was in fact locked onto it and tracking.

Sweat mingled with the drizzle on the agent's face as he began to run. It must have discovered him in the theater though probably it could not then single him out in the crowd. Avoiding horse-drawn cabs, four-wheelers and an omnibus, he turned out of Oxford Street to Baker Street and slowed to a fast walk for the short distance remaining. He could not throw away the telltale watch for he would be unable to track the enemy without it. But neither did he dare retain it on his person.

As the agent burst into the sitting room his roommate looked up with his usual somewhat shallow smile from a leisurely job of taking books out of a crate and putting them on shelves.

"I say," the agent began in mingled relief and urgency, "something rather important has come up, and I find there are two errands I must undertake at once. Might I impose one of them on you?"

The agent's own brisk errand took him no farther than just across the street. There in the doorway of Camden House he shrank back, trying to breathe silently. He had not moved when three minutes later there approached from the direction of Oxford Street a tall figure that the agent suspected was not human. Its hat was pulled down and the lower portion of its face was muffled in bandages. Across the street it paused, seemed to consult a pocket watch of its own, then turned to ring the bell. Had the agent been absolutely sure it was his quarry, he would have shot it in the back. But without his watch, he would have to get closer to be absolutely sure.

After a moment's questioning from the landlady, the figure was admitted. The agent waited for two minutes. Then he drew a deep breath, gathered up his courage and went after it.

The thing standing alone at a window turned to face him as he entered the sitting room, and now he was sure of what it was. The eyes above the bandaged lower face were not the Turk's eyes, but they were not human either.

The white swathing muffled its gruff voice. "You are the doctor?"

"Ah, it is my fellow lodger that you want." The agent threw a careless glance toward the desk where he had locked up the watch, the desk on which some papers bearing his roommate's name were scattered. "He is out at the moment, as you see, but we can expect him presently. I take it you are a patient."

The thing said in its wrong voice, "I have been referred to him. It seems the doctor and I share a certain common background. Therefore the good landlady has let me wait in here. I trust my presence is no inconvenience."

"Not in the least. Pray take a seat, Mr—?"

What name the berserker might have given, the agent never learned. The bell sounded below, suspending conversation. He heard the servant girl answering the door and a moment later his roommate's brisk feet on the stairs. The death machine took a small object from its pocket and sidestepped a little to get a clear view past the agent toward the door.

Turning his back upon the enemy as if with the casual purpose of greeting the man about to enter, the agent casually drew from his own pocket a quite functional briar pipe, which was designed to serve another function too. Then he turned his head and fired the pipe at the berserker from under his own left armpit.

For a human being he was uncannily fast, and for a berserker the android was meanly slow and clumsy, being designed primarily for imitation, not dueling. Their weapons triggered at the same instant.

Explosions racked and destroyed the enemy, blasts shatteringly powerful but compactly limited in space, self-damping and almost silent.

The agent was hit too. Staggering, he knew with his last clear thought just what weapon the enemy had carried—the switching mindbeam. Then for a moment he could no longer think at all. He was dimly aware of being down on one knee and of his fellow lodger, who had just entered, standing stunned a step inside the door.

At last the agent could move again, and he shakily pocketed his pipe. The ruined body of the enemy was almost vaporized already. It must have been built to self-destruct when damaged badly, so that humanity might never learn its secrets. Already it was no more than a puddle of heavy mist, warping in slow tendrils out the slightly open window to mingle with the fog.

The man still standing near the door had put out a hand to steady himself against the wall. "The jeweler—did not have your watch," he muttered dazedly.

I have won, thought the agent dully. It was a joyless thought, because with it came slow realization of the price of his success. Three quarters of his intellect, at least, was gone, the superior pattern of his brain-cell connections scattered. No. Not scattered. The switching mindbeam would have reimposed the pattern of his neurons somewhere farther down its pathway, *there,* behind those gray eyes with their newly penetrating gaze.

"Obviously sending me out for your watch was a ruse." His roommate's voice was suddenly crisper, more assured than it had been. "Also, I perceive that your desk has just been broken into, by someone who thought it mine." The tone softened somewhat. "Come, man. I bear you no ill will. Your secret, if honorable, shall be safe. But it is plain that you are not what you have represented yourself to be."

The agent got to his feet, pulling at his sandy hair, trying desperately to think. "How—how do you know?"

"Elementary!" the tall man snapped. ∞

INTERVIEW

CONTINUED FROM PAGE 64

take place at night. There is a curve I've found to be consistent in all countries and in all the studies that I've done. It shows that the level of UFO activity starts at about 6:00 or 7:00 PM, local time, goes up very quickly, doubles between 7:00 and 8:00, triples between 8:00 and 9:00, reaches its highest point just before midnight, and then declines approximately at the rate at which people retire at night. There is a secondary peak just before dawn. By about 6:00 AM, local time, we are back to the noise level.

In summary, what we're dealing with is an essentially nocturnal phenomenon that has the ability to alter witnesses' perceptions of reality.

I have investigated some cases for which it was possible to determine the energy level in a certain volume of space. I've gotten figures in the thousands of kilowatts—a very great amount. Of course, witnesses give you an interpretation of their experience in terms of a technology generally in terms of spacecraft, because that's the only way they can explain what has happened to them. And it's precisely at that point that we have to judge where the physical experience ends and the psychological distortion takes over.

Omni: What about the classic flying objects themselves, rather than the close encounters?

Vallee: I've spent less time looking at those because you have fewer bits of information when the objects are high in the sky. I would rather concentrate on something that was visually close by, where we have some frame of reference, for example, some object located behind the UFO, giving a dimension, giving a distance. If we have something burned at the spot, as we sometimes do, by knowing the distance of the object from the UFO, we can arrive at a measure of total energy.

Omni: In your view, have there been any really good moving or still pictures of UFOs?

Vallee: You shouldn't expect to have really good movies or photographs given the conditions under which the objects are seen. They seem to suddenly appear and disappear at a local level. They are rarely seen arriving. Typically, in the close encounters, the object is suddenly there and in some cases it disappears on the spot. Those are not the conditions in which people are in a position to take good pictures. However, there are some interesting pictures of spots or blurred objects in the sky. Sometimes people have seen something close by and rushed inside the house to get a camera and take a picture. By the time they've gotten back outside, the object has moved far away. The result is a blurry picture. I do think that those photographs could yield some information if they were analyzed properly, but that hasn't been done yet. They are also not the kinds of photographs you would publish in a magazine; they don't have much visual impact. The so-called UFO pictures that magazines do publish generally turn out to be fakes. That was the case with the display in a recent issue of *Omni*: nice, clear pictures of lenticular clouds and frisbees that shouldn't fool anybody.

Omni: After your own experience in 1961, when you first witnessed the "cover-up" among French astronomers quashing reports of unidentified phenomena, how did you proceed?

Vallee: I started extending a little network of contacts in France, beginning with members of the French Air Force, French astronomers and other scientists. We found that, in fact, there was a lot of data that had never been reported. My wife, Janine, and I had access to computer resources, and we thought it would be interesting to see if there were any patterns.

Her first reaction to UFOs in general was skeptical, like mine. She knew that the human mind is capable of many fabrications, and she showed me that many "contact" sightings were classic psychological cases. Her reaction to the astronomers was one of cynicism. Scientists were, after all, human beings, like the rest of us. When their reputations were threatened, when their ideas were challenged, they reacted by eliminating the data. If the data didn't fit their preconceived notions, they got rid of it. Too bad for the myth of scientific honesty.

Omni: What was your initial hunch? Did you take a step forward and say that it looked as though there was something in this and that it was being suppressed?

Vallee: No. I didn't think there was a cover-up. It was not suppressed in any organized way. It was suppressed by people just not wanting to recognize it. The French Air Force didn't suppress the data. It gave me access to it very readily, very casually. It had people informally gathering what data they could. It wasn't the air force's mission to do research on it, but it had the cases there. It could easily have destroyed them if there had been a cover-up.

Omni: Didn't it subsequently irritate you when you heard so many UFO supporters arguing about the numerous cover-ups that were going on? There's always a UFO fan who goes on about how the U.S. Air Force maintains secret files.

Vallee: That was characteristic of UFO believers in America, especially in the Fifties, when a group called National Investigations Committee on Aerial Phenomena (NICAP) and its leader, Major Donald E. Keyhoe, were trying to get congressional hearings to expose the "cover-up." It seemed to me that there were better things to do, such as to study the phenomenon itself.

When I was compiling the catalog of landings that is the appendix to my book *Passport to Magonia*, I found that I had much better access to the files of the air force than to those of the UFO groups. These groups were allegedly set up by citi-

zens anxious to reveal the truth but they have never published their data for purely egotistical reasons. If you go through my catalog you'll find more cases of UFO landings from the U.S. Air Force than you will from any one of the amateur groups. So that says something.

Omni: It does. Does it say that it's essential for UFO fans as a whole to believe that there's a cover-up?

Vallee: That seems to be what sociologist Leon Festinger found in his study of a UFO cult. When there was an outside threat, the group was much stronger, and even the failure of its own prophecy made the group stronger. I think you could extrapolate that to the UFO groups in general. But at the time there were more important things that really didn't occur to us. For instance, we missed the whole mythological, religious angle. All of us were professional scientists with a rationalist orientation, and we were excited by the idea of something unexplained that could possibly be a spacecraft. Now in those days that was quite a revolutionary idea.

Omni: What days were those, by the way?

Vallee: That was in 1961–1962, when most astronomers were laughing at the idea of Project OZMA, which tried to detect intelligent radio signals from space. Scientists had been saying that life was very improbable elsewhere in the universe. That was beginning to change, but the strongest current in astronomy was arguing against any kind of travel being possible from "there" to "here." There were only a very few people, like Carl Sagan, Drake, and Bracewell, who were already promoting the search for extraterrestrial intelligence. They were quite isolated. So it was a very daring concept to say that UFOs might be spacecraft. We started looking for evidence that they were coming from space, and *we couldn't find it. The evidence was not there.* For example, deep-space radar doesn't seem to track incoming or outgoing objects on any kind of continuous trajectory. Instead, many witnesses describe something that appears on the spot. As I said, sometimes the object vanishes on the spot. Sometimes the object becomes blurry and fades away. It doesn't actually move. Sometimes it seems to be getting smaller and vanishes to a point. What kind of spacecraft is that?

Omni: What about those occasional cases where you'll get a visual sighting from a plane and some kind of radar contact?

Vallee: There have been quite a few of those. There are about a dozen cases of radar-visual sightings in air force files that are labeled UNIDENTIFIED.

Omni: What do you make of that? Do you determine the speed and trajectory of the UFO, to make sure it's not a jet that somehow hasn't been reported?

Vallee: We have to be careful before we ascribe trajectories to these objects. Words like *trajectory* and *propulsion* are misleading because they suggest that the phenomena are using space and time the way our airborne vehicles do. If we believe what the witnesses are saying—and I think it's high time we did that—we should ask what kind of physical object they suggest. We end up with something quite different from ordinary aircraft or spacecraft, something that is using time and space in quite a different way than our current physics would assume. When you talk to theoretical physicists, they see nothing wrong with such behavior in principle. There are both microscopic and macroscopic objects that violate our commonsense ideas of space and time. The fact is that we don't yet know how to exhibit a material device that would appear and disappear on the spot. That doesn't mean it's impossible. That kind of speculation seems to be more useful than asking what kind of trajectory and propulsion these craft have.

Omni: Okay. Let's agree that the use of words like *trajectory* do point us in a direction that could be misleading. Let's take the case where creatures or beings of some kind have been reported. What are your feelings about the evidence of physical beings?

Vallee: I have been very intrigued with that problem. In fact, I have spent much time looking at close encounters, of which about one third of the cases involved occupants. This was a natural thing for us in France because so many of our early reports were of close encounters. We were already speculating about that when, in this country, it was anathema even among the UFO buffs to talk about landings. Groups like NICAP would not consider any cases of occupants, putting them immediately in the "crackpot" category. In France we had hundreds of cases like that, and it was impossible to brush them aside. Some descriptions involved what people called robots, beings that seemed to wear diving suits, suggesting again the spacecraft idea. There was nothing wrong with the theory that a humanoid would be using some sort of space suit. The problem was that mixed with reports of humanoids were reports of *human beings* and of small occupants that were breathing our air and walking normally on the earth. Now you're confronted with something much more difficult to explain. In the simple terms of outer-space origin.

In the usual spacecraft theory, as it is believed by the UFO groups, we have been discovered by some other planet and they are sending exploration teams here. That theory fails to explain a number of things: (1) why they developed as humanoid creatures, (2) why they have the same configuration of sensory organs—eyes, nose, mouth, and ears—that we do, and (3) why they are adapted to the earth's gravity. You saw our astronauts on the moon. They were not walking normally. Well, these creatures are walking normally on the surface of the earth; they are breathing our air, and you can read emotions on their face. Reading

"I have a collect call for anyone in this dimension."

the emotions on the face of animals as close to man as the simian is difficult

Take the case of a witness as reliable as Mr. Masse, who lives in the French Alps. Here is an extremely courageous, reliable witness, a former leader in the French Resistance, well known in his community. He describes to us an encounter with two beings that he had never seen before, and he can read the emotions on their face! These two beings are a few feet away from him, and he feels paralyzed. This is not real paralysis, mind you, but he is unable to move for a long time during and after the observation. He cannot understand the language of these beings, but he can read the emotions on their face. The most likely conclusion that you can draw from that is that either these beings are human or they are the product of human imagination in some way. You cannot ascribe them to the biology of another planet by any stretch of the imagination, unless you start speculating about artificial human beings, but then you're drawn into a major transformation of the garden-variety-spacecraft theory.

Omni: What you're really saying is that the man had a very striking psychological experience. Was there any physical evidence in the way of traces on the grass or something?

Vallee: Oh, yes. There were remarkable impressions over a sizable area on the ground. That case, by the way, has been investigated by five different agencies of the French government, each agency investigating for a different purpose. All concluded the witness had seen a genuine UFO.

Another interesting aspect is to look at the *contactees*, by which I mean the increasing number of people who describe a close encounter in the course of which they feel they have been inside or close to an unidentified object. Some of those cases have now been investigated as well.

Omni: Are you as impressed by any of those as you are by the Masse account?

Vallee: Yes. A typical case is that of Herbert Shirmer, the highway patrolman from Ashland, Nebraska, who in 1967 had an experience in the course of which he appeared to lose some time. A hypnotic regression was done, was redone by the University of Colorado, and was repeated again at another university. All three investigations have been consistent. There was a very interesting point in the hypnosis when he described his patrol car stopping close to an object and two humanoids coming toward him. He was unable to move. He was unable to make a radio call. He was unable to draw his gun. At one point he described a flash of light. Well, everything up to that flash of light had a physical correlation. He was in the car. He could feel the car around him. After that flash of light, in the hypnotic investigation, the physical correlation seemed to stop. For example, the hypnotist asked what they were doing now, and he said that they were taking him out of the car and that he was walking with them toward the object. The hypnotist asked how he knew he was walking. And he said that he knew he was walking because he was putting one foot in front of the other. Then the hypnotist asked him whether, when he put his foot down, he felt any pressure on the soles of his shoes. And he said no. So something was happening to him that was part of his reality. But if you and I had been there with him, it is not at all clear that we would have experienced the same thing. That's the most interesting point, as far as I'm concerned. It's as if something had taken away a slice of the witness's reality and replaced it with something else. Now there may be a technology to do that, and there may even be a *human* technology to do that.

Omni: So the witnesses' descriptions are limited to their own sensory and conceptual recognition programs on the basis of something extremely puzzling, which might have something to do with space travel and might not.

Vallee: That's right.

Omni: I'd like to think of that as one hypothesis. We already had one, the classic spacecraft theory which includes interstellar travel and everything that's covered in *Close Encounters of the Third Kind*. Now you say there's a genuine phenomenon that might be an attempt at communication.

Vallee: I want to resist the temptation to speculate on the nature of this communication. We need three different methodologies. We need to look much [illegible] the physics of UFOs before we test such hypotheses. We haven't done that seriously at all. We need to look at the physiology of and the effects on the witnesses. And there again, we haven't even begun to do it. And then we need to look at the sociology of the phenomenon. And I think that of these three, the sociology is the most important right now. It's important because here we have some solid facts. We have the fact that a majority of the American public believes in the existence of the UFO phenomenon as a nonnatural phenomenon, a phenomenon that is not explained by contemporary science. We have a rising expectation of contact with an alien civilization. Those are forces that are capable of shaping our culture. There seems to be some movement toward the irrational, which you noted in your own book *Cults of Unreason*. The burden here is in part on the scientists themselves. Science has more and more isolated itself from the public and has created a credibility gap that is now being filled by cultist sects. Having spent some time with those people, I have tried to listen to them as an open-minded participant. I find that at the logical level what they say makes no sense, but at the emotional and spiritual level, it answers a genuine need of this culture, a need that science has ignored completely.

Science lost its credibility once already, at the end of the Greek enlightenment

period, when the irrational took over for a thousand years. It seems to me we've become very complacent with knowledge.

Omni: Now, grouping this into our list of hypotheses, we've got the traditional spacecraft theory we've got—

Vallee: Let me mention three more theories that I explore in *Messengers of Deception*. These hypotheses, which have not been sufficiently examined, in my view are alternatives to the spacecraft theory. The third one is the most interesting. The first one is the idea of a covert human operation. Many UFO phenomena can be simulated. With the technology we have today we could create similar effects on the witnesses.

Omni: You mean that this could be the government experimenting on the use of some mass psychological techniques?

Vallee: I'm thinking of something on a larger scale than just one government. Have you read *A Bodyguard of Lies*? It's a remarkable book by Anthony Cave Brown about the deception operations of World War II. It describes a secret agreement among American, British, and Soviet Intelligence, with some Germans also involved, in a series of operations to fool Hitler with large-scale strategic deceptions.

Omni: I can see something like that in relation to the UFO phenomenon.

Vallee: We cannot push it too far, but a number of UFO sightings should make us think about such a deception. A second interesting theory would assume that somebody had a technology that was radically different from anything that we have in our textbooks. It's possible that somebody, sometime, might have stumbled on a simple principle involving an alternate way of looking at physics. Suppose that somebody just happened to walk straight into another dimension and that this accidental discovery led to a parallel branch of knowledge that has remained secret.

Omni: Very good point. And there is another theory that UFOs are an attempt at communication from extraterrestrials of some kind but that it is being leaked in a precise and elusive way.

Vallee: Right. That's why I have suggested we look at this phenomenon as a conditioning process, as a control system. That's another thing that came out of my computer studies, fairly clearly. When you look at the pattern of waves of UFO activity, one of the main similarities appears to be some kind of schedule of reinforcement. And if you correlate it with the Gallup polls on the American population's belief in UFOs, you see a steady rise in the popular belief with each new wave. In a control system, no single incident means anything.

Omni: With all these possibilities in mind, what are your plans for the future?

Vallee: In a sense, I'm just beginning. There is a tremendous sense of excitement about this. I finance my own research now, having left all the groups I ever belonged to. I find that I can cover much more ground with my own resources and in my spare time. I now work with a very small group of scientists. I try to control the information very critically. And I try to work only on cases that have not been publicized, have not been reported to newspapers, and have not been looked at by the UFO groups.

Omni: Your new fairly radical approach to the phenomenon isn't going to please traditional UFO fans, really because not everything that you're saying is the kind of thing that they want to hear. These people are really awaiting a spaceship landing outside Stanford or next to the Arc de Triomphe, and that's not going to happen.

Vallee: Well, it might. In fact, if some of those things are the product of a deception of some kind, then there's a definite probability that one *would* land. I mean, suppose it's a cover-up operation aimed at manipulation of the public. Then there might be some incredible event that will be perceived by the public as a landing.

Omni: They might do something dramatic like that. Yes, very interesting.

Vallee: I'm reminded again of the manipulation operations during World War II, when nonexistent armies were created out of thin air. With rubber tanks and armored trucks in the desert, simulating entire armies moving around. There was a lot of physical evidence. There had to be. General Patton for example, was in the south of England for several months with an entire army that didn't exist.

Omni: Extremely interesting. Okay, we have discussed two of the three hypotheses from your book, the psychological-warfare hypothesis and the esoteric-intervention hypothesis. What is the third?

Vallee: This third hypothesis is the one I prefer. It has to do with our concept of reality. It seems to me that contemporary physics, which is a physics of energy, represents only one way of looking at reality. If energy and information are two sides of the same coin, modern physics should have a twin sister, and that twin sister—the physics of information—has gotten lost somewhere. My interest in UFOs and other apparently paranormal events does not come from any expectation of wise visitors from space. Being an information scientist by profession, I continue to look at these phenomena as occasions to learn about the limitations of one particular model of the universe, the space-time model, and as occasions to try to construct alternative models.

The concept of Cartesian coordinates representing space-time, in my opinion, may be nothing more than a cultural artifact due to the invention of graph paper. If we had invented the computer before we invented graph paper we would have a very different physics today, and it might have an explanation for UFOs. Cartesian coordinates may be useful in physics, but they are a lousy way to represent and store information. UFO experiences are complex informational events. They seem to violate physical law. I think we have a lot to learn from a study of this process. ∞

FICTION

FAT FARM

He was grossly fat, tired and old when he went in. He came out a new man—for a price

BY ORSON SCOTT CARD

The receptionist was surprised that he was back so soon.

"Why, Mr. Barth, how glad I am to see you," she said.

"Surprised, you mean," Barth answered. His voice rumbled from the rolls of fat under his chin.

"Delighted."

"How long has it been?" Barth asked.

"Three years. How time flies."

The receptionist smiled, but Barth saw the awe and revulsion on her face as she glanced over his immense body. In her job she saw fat people every day. But Barth knew he was unusual. He was proud of being unusual.

"Back to the fat farm," he said, laughing.

The effort of laughing made him short of breath, and he gasped for air as she pushed a button and said, "Mr. Barth is back."

He did not bother to look for a chair. No chair could hold him. He did lean against a wall, however. Standing was a labor he preferred to avoid.

Yet it was not shortness of breath or exhaustion at the slightest effort that had brought him back to Anderson's Fitness Center. He had often been fat before, and he rather relished the sensation of bulk, the impression he made as crowds parted for him. He pitied those who could only be slightly fat—short people, who were not able to bear the weight. At well over two meters, Barth could get gloriously fat, stunningly fat. He owned thirty wardrobes and took delight in changing from one to another as his belly and buttocks and thighs grew. At times he felt that if he grew large enough, he could take over the world, be the world. At the dinner table he was a conqueror to rival Genghis Khan.

It was not his fatness, then, that had brought him in. It was that at last the fat was interfering with his other pleasures. The girl he had been with the night before

PAINTING BY FERNANDO BOTERO

hed tried and tried, but he was incapable—a sign that it was time to renew, refresh, reduce.

"I am a man of pleasure," he wheezed to the receptionist, whose name he never bothered to learn. She smiled back.

"Mr. Anderson will be here in a moment."

"Isn't it ironic," he said, "that a man such as I, who is capable of fulfilling every one of his desires, is never satisfied!" He gasped with laughter again. "Why haven't we ever slept together?" he asked.

She looked at him, irritation crossing her face. "You always ask that, Mr. Barth, on your way in. But you never ask it on your way out."

True enough. When he was on his way out of the Anderson Fitness Center, she never seemed as attractive as she had on his way in.

Anderson came in effusively handsome, gushingly warm, taking Barth's fleshy hand in his and pumping it with enthusiasm.

"One of my best customers," he said.

"The usual," Barth said.

"Of course." Anderson answered. "But the price *has* gone up."

"If you ever go out of business," Barth said, following Anderson into the inner rooms, "give me plenty of warning. I only let myself go this much because I know you're here."

"Oh," Anderson chuckled. "We'll never go out of business."

"I have no doubt you could support your whole organization on what you charge *me*."

"You're paying for much more than the simple service we perform. You're also paying for privacy. Our, shall we say, lack of government intervention."

"How many of the bastards do you bribe?"

"Very few, very few. Partly because so many high officials also need our service."

"No doubt."

"It isn't just weight gains that bring people to us, you know. It's cancer and aging and accidental disfigurement. You'd be surprised to learn who has had our service."

Barth doubted that he would. The couch was ready for him, immense and soft and angled so that it would be easy for him to get up again.

"Damn near got married this time," Barth said, by way of conversation.

Anderson turned to him in surprise. "But you didn't?"

"Of course not. Started getting fat, and she couldn't cope."

"Did you tell her?"

"That I was getting fat? It was obvious."

"About us, I mean."

"I'm not a fool."

Anderson looked relieved. "Can't have rumors getting around among the thin and young, you know."

"Still, I think I'll look her up again, afterward. She did things to me a woman shouldn't be able to do. And I thought I was jaded."

Anderson placed a tight-fitting rubber cap over Barth's head.

"Think your key thought," Anderson reminded him.

Key thought. At first that had been such a comfort, to make sure that not one iota of his memory would be lost. Now it was boring, almost juvenile. Key thought. Do you have your own Captain Aardvark secret decoder ring? Be the first on your block. The only thing Barth had been the first on his block to do was reach puberty. He had also been the first on his block to reach one hundred fifty kilos.

How many times have I been here? he wondered as the tingling in his scalp began. *This is the eighth time. Eight times, and my fortune is larger than ever, the kind of wealth that takes on a life of its own. I can keep this up forever,* he thought, with relish. Forever at the supper table with neither worries nor restraints. "It's dangerous to gain so much weight," Lynette had said. "Heart attacks, you know." But the only

"And just as he had done the last time, he touched the naked young Barth, stroked the smooth and lovely skin, and finally embraced him. And the young Barth embraced him back."

things that Barth worried about were hemorrhoids and impotence. The former was a nuisance, but the latter made life unbearable and drove him back to Anderson.

Key thought. What else? Lynette, standing naked on the edge of the cliff with the wind blowing. She was courting death, and he admired her for it, almost hoped that she would find it. She despised safety precautions. Like clothing, they were restrictions to be cast aside. She had once talked him into playing tag with her on a construction site, racing along the girders in the darkness until the police came and made them leave. That had been when Barth was still thin, from his last time at Anderson's. But it was not Lynette on the girders that he held in his mind. It was Lynette, fragile and beautiful Lynette, daring the wind to snatch her from the cliff and break up her body on the rocks by the river.

Even that, Barth thought, *would be a kind of pleasure. A new kind of pleasure, to taste a grief so magnificently, so admirably earned.*

And then the tingling in his head stopped. Anderson came back in.

"Already?" Barth asked.

"We've streamlined the process." Anderson carefully peeled the cap from Barth's head, helped the immense man lift himself from the couch.

"I can't understand why it's illegal," Barth said. "Such a simple thing."

"Oh, there are reasons. Population control, that sort of thing. This is a kind of immortality, you know. But it's mostly the repugnance most people feel. They can't face the thought. You're a man of rare courage."

But it was not courage. Barth knew it was pleasure. He eagerly anticipated seeing, and they did not make him wait.

"Mr. Barth, meet Mr. Barth."

It nearly broke his heart to see his own body young and strong and beautiful again, as it never had been the first time through his life. It was unquestionably himself, however that they led into the room. Except that the belly was firm, the thighs well muscled but slender enough that they did not meet, even at the crotch. They brought him in naked, of course. Barth insisted on it.

He tried to remember the last time. Then *he* had been the one coming from the learning room, emerging to see the immense fat man that all his memories told him was himself. Barth remembered that it had been a double pleasure, to see the mountain he had made of himself, yet to view it from inside this beautiful young body.

"Come here." Barth said, his own voice arousing echoes of the last time, when it had been the other Barth who had said it. And just as that other had done the last time, he touched the naked young Barth, stroked the smooth and lovely skin, and finally embraced him.

And the young Barth embraced him back, for that was the way of it. No one loved Barth as much as Barth did, thin or fat, young or old. Life was a celebration of Barth, the sight of himself was his strongest nostalgia.

"What did I think of?" Barth asked.

The young Barth smiled into his eyes. "Lynette," he said. "Naked on a cliff. The wind blowing. And the thought of her thrown to her death."

"Will you go back to her?" Barth asked his young self eagerly.

"Perhaps. Or to someone like her." And Barth saw with delight that the mere thought of it had aroused his young self more than a little.

"He'll do," Barth said, and Anderson handed him the simple papers to sign—papers that would never be seen in a court of law because they attested to Barth's own compliance in and initiation of an act that was second only to murder in the lawbooks of every state.

"That's it, then," Anderson said, turning from the fat Barth to the young, thin one. "You're Mr. Barth now, in control of his wealth and his life. Your clothing is in the next room."

"I know where it is," the young Barth said with a smile, and his footsteps were

Painting by Fernando Botero, *Man Eating Oranges*. Galerie Brusberg, Hannover, Germany

buoyant as he left the room. He would dress quickly and leave the Fitness Center briskly, hardly noticing the rather plain-looking receptionist except to take note of her wistful look after him, a tall, slender, beautiful man who had, only moments before, been lying mindless in storage, waiting to be given a mind and a memory, waiting for a fat man to move out of the way so he could fill his space.

In the memory room Barth sat on the edge of the couch, looking at the door and then realized, with surprise, that he had no idea what came next.

"My memories run out here," Barth said to Anderson. "The agreement was—what was the agreement?"

"The agreement was tender care of you until you passed away."

"Ah, yes."

"The agreement isn't worth a damn thing," Anderson said, smiling.

Barth looked at him with surprise. "What do you mean?"

"There are two options, Barth. A needle within the next fifteen minutes. Or employment."

"What are you talking about?"

"You didn't think we'd waste time and effort feeding you the ridiculous amounts of food you require, did you?"

Barth felt himself sink inside. This was not what he had expected, though he had not honestly expected anything. Barth was not the kind to anticipate trouble. Life had never given him much trouble.

"A needle?"

"Cyanide, if you insist—though we'd rather be able to vivisect you and get as many useful body parts as we can. Your body's still fairly young. We can get incredible amounts of money for your pelvis and your glands, but they have to be taken from you alive."

"What are you talking about? This isn't what we agreed."

"I agreed to nothing with *you*, my friend," Anderson said, smiling. "I agreed with Barth. And Barth just left the room."

"Call him back! I insist—"

"Barth doesn't give a damn what happens to you."

And he knew that it was true.

"You said something about employment."

"Indeed."

"What kind of employment?"

Anderson shook his head. "It all depends," he said.

"On what?"

"On what kind of work turns up. There are several assignments every year that must be performed by a living human being, for which no volunteer can be found. No person, not even a criminal, can be compelled to do them."

"And I?"

"Will do them. Or one of them, rather, since you rarely get a second job."

"How can you do this? I'm a human being!"

Anderson shook his head. "The law says that there is only one possible Barth in all the world. And you aren't it. You're just a number. And a letter. The letter *H*."

"Why *H*?"

"Because you're such a disgusting glutton, my friend. Even our first customers haven't got past *C* yet."

Anderson left then, and Barth was alone in the room. Why hadn't he anticipated this? *Of course, of course*, he shouted to himself now. Of course they wouldn't keep him pleasantly alive. He wanted to get up and try to run. But walking was difficult for him, running would be impossible. He sat there, his belly pressing heavily on his thighs, which were spread wide by the fat. He stood, with great effort, and could only waddle because his legs were so far apart, so constrained in their movement.

This has happened every time. Barth thought. *Every damn time I've walked out of this place young and thin, I've left behind someone like me, and they've had their way, haven't they?* His hands trembled badly.

> *Then they found him and brought him back, weary and despairing, and forced him to finish a day's work in the field before letting him rest. And even then the lash . . . bit deep.*

He wondered what he had decided before, and knew immediately that there was no decision to make at all. Some fat people might hate themselves and choose death for the sake of having a thin version of themselves live on. But not Barth. Barth could never choose to cause himself any pain. And to obliterate even an illegal, clandestine version of himself—impossible. Whatever else he might be, he was still Barth. The man who walked out of the memory room a few minutes before had not taken over Barth's identity. He had only duplicated it. *They've stolen my soul with mirrors*, Barth told himself. *I have to get it back.*

"Anderson!" Barth shouted. "Anderson! I've made up my mind."

It was not Anderson who entered, of course. Barth would never see Anderson again. It would have been too tempting to try to kill him.

"Get to work, H!" the old man shouted from the other side of the field.

Barth leaned on his hoe a moment more, then got back to work, scraping weeds from between the potato plants. The calluses on his hands had long since shaped themselves to fit the wooden handle, and his muscles knew how to perform the work without Barth's having to think about it at all. Yet that made the labor no easier. When he first realized that they meant him to be a potato farmer, he had asked, "Is this my assignment? Is this *all*?" And they had laughed and told him no. "It's just preparation," they said, "to get you in shape." So for two years he had worked in the potato fields, and now he began to doubt that they would ever come back, that the potatoes would ever end.

The old man was watching, he knew. His gaze always burned worse than the sun. The old man was watching, and if Barth rested too long or too often, the old man would come to him, whip in hand, to scar him deeply, to hurt him to the soul.

He dug into the ground, chopping at a stubborn plant whose root seemed to cling to the foundation of the world. "Come up, damn you," he muttered. He thought his arms were too weak to strike harder, but he struck harder anyway. The root split, and the impact shattered him to the bone.

He was naked and brown to the point of blackness from the sun. The flesh hung loosely on him in great folds, a memory of the mountain he had been. Under the loose skin, however, he was tight and hard. It might have given him pleasure, for every muscle had been earned by hard labor and the pain of the lash. But there was no pleasure in it. The price was too high.

I'll kill myself, he often thought and thought again now with his arms trembling with exhaustion. *I'll kill myself so they can't use my body and can't use my soul.*

But he would never kill himself. Even now, Barth was incapable of ending it.

The farm he worked on was unfenced, but the time he had gotten away he had walked and walked and walked for three days and had not once seen any sign of human habitation other than an occasional jeep track in the sagebrush-and-grass desert. Then they found him and brought him back, weary and despairing, and forced him to finish a day's work in the field before letting him rest. And even then the lash had bitten deep, the old man laying it on with a relish that spoke of sadism or a deep, personal hatred.

But why should the old man hate me? Barth wondered. *I don't know him.* He finally decided that it was because he had been so fat, so obviously soft, while the old man was wiry to the point of being gaunt, his face pinched by years of exposure to the sunlight. Yet the old man's hatred had not diminished as the months went by and the fat melted away in the sweat and sunlight of the potato field.

A sharp sting across his back, the sound of slapping leather on skin, and then an excruciating pain deep in his muscles. He had paused too long. The old man had come to him.

The old man said nothing. Just raised the lash again, ready to strike. Barth lifted the hoe out of the ground, to start work again. It

occurred to him, as it had a hundred times before, that the hoe could reach as far as the whip, with as good effect. But, as a hundred times before, Barth looked into the old man's eyes, and what he saw there, while he did not understand it, was enough to stop him. He could not strike back. He could only endure.

The lash did not fall again. Instead he and the old man just looked at each other. The sun burned where blood was coming from his back. Flies buzzed near him. He did not bother to brush them away.

Finally the old man broke the silence.

"H," he said.

Barth did not answer. Just waited.

"They've come for you. First job," said the old man.

First job. It took Barth a moment to realize the implications. The end of the potato fields. The end of the sunlight. The end of the old man with the whip. The end of the loneliness or at least, of the boredom.

"Thank God," Barth said. His throat was dry.

"Go wash," the old man said.

Barth carried the hoe back to the shed. He remembered how heavy the hoe had seemed when he first arrived. How ten minutes in the sunlight had made him faint. Yet they had revived him in the field, and the old man had said, 'Carry it back." So he had carried back the heavy, heavy hoe, feeling for all the world like Christ bearing his cross. Soon enough the others had gone, and the old man and he had been alone together, but the ritual with the hoe never changed. They got to the shed, and the old man carefully took the hoe from him and locked it away, so that Barth couldn't get it in the night and kill him with it.

And then into the house, where Barth bathed painfully and the old man put an excruciating disinfectant on his back. Barth had long since given up on the idea of an anesthetic. It wasn't in the old man's nature to use an anesthetic.

Clean clothes. A few minutes' wait. And then the helicopter. A young, businesslike man emerged from it, looking unfamiliar in detail but very familiar in general. He was an echo of all the businesslike young men and women who had dealt with him before. The young man came to him, unsmilingly, and said, "H?"

Barth nodded. It was the only name they used for him.

"You have an assignment."

"What is it?" Barth asked.

The young man did not answer. The old man, behind him, whispered, "They'll tell you soon enough. And then you'll wish you were back here, H. They'll tell you, and you'll pray for the potato fields."

But Barth doubted it. In two years there had not been a moment's pleasure. The food was hideous, and there was never enough. There were no women, and he was usually too tired to amuse himself. Just pain and labor and loneliness, all excruciating. He would leave that now. Anything would be better, anything at all.

"Whatever they assign you, though," the old man said, "it can't be any worse than my assignment."

Barth would have asked him what his assignment had been, but there was nothing in the old man's voice that invited the question, and there was nothing in their relationship in the past that would allow the question to be asked. Instead, they stood in silence as the young man reached into the helicopter and helped a man get out. An immensely fat man, stark-naked and white as the flesh of a potato, looking petrified. The old man strode purposefully toward him.

"Hello, J," the old man said.

"My name's Barth," the fat man answered petulantly. The old man struck him hard across the mouth, hard enough that the tender lip split and blood dripped from where his teeth had cut into the skin.

"J," said the old man. "Your name is J."

The fat man nodded pitiably, but Barth—H—felt no pity for him. Two years

"Barth watched as the old man put a hoe in the fat man's hands and drove him out into the field. Two more young men got out of the helicopter. Barth knew what they would do."

this time. Only two damnable years and he was already in this condition. Barth could vaguely remember being proud of the mountain he had made of himself. But now he felt only contempt. Only a desire to go to the fat man, to scream in his face, "Why did you do it! Why did you let it happen again!"

It would have meant nothing. To J, as to H, it was the first time, the first betrayal. There had been no others in his memory.

Barth watched as the old man put a hoe in the fat man's hands and drove him out into the field. Two more young men got out of the helicopter. Barth knew what they would do, could almost see them helping the old man for a few days, until J finally learned the hopelessness of resistance and delay.

But Barth did not get to watch the replay of his own torture of two years before. The young man who had first emerged from the copter now led him to it, put him in a seat by a window, and sat beside him. The pilot speeded up the engines, and the copter began to rise.

"The bastard," Barth said, looking out the window at the old man as he slapped J across the face brutally.

The young man chuckled. Then he told Barth his assignment.

Barth clung to the window, looking out, feeling his life slip away from him even as the ground receded slowly. "I can't do it."

"There are worse assignments," the young man said.

Barth did not believe it.

"If I live," he said, "if I live, I want to come back here."

"Love it that much?"

"To kill him."

The young man looked at him blankly.

"The old man," Barth explained, then realized that the young man was ultimately incapable of understanding anything. He looked back out the window. The old man looked very small next to the huge lump of white flesh beside him. Barth felt a terrible loathing for J. A terrible despair in knowing that nothing could possibly be learned, that again and again his selves would replay this hideous scenario.

Somewhere, the man who would be J was dancing, was playing polo, was seducing and perverting and being delighted by every woman and boy and, God knows, sheep that he could find; somewhere the man who would be J dined.

J bent immensely in the sunlight and tried, clumsily to use the hoe. Then, losing his balance, he fell over into the dirt, writhing. The old man raised his whip.

The helicopter turned then, so that Barth could see nothing but sky from his window. He never saw the whip fall. But he imagined the whip falling. Imagined and relished it. Longed to feel the heaviness of the blow flowing from his own arm. *Hit him again!* he cried out inside himself. *Hit him for me!* And inside himself he made the whip fall a dozen times more.

"What are you thinking?" the young man asked, smiling, as if he knew the punch line of a joke.

"I was thinking," Barth said, "that the old man can't possibly hate him as much as I do."

Apparently that was the punch line. The young man laughed uproariously. Barth did not understand the joke, but somehow he was certain that he was the butt of it. He wanted to strike out but dared not.

Perhaps the young man saw the tension in Barth's body, or perhaps he merely wanted to explain. He stopped laughing but could not repress his smile, which penetrated Barth far more deeply than the laugh.

"But don't you see?" the young man asked. "Don't you know who the old man is?"

Barth didn't know.

"What do you think we did with A?" And the young man laughed again.

There are worse assignments than mine, Barth realized. And the worst of all would be to spend day after day, month after month, supervising that contemptible animal that he could not deny was himself.

The scar on his back bled a little, and the blood stuck to the seat when it dried. ∞

ANIMALS

CONTINUED FROM PAGE 90

say Washoe did not use language until they could agree on what language was.

If the Gardners alone had been studying the language abilities of apes, their work might have been drowned in criticism. But at about the same time David Premack of the University of Pennsylvania, successfully taught a female chimp named Sarah a token language. A little later Duane Rumbaugh of Yerkes Emory Regional Primate Facility began his work with Lana, a female chimp that communicated through a computer console. And then there was Koko.

GORILLA HUMOR

One of the people impressed by the Gardners' work was a Stanford graduate student named Penny Patterson. After hearing the Gardners' lecture in 1971, Patterson set out to learn sign language, although she had neither a chimp to work with nor any real hope of finding one in the near future. A year later Penny persuaded the San Francisco Zoo to let her work with a one-year-old female gorilla. Named Hanabi-Ko, Japanese for "fireworks child," because she was born on the Fourth of July, she is now famous as Koko. She speaks roughly 600 words.

The literature on gorillas claimed that they were the stubborn, intellectually disadvantaged cousins of the chimps. Moreover it had been assumed that gorillas became unmanageable once they reached maturity. Penny's work with Koko has confirmed the gorilla's stubbornness but shows that it springs from the animal's intelligence, rather than stupidity.

Koko has proved her stubbornness in astonishingly creative ways. She uses Ameslan to lie, swear, joke and convey withering scorn. She creates metaphors, gestural puns, and even rhymes. Often her motives are a stubborn refusal to let her mentors coerce her into boring drills and tests and a wish to breathe some life into her dull school routine. For instance, Koko makes the sign for *drink* by thumbing her nose and placing the thumb to her lips. One of Patterson's assistants was recently pleading with Koko to say "drink." After steadfastly refusing to sign, Koko finally executed a perfect *drink* sign—in her ear. Koko has made numerous other "jokes" that seem to indicate a humorous intent.

What she is doing when she makes a *drink* sign in her ear is playing with the structure of Ameslan. She is distressing one aspect of the sign just enough so that the observer knows her "error" is intentional. Once when asked, "Where do you want this drink?" (a glass with a straw), Koko presented her ear. On another occasion, when she was shown an empty jelly jar, Koko said, 'Do food.' One of Patterson's associates, Cindy, then asked, "Do where? In your mouth?"

Koko: 'Nose.'

Cindy: 'Nose?'

Koko: 'Fake mouth.'

Cindy: 'Where's your fake mouth?'

Koko: 'Nose.'

It seems that gorillas, like humans, see the nose as a chance to be obnoxious.

Koko has no love for language drills. She made that plain when asked what she thought was boring. Koko responded: "Think eye ear eye nose boring." These drills occur so frequently because bodily parts are the first signs new assistants learn and the first they ask Koko to say.

Dr. Ronald Cohn has known Koko since her infancy and has often been cast in the unenviable role of her disciplinarian. Koko makes no secret of her feelings about her stern father. 'Koko once responded to the question "Who's Ron?" with "Stupid devil." Her feelings about Ron have even moved her to sarcasm. Asked "What's funny?" Koko replied "Koko love Ron," then kissed him something she had never done.

On another occasion Ron pointed to a picture of bottles on a wall and asked Koko 'What's that?' She made the *drink* sign on her nose, a gesture similar to the sign for *rotten*. Then she signed 'Funny there.'

Koko's comment "Funny there" suggests that she knew she was making a joke. It was a very sophisticated joke indeed. It implied that Koko has a well-developed abstract sense of the language she is using.

Patterson is accumulating evidence that confirms this degree of abstraction. In recent months Koko has begun to rhyme on both spoken and signed words.

From the beginning of the project Patterson has used either sign only, English only or, as she does on most occasions, both sign and English. Koko's comprehension is about the same whether she is spoken to in sign or in English and slightly better if she has the advantage of both hearing and seeing a statement.

What is astonishing about this is that Koko has received little formal training in English. She has learned by observation and by adapting her knowledge of Ameslan.

When she rhymes on an English word she is playing with a system that she cannot use directly. Sometimes Koko rhymes on the sound of English words, saying things like 'pink drink' (when the drink is not pink) or 'sip lip' or 'bear hair.' She also rhymes on the gesture. For example, when Patterson asked what rhymes with *sweet*, Koko replied "red." The sign for *sweet* is made by drawing two fingers down across the lips, while the sign for *red* is made by drawing only one finger down in the same gesture. When Penny asked Koko to rhyme both in English and in sign on *neat*, Koko signed "meat" and then "oil," a sign quite similar to the one for *neat*.

Patterson is also investigating Koko's attitudes toward death. When asked where you go when you die, Koko once replied "Comfortable hole bye." On the other hand she refuses to discuss the possibility of Patterson's death. Last April, distressed by the number of trips she had to make, Pat-

terson remarked to Maureen Sheehan one of her assistants. "If I have to go to L.A. every month it's going to kill me!" Koko overheard them and frowned.

One thing is clear about Project Koko. Patterson has not "humanized" a gorilla; the gorilla has seized on a useful human system to express its own nature. While the behavioral sciences plod along crediting Washoe and Koko with the ability to use single words, Koko gaily makes her own discoveries about the language and leaves it to Patterson and her associates to figure out what game she is playing. And occasionally she reminds the humans around her that she knows who she is. Patterson exasperated at Koko's toy-wrecking, once picked up the mess and muttered to herself, "Why can't you be normal, like any other kid?" Koko signed, "Gorilla."

WASHOE'S BABY

If developments in Project Koko have been dramatic, recent events in Washoe's life have been downright melodramatic. For the past three years Fouts had been hoping that Washoe would raise a child. She gave birth twice and lost both babies, the first because of congenital deformities and the second, after three months, to pneumonia.

In both cases, the death was a severe blow to Washoe. She could see that her first baby was dying and, touchingly, handed it to Fouts in hopes that he could save it. When it was discovered that the second baby had a severe bronchial infection, Fouts had to take the infant away for intensive medical care. It died soon afterward and he had to break the news to Washoe.

The next day he visited her quarters. Immediately she rushed up to him and signed, "Where's baby?" inflecting the question with her eyes as is often done in Ameslan. The sign for *baby* is made by forming the hands in cradle configuration in front of one's body. When Fouts told her the baby was dead, Washoe slumped, dropped her hands into her lap, and stared off into a corner. For the next two days Washoe rushed up to Fouts whenever she saw him and asked each time, "Where's baby?" He had to tell her that her baby was dead, and again Washoe sat staring.

Fouts acted quickly and obtained a ten-month-old male from Yerkes Emory Regional Primate Center. A week later he told Washoe that he had a baby for her. When little Loulis was brought in, Washoe saw instantly that the baby was not hers and for two hours would have nothing to do with him. For his part, Loulis saw that this was not his mother and wanted nothing to do with her. It took three hours for them to become reconciled to each other.

Two days later Washoe and Loulis were sleeping separately when Washoe awoke and decided that she wanted the baby in her arms. She stood up and signed, "Come, hug," as dramatically as she could. Loulis, who had earlier failed to understand what Washoe meant by the gesture, got the picture and jumped into her arms.

Fouts has purposely not taught Loulis sign language. He wants to see how many signs the baby learns from Washoe and in what manner he acquires them. Washoe and Loulis are continually monitored by television, so that scientists can observe them without interfering too much with their relationship. So far Loulis has learned about ten signs, most of them dealing with such everyday concerns as food, names and hugging. It may not seem like much, but Fouts reports that it's more than Washoe mastered in her first year.

JEALOUSY

Jane Goodall, a noted biologist, described chimp mating as a somewhat impersonal activity. Females, she said, often seemed not to know who their consort was. Washoe throws doubt on this notion.

Ali fathered Washoe's most recent baby. When Washoe was pregnant and gave off signals that she did not want to mate, Vanessa, another of Fouts's chimps, went into estrus and signaled to Ali that she wanted to mate. Ali and Vanessa were separated by wire mesh, which meant that they had to mate through the bars. Washoe could not do anything to Vanessa. She could do something to Ali, however. When she caught them mating, she rushed over, bit Ali on the rear and clouted him, sending him halfway across the cage. Ali did not mend his philandering ways after this incident, but he did time his assignations for moments when Washoe was distracted, and he kept a wary eye out for his jealous mate.

The difference between what anecdotal evidence suggests the great apes are capable of and what experiments have established points out one of the difficulties in studying something as elusive as language. Because such subtle behavior as humor and lying must be interpreted according to the speaker's intentions, it is difficult to prove beyond doubt that something is a joke or a lie. A skeptic might claim that Koko is merely consistent in her mistakes.

It is an unanswerable criticism. As many a courtroom drama has shown, we often fail to prove human intentions. How then can we hope to prove the intentions of another species using a human language? The best we can do is try to interpret the animal's intentions in the light of what we know about its nature, guided by context and similar statements the animal has made in the past—what might be called informed anecdote. What Koko's dislike of drills and formal tests tells us is that if we want to understand the gorilla's capacity for language, we must look at what she does with the language in her terms instead of trying to force her to do as we want.

One dividend of these sign-language experiments has been the discovery of a way to teach autistic children how to speak. It is now believed that some forms of autism are the result of brain damage. In Oregon a

psychologist named Benson Shaffer taught 20 autistic children Ameslan then used the sign language to teach the children spoken language and gradually dropped the Ameslan. The nonspeaking children ended up talking.

These language experiments are changing our notions about the nature of thought and about the difference between animals and humans. Success in teaching sign language to apes has given the gestural theory of language origins a shot in the arm. This theory holds that before man developed articulate speech he got by with sign language. Ultimately the hands became overburdened by the demands of communication, tool making, and hunting, and man gradually learned speech.

Such theorists as Gordon Hewes speculate that the manual dexterity needed for sign language and tool making is the basis from which both technology and language developed and that this ability may be the key to understanding the "deep structure" of language. As language shifted from the gestural to the articulate, it came to be more centered in the left hemisphere of the human brain. This brings us to another dividend of these language experiments.

Fouts is developing a theory about control of the tongue, a skill that in most people is housed in the brain's left hemisphere. He feels that the way humans control the tongue imposed constraints on the way human thought developed. Scientists are just beginning to probe the differences between the two hemispheres, but it appears that within our head are two different worlds, each with its own set of rules and abilities. The left hemisphere is rhetorical. It is also sequential and rule following. This derives from the nature of speech, which, because it is time-bound, must have a sequential logic. This contrasts with sign language, which, because it is visual, allows many complex variations in a single moment. The right hemisphere is more musical and emotional, and it approaches problem solving in a more holistic way.

Fouts describes the left hemisphere as digital, the right hemisphere as analogic. Most daily activities integrate the contributions of both hemispheres. Fouts argues that control of the tongue has given ascendancy to the type of thought that goes with articulate speech and that this has occurred at the expense of the equally valid thought of the right brain.

What this means is that, as a society, we favor ideas that can be proved over ideas that make sense, because they fit into large, explanatory patterns. We are more inclined to accept that Washoe and Koko understand single words, because that can be proved, than we are to accept that they can lie and joke, which can only be asserted because it makes sense from what we know about Koko's use of language.

And this brings us back to the issue of word order. Word order is of left-brain importance, to put the issue in Fouts's terms. Humans create complicated statements with a string of clauses, but Koko seems to use nonsequential rules. She complicates messages by playing with the structure of her sign language in several ways at once.

While we are looking for evidence of rule following, Koko is apparently using her language in accord with the right hemisphere, which controls it. Koko may well be capable of the recursive, rule-following behavior we associate with speech. In the meantime, we should not ignore the window she may give us into the culturally disfavored world of the right brain.

TUNNEL VISION

These experiments do more than raise questions about the nature of language. They cause us to wonder about the nature of scientific inquiry itself. For decades scientists have watched chimps demonstrate behavior no less propositional than language, and for decades scientists have ignored the obvious conclusion that chimps have some linguistic abilities.

Our perceptions of other species have been limited by a laboratory version of tunnel vision. Operating under Francis Bacon's thesis that nature best reveals its secrets when tormented, we have tended to dissect and study animals to determine how they might solve our medical and social problems, rather than attempt to understand them in their own right, in their own environment.

When we eventually got around to comparing human and animal behavior, we studied animals as if they had no reason or language, while we studied humans, knowing we had both. The disparate investigations tended to perpetuate the assumptions on which they were based, and our approach to animal and human communication eventually resurfaced as the explanation for their differences: Man is different because that is the way we look at him.

If chimps and other animals share our gifts of reason and language, what happens to our reign over nature? It is true that our prerogatives have been profitable in the short term, but we are beginning to recognize the costs of treating the world as an inexhaustible resource. The price of our pride has been the loss of our sense of place in nature.

Jung once said that we lacked self-knowledge because we had no other being with whom we might compare ourselves. Jung, like many of us, expected to find such creatures on other planets. Now we have discovered that they have been here all along. But, in our ignorance, we have brought the great apes to the point of extinction. It would be unutterably sad to let any of these animals disappear. After so long we have a lot to talk about.

Both Fouts and Patterson would like to see their charges spend the future in the company of other language-using apes in circumstances of relative freedom. Chimp enclaves and gorilla islands may provide the seeds of a world in which speaking with the animals is the norm.

GAMES

CONTINUED FROM PAGE 129

6 *True* The apple didn't hit him on the head as cartoonists would have it, but Sir Isaac Newton did see an apple fall from a tree at a time when the crescent moon was in the evening sky. He wrote about the incident and said that it made him wonder whether the moon was held in the grip of the same universal force that held the apple. The rest is history.

7 *False* Pediatricians at New York University found that babies thrive as well on cold as on warm formula. On measures of weight gain, sleep soundness, crying frequency and bottle preference, babies given the traditional wrist-temperature bottle were not different from babies fed formula straight from the refrigerator. In addition, the doctors note, cold milk may be safer because there is less chance of bacterial multiplication than in milk that is merely warmed (not boiled).

8 *False* Although delivery-room doctors and nurses are often convinced of the correlation between the full moon and childbirth, there is no evidence for it. A study of more than 10,000 births at UCLA Hospital between 1974 and 1978 found the distribution of births completely random, with no relationship to either the day of the full moon or the other moon phases. These findings held true for natural births, multiple births, and even stillbirths.

9 *True* Dr. James R. Hoon, a gastric specialist in Sheboygan, Wisconsin, took pictures of the stomachs of hangover sufferers with a device called a gastrocamera. He found that a morning-after nip did indeed quiet overactive, jittery stomach walls. Too much alcohol can, of course, trigger another hangover, so this is a risky way to quiet the wrath of grapes.

10 *False* The admonition to "wait a half-hour (or hour) after eating before going swimming" appears to have no basis in fact. The cramps that are supposed to follow when a full stomach is immersed in water just don't occur. Actually, cramping is more likely if you swim hungry, when glycogen-starved muscles are most likely to knot up. But glycogen quickly reaches a safe level after you eat. If the water's fine, go on in.

11 *False* No credible observer has ever recorded the mass suicide of lemmings, although the myth has been perpetuated by the "true life" nature films of Walt Disney and even by the revered *Encyclopaedia Britannica*, which, in its Fourteenth Edition, says that lemmings "descend [...] in countless multitudes and proceed in a straight line until they reach the sea, into which they plunge and are drowned." The reason? Their march "is a survival from the old times when there was dry land over the Baltic and North seas."

It's all a myth. Lemming populations go through drastic cycles and during times of peak density will migrate in all directions, but they are in search of food and nesting sites, not death. They swim small streams and some reach the ocean and imagine it to be another small stream, get in over their head, and drown. But their "compelling" suicide wish" is the product of a writer's overactive imagination.

12 *True* Milk, whether warm or cool, contains tryptophan, an amino acid that has definite sedative effects. A recent study at Maryland Psychiatric Institute found that tryptophan aids insomniacs to fall asleep faster and to sleep longer. The substance is seen as preferable to drugs because it is natural and nonaddictive and does not disturb normal sleep patterns.

13 *True* Charles Drew, a pioneer of blood-plasma research and the originator of the idea of a national blood bank, was himself not allowed to donate to the Red Cross because of the prejudice against blacks, although it was known that there is no chemical way to differentiate the blood of any racial group. Charles Drew died after an auto accident when a so-called white hospital in Burlington, North Carolina, refused to admit him for a blood transfusion because of the color of his skin. The year was 1950.

14 *True* Navajo Indians were an invaluable part of the U.S. Army Cryptographic Corps during World War II.

15 *False* There is no evidence that cedar repels moths any better than any other kind of wood.

16 *False* According to a study by Dr. G. H. Miller at Edinboro State College, Pennsylvania, filter cigarettes send more carbon monoxide to the lungs and the bloodstream because the filters prevent the dilution of the poisonous gas by oxygen. The result is a greater danger of strokes and heart attacks. Dr. Miller concluded that filter-cigarette smokers are in danger of dying two to almost four years earlier than smokers of regular cigarettes.

17 *True* Tests at Mount Sinai Hospital in Miami found that chicken soup did indeed help to expel mucus from the nasal passages. Thus, it may have some beneficial effects in relieving symptoms of the common cold.

18 *False* The epitaph Fields wrote for himself, often misquoted as here, was actually "I would rather be living in Philadelphia," a reference to the one condition under which he would be willing to return to the town he ran away from in his youth. It was one of a series of gag epitaphs run by *Vanity Fair* magazine in the 1920s. In fact, Fields's tombstone reads simply "W. C. Fields. 1880–1946."

19 *True* Andrea Rosanoff, at the University of California in Berkeley, found that when eight ordinary 16-penny nails were left in a red Delicious apple for a day, they left a 15-milligram increase in bioavailable iron. Rats that ate the apples got as much iron from them as another group fed ferrous sulfate, a dietary supplement often used for treatment of iron-deficiency anemia.

20 *False* Lindbergh was the sixty-seventh to fly the Atlantic. The first 66 made the crossing in dirigibles and twin-engine mail planes. Lindbergh was the first to make the flight alone.

21 *True* A horse *can* sleep standing up.

22 *False* According to *The Cheese Book* by Marquis and Haskel, researchers recently offered several foods to mice, including a range of cheeses up to the most pungent Limburger. The mice's favorite? Gumdrops.

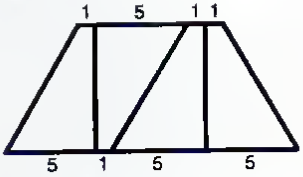
23 *False* The snakes don't hear the music. What makes them respond is the weaving motion of the snake charmer and his pipe. The snakes are not in a "trance" but are maneuvering for a position from which to strike.

24 *True* Very spicy food stimulates perspiration. In hot countries, such as India and Mexico, people often eat hot foods specifically for this purpose. The perspiration evaporates from the skin, causing a cooling sensation. Spicy foods also stimulate oil glands, and the oil combined with the perspiration can cause a case of acne.

25 *False* Though most of the state is east of the Mississippi, Kaskaskia, Illinois, is to the west. It is there as the result of a nineteenth-century flood during which the river cut itself a new channel.

OTHER ANSWERS

Only three numbers are equal to the sum of the fourth powers of their digits: and all three are four-digit numbers: 1,634, 8,208, and 9,474.



Andrew Miller's new solution to parceling the triamond (so named because it can be formed by three adjacent equilateral triangles) appears above. ∞

EARTH

CONTINUED FROM PAGE 14

Systems and Data D Misreadings and Misrepresentations of Literature E Improper Calculational Procedures F Untenable Assumptions and Contentions G Typographical Errors Internal Discrepancies, and Arithmetic Mistakes The critique details all Inhaber s false steps how he confuses concrete with cement man-hours with man-days how he writes 9 cubic meters when he means 91 cubic meters how his columns of figures fail to add up to the total he s given

Struggling through the dim humid, itchy jungles of Herbert Inhaber s logic John Holdren and the gang of graduate students who follow his machete have occasionally been heard to scream

AECB-1119 the professor once said in vexation is by far the most incompetent technical document I have ever known to have been distributed by grown-ups He described it as 'the shabbiest hodge podge of misreadings, misrepresentations and preposterous calculational errors I have ever seen between glossy covers One of his graduate students Kent Anderson said 'Using the report as food for thought is equivalent to eating garbage

Holdren and his colleagues have been criticized for using this kind of language A reporter for *The Wall Street Journal* found the Holdren attack egregious in its invective and threats '

Holdren denies making threats He admits the invective but he does not regret employing it 'We believe, he and his colleagues write 'that the integrity of the whole process of intellectual inquiry and rational debate is too fragile and too precious—and the costs of misinformation too high—to dismiss so blatant an abuse with a shrug or with another restrained commentary Such drastic instances of the propagation of outright baloney whether deliberate or out of ignorance have been relatively rare even in the emotional and intellectual turmoil of the energy debate When they do occur there should be no taboo on the accurate use of words like *incompetence* and *nonsense* to warn the technical community and the public about the nature of what they are being asked to swallow

Science *is* fragile It depends like the rule of law on the cooperation and integrity of the people involved It is not impossible that science, though it leads the way will be our weak link, the first institution to fail under the pressures of the complex new age it has helped usher in Perhaps the end will announce itself as scattered breakdowns in scientific integrity—little cancer cells of myth in the body of science

In our scenarios the deranged scientist who ends the world is always a genius a Dr Strangelove. In reality, it may be the opposite Perhaps the scientist who rings in the End will be a spectacular nongenius

THE BOX

CONTINUED FROM PAGE 84

threatened Ambrose with being blackballed if he persisted in his threat. "Look here, Talaylee," Wingate counseled from a distance, "if you'll just quietly leave the university we'll call it quits. We'll even write you a good recommendation, one good enough to get you a teaching job at some reasonably decent high school. Get tough with us, though, and we'll see you never work in academia *anywhere*! Now what do you say?"

"You stinking bastards! You're scared, aren't you? Well, you should be. I'm suing!"

For their defense, the committee hired Sylvester Shylock Shyster, a highly respected criminal lawyer. Ambrose elected to serve as his own lawyer. This is, of course, most unusual, but the judge relented after listening to Ambrose's arguments in closed chambers. Once the judge had caught the drift of Ambrose's arguments (to say nothing of catching the drift of Ambrose himself), he quickly agreed, and just as quickly he rushed from the room.

Since all the physical evidence was circumstantial, Shyster was confident of victory. But then the prosecution called its surprise witness—the box! Yes, the box had been in the laboratory/closet with Ambrose when the committee made its threats. The box had heard it all, but, after all, which of the professors cared what they said in front of a mere box?

Naturally, S. S. Shyster stood in court to protest.

"Your Honor, this is most unusual. This box is only a conglomeration of inanimate wires, circuit chips, and solder. It has no soul, no moral code of behavior, no knowledge of right from wrong. Its metabolism is that of amperes and volts, not that of a human's beating heart and the pulse of warm blood. It is a dispassionate, cold, unemotional *machine*. It has no sensitivity, no ability to give voice to the feelings of humanity. Therefore, I move the testimony of this box not be allowed."

"Do you feel the machine is capable of lying?" the judge asked.

"No, Your Honor. It has been shown to be a machine of computational infallibility. But the intricate complexities, the subtle nuances of this incredibly convoluted case are just too involved for its mechanistic principles to grasp. It cannot, to make an analogy, appreciate the infinite variations that separate the pure white of innocence from the deep black of guilt."

"So," said the judge, "your objection really comes down to a feeling that the box may not be able to express itself in a sufficiently human manner. Well, let me ask it the crucial question, and we'll see whether you're correct."

Turning to the cubical box (positioned comfortably on a purple velvet cushion in the witness chair), the judge asked, "Tell me, box, did the committee, in fact, threaten to do damage to the reputation of your creator, one Ambrose P. Talaylee? And further, did the committee unfairly deny him the royal anointment of the doctorate?"

"Does a bear crap in the woods, Your Honor?" the box said. "Is a hog's fanny pork?"

"I object," yelled S. S. Shyster.

"We contess," cried the committee in unison.

"Guilty as charged," the judge roared.

"Damn right!" chuckled the box.

"Double damn right!" snorted Ambrose, who in his ecstasy failed to notice that said snort caused all those nearby to turn green. But he wouldn't have cared even if he had noticed.

Thus did the committee learn, as its members were led away in shame and humiliation, of the error in treating an artificially intelligent box lightly.

It was later, as the committee sat glumly in jail while they waited for Shyster to come to see them, that they learned things were even worse than they had suspected. Wingate had just read a note passed to him by the jailer. It was from his secretary. He hurled it to the floor as he cried, "God damn it! Is there *no* justice left in the world?"

> *"Wingate slowly raised his head. "No, no, no, you idiot. Talaylee doesn't want the appointment for himself. He's already got a ... job at the CIA. He can work alone."*

Professor Hogson, from biology, was stunned at the outburst. "My heavens, Wingate, what's wrong now?"

Wingate stared at the floor, his jaw muscles working. "That bastard Talaylee! Not only does he get his Ph.D., but now he's putting us out of business. Do you know what that guy has gone and done? *Do you know?*"

Wingate could see from the puzzled expressions on his colleagues' faces that they didn't know.

"*I'll tell you what that creep has done!* He's taken that miserable box of his, put a coin slot on it, and stuck it in the Student Union Building! He's got kids lined up getting their homework done for a quarter. It's charging fifty cents for an English essay and two bucks for a master's thesis. A five-spot gets you a doctoral dissertation!"

"My Lord, Wingate," gasped Hogson, who was near fainting, "academia as we know it will utterly collapse. What'll we do?"

"He's laid down terms. If we meet his terms, he'll stop." Wingate looked as if he were about to cry.

"Well, come on, man," croaked Sweeney of political science. "What are they? Whatever they are, we'll have to meet them!"

"He wants a faculty appointment at EPU, in my department," said Wingate, bursting into tears. "Oh, mother, I can't bear the thought!"

Sweeney was the first to regain his composure. "Be tough, Wingate, be tough. So he gets an appointment. That doesn't mean he'll get tenure. Then, later, out he goes on his butt!"

Wingate slowly raised his head. "No, no, *no*, you idiot. You don't understand. Talaylee doesn't want the appointment for *himself*. He's already got a research job with the CIA. He can work alone for them, breaking codes, and so they don't care *how* bad he smells. It's that damned *box* of his. He wants the *box* to be given a faculty spot! Christ, a bloody damn computer as an assistant professor!" He lowered his head again and began to weep quietly.

The professors sat motionless for several minutes, immobilized with despair. Then Vreeble, from mathematics, looked as if he'd just had an idea. "I say, Wingate, look at the *bright* side of it all." Wingate stared at him with a stunned expression on his face.

"Just what in hell is *bright*, Vreeble? It sure as heck isn't you!"

"Come, come, don't be bitter. See here, you'll be in excellent shape with the affirmative action, equal opportunity people. Gad, can you think of a *better* minority faculty hiring decision? Yours will be the first academic department in the entire country to hire a box! You'll be—"

Vreeble couldn't continue, for by now an enraged Wingate was attempting to throttle the unfortunate mathematics professor. Which is why, while the rest of the committee were released, Wingate had to stay another six months pending litigation of an attempted murder charge. But it all worked out okay, since it was Wingate's sabbatical year and he didn't have anything else to do anyway. It gave him plenty of time to figure out just where things had started to go to hell and to ponder the evil of all prejudice, be it racial or nasal.

Everything worked out rather well for the box, too. It proved to have all kinds of good points. It was a great joke teller and was able to establish friendly relationships with students, and it didn't smell nearly as bad as Talaylee, either (unless the oil on its hinges got too hot). It was marvelous fun at department parties, and it never drank too much. One year later, when Wingate stepped down from the department chairmanship, the box was elected almost unanimously. Only Simpson and Wingate dissented. It's done just a great job since, too. There's even talk that when the dean retires, then—well, maybe *that's* premature right now.

But still, who can tell? Who can tell?

AMERICA'S FIRE MOUNTAINS

EXPLORATIONS

By Joel Davis

Most geologic processes happen so slowly that they're not detectable by our short-lived race. But not volcanism. Overnight, a peaceful Mexican cornfield is transformed into a scene of incredible violence as fire and ash erupt from the bowels of the earth. One day the sea stretches unbroken to the horizon. A week later, amid boiling, steaming waters, a new island rears its head above the surface.

America has its own fire mountains. The majority are located in national preserves specially designed to make these wonders of the world easily accessible to the public. The Hawaiian islands are a chain of mountains that were formed by 25 million years of volcanic activity. Stretching from northern California to the Canadian border is the Cascade Mountain Range, a host of volcanoes rising high above the landscape. And in Flagstaff, Arizona, a volcano that erupted 1,100 years ago terrorized local Indians, who viewed that cataclysmic event as an evil omen from the gods.

Only recently, with the discovery of plate tectonics, has a true understanding of volcanic phenomena emerged. The surface of the earth rests on a number of giant plates floating on the underlying mantle. As one plate grinds past, or dives below another, earthquakes occur. Heat caused by such radioactive elements as thorium and by the stresses of one plate diving below another melts the rocks. The molten material migrates upward through cracks in the crust and forms the magma chamber pools. Gas pressure in the magma chambers then forces the matter through fissures near the surface—and a volcano erupts.

Most volcanoes are formed this way, but not all. In some instances, towering columns of molten rock called mantle plumes rise up from below continental and undersea plates. These plumes can break through the surface to form volcanoes, and as the plate moves above the plume a whole string of fire mountains can emerge.

There are three basic types of volcanoes. *Cinder cones*, formed of fragmented pyroclastic rock that solidifies as it's hurled into the air by the eruption, are the first type. They are called cinder cones because pyroclastic rock resembles cinders. *Shield volcanoes* often created by mantle plumes, are formed of highly fluid lava. The liquid rock flows a great distance before cooling. Consequently, shield volcanoes frequently have wide, sloping sides. *Composite volcanoes* are formed of both lava flows and pyroclastic material. Often called stratovolcanoes because they tower so high, composite volcanoes make up the largest and most symmetrical volcanoes in the Cascades.

The entire Hawaiian island chain is a group of shield volcanoes formed as the Pacific plate continues to move northwestward, as it has for the past 25 million years, over a mantle plume. Some volcanoes are extinct, but four are still classified as either dormant or active. Two are extremely active.

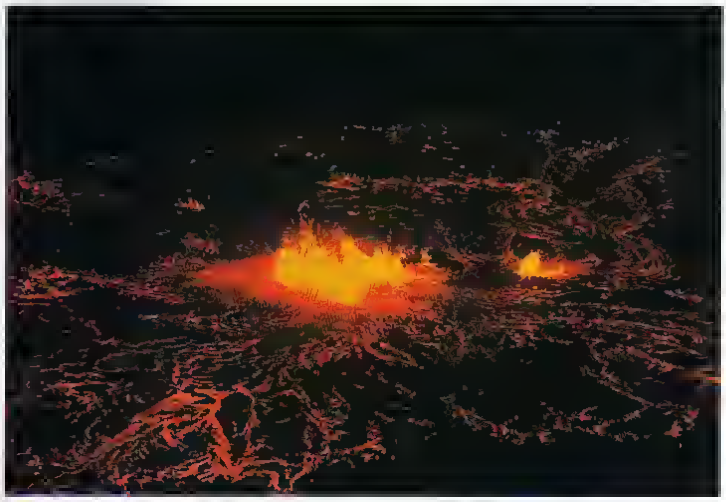
On the island of Maui is *Haleakala*, a dormant cone rising 3,055 meters from sea level. Streaks of multicolored ash cover its sides. And Haleakala National Park has something else to offer—the rare silversword plant, found there and nowhere else in the world.

But there's little chance of seeing Haleakala erupt again. The Pacific plate is slowly carrying it beyond the mantle plume that gave birth to it.

You've got a much better chance of seeing some action on the big island of Hawaii. Three volcanoes there are still classified as active.

Mauna Kea, 4,205 meters high, and *Mauna Loa*, 4,159 meters high, together make up the largest single mountain mass on Earth. They tower more than 9,100 meters above the ocean floor, higher than Mount Everest.

It's been 4,500 years since Mauna Kea last poured forth fire. But Mauna Loa erupted in 1978. In fact, fresh lava flows are still visible. If you stop at Summit Cabin, you can peer down into the volcano's huge crater, or caldera. It's 183 meters deep—a spectacular sight. Even



Bubbling lava caldron of Kilauea, seen in extraordinary night shot as it erupted in 1977

more awesome is *Kilauea* which like Mauna Loa and Mauna Kea is located in the Hawaii Volcanoes National Park It rises 1,222 meters above sea level Fields of *pahoehoe* (smooth fluid lava) and *aa* (sharp stony lava) stretch out all around you Since 1969 a series of eruptions has created a new lava shield called *Mauna Ulu* the "growing mountain " As a result more than 19 kilometers of park roads now lie buried under up to 90 meters of new rock

Kilauea s most recent eruption was in 1977 But who knows? On your visit to the Kilauea Visitor Center you may be lucky enough to see towering fountains of hot lava leaping into the air

The trip from a towering shield volcano to a tiny cinder cone is a distance of several thousand kilometers but don't let that stop you *Sunset Crater* 22 kilometers northeast of Flagstaff Arizona is a marvelous sight

In A D 1065 a sudden volcanic eruption threw ash and cinders high into the sky and sent the Indians living in the area running for their lives When it was over a cinder cone had lifted its head 305 meters above the surrounding area Volcanic ash was scattered for hundreds of kilometers around

Today you can visit Sunset Crater National Monument without fear You ll quickly see why it s called Sunset Crater Minerals in the gases emitted during the eruption have condensed and seeped into and stained the ashes and cinders that make up the summit of this crater It shimmers with all the deep and subtle hues of sunset.

When you drive along Interstate Highway 5 you can t help seeing two of California's most intriguing mountains *Mount Lassen* and *Mount Shasta* Lassen 3 187 meters high and just 80 kilometers east of Redding California is the only active volcano in the Lower Forty eight From 1914 to 1921 it erupted almost constantly and you ll see evidence of that all around you A tongue of lava 300 meters long tumbles down the western summit of Lassen mute evidence of its violence Steam and sulfur bubble up from the ground at Devil s Kitchen Boiling Springs Lake and Bumpass Hell Geologists have little doubt that Lassen will erupt again before the end of this century

Mount Shasta located off Interstate Highway 5 near the California-Oregon border is one of the world s largest composite volcanoes It towers 4 280 meters above sea level and Lassen some 124 kilometers south is a mere hillock by comparison

Shasta is the centerpiece of many offbeat religious cults but you don t have to be a "believer" to appreciate the beauty of this snow-capped glacier sided peak Mild eruptions were reported as recently as 1854 and a U S Geological Survey overflight with infrared camera has clearly detected numerous hot spots in the mountain Shasta is still alive

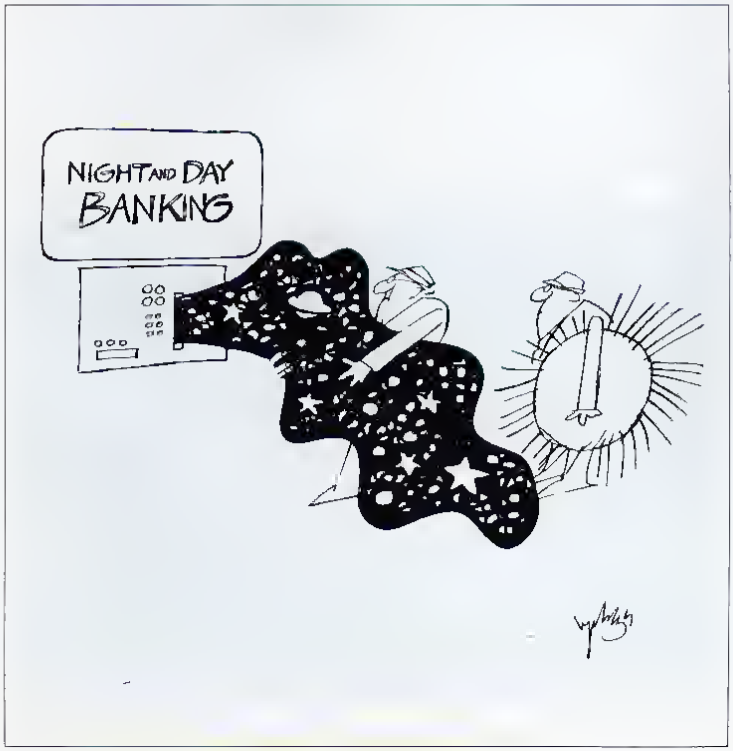
Who does not know of *Crater Lake*? Some 42 kilometers in circumference and 466 meters deep, Crater Lake is all that remains of a giant volcano called Mount Mazama which exploded 6 600 years ago in the southwestern part of Oregon The violence of that eruption took Mazama s top off and the rest of the mountain collapsed into the emptied magma chamber below leaving a giant caldera that eventually filled with sapphire-blue water

Take the Rim Drive around the lake and stop at the numerous observation points Marvel at the steep sides of the crater s rim and gaze out upon Wizard Island a cinder cone whose top breaks through the water s surface

Although Crater Lake lies quiet and peaceful today imagine what the Indians in the area must have felt when that mountain blew its top!

Mount Rainier just 95 kilometers southeast of Seattle dominates the skyline for hundreds of kilometers around Rising 4 392 meters high it is home to at least 26 glaciers Rainier hasn't erupted in over a century but jets of steam are still spotted The U S Geological Survey and the University of Washington keep a close watch on the mountain and swarms of microearthquakes frequently take place even now

Rainier is accessible from every side by paved roads and dozens of hiking trails crisscross the mountain Climbing Rainier should be attempted only by the experienced mountaineer but you don t have to be an Edmund Hillary to appreciate this most awesome of the Cascade volcanoes



IN TRANSIT

The above is not intended as a guide to every volcano in the United States but rather of the ones easily accessible fo the average person Throughout the Cascade Mountain Range for example major volcanic peaks are spaced from 60 to 130 kilometers apart Some like Mount Jefferson Mount Adams and the Three Sisters can be reached only by logging roads or by Forest Service trails They re beautiful spectacular examples of volcanoes but you have to be a skilled mountain climber to get a good close-up look This is unfortunate but no one ever said that nature is democratic

Finally a comprehensive listing of volcanoes located within federal preserves can be obtained by contacting the National Park Service and the U S Forest Service They will gladly provide you with information on these volcanoes and the surrounding areas including details on camping hiking fishing boating and the hours when the parks are open

CIRCLES

CONTINUED FROM PAGE 22

twelve read law ... from twelve to one read politics. In the afternoon read history. From dark to bedtime belles lettres, criticism, rhetoric, oratory. Read the best of the poets, but among these Shakespeare must be singled out by one who wishes to learn the full powers of the English language. Read the orations of Demosthenes and Cicero."

Not even the famed Kennedy senatorial staff, let alone the adviser-fed senator himself, covers such intellectual territory. One wonders what topics President Carter peruses in his bathroom reading or whether other candidates even look at the pictures.

"I will be able to die happily," MacFarland remarked, "the day that any candidate for president spends an hour in the Library of Congress reading room."

Jefferson then fired his opening shot.

"Perhaps you are too hard on them," he said, to our surprise. "It is self-evident that the candidates merely reflect the declining literacy and reasoning power of the American electorate. If the candidates give the appearance of emptiness, of being uncomfortable with ideas, of having not the slightest idea of planning rationally for the long-term future, does that hamper their election chances? Of course not. Do the voters seek out leaders who spend their evenings discussing the impact of the computer on education or on privacy, the various theories of the formation of the universe, the potentially dangerous increase of carbon dioxide in the atmosphere, the intentional alteration of the human species through manipulation of DNA or new mind-altering drugs, the philosophical implications of new findings on brain function? Of course not.

"Was there a massive public outcry when your leaders, after America placed men on the moon and built a vast lead in space exploration, proceeded more or less to dismantle the space program? Of course not. Is there massive indignation that there is a textbook currently in use in the Washington, D.C., school system that has a sentence going something like this: 'Some day man will walk on the moon.'? Of course not.

"Your liberals prepare vast lists of social problems but say little of your true and most basic social problem, the decline of quality in public education. 'This system is doing no less than producing a vast future slave class.'

"There was reason for his bitter tone. As both a Virginia governor and a legislator early in his career, Jefferson brought social revolution to that state by advocating the creation of a free public-school system with financial aid for the poor but bright. He had hoped that public school districts would become 'little republics' that would form the major strength of the main republic. Now, in 1980, he concluded painfully, that the little republics were America's principal weakness.

"Where," he pleaded, "are your education-conscious candidates?"

Another element of Jeffersonian creativity was the adoption of the economic embargo as a substitute for war. Through his two presidential terms in the early 1800s, an arrogant British fleet freed to harass U.S. merchant ships after the victory at Trafalgar seized 1,000 U.S. ships and impressed 6,000 American sailors, attempting to goad the new republic into war before America was ready for war. Jefferson instead halted all maritime trade, crippling Britain's export industries to major British overseas markets. The move was initially unpopular—putting thousands of U.S. seamen out of work and shutting down many trade-dependent industries—but it turned America's eye inward and helped to develop a strong domestic industry.

Jefferson's America was restless, adventurous and thirsty for exploration.

> *"Your liberals say little of your true and most basic social problem, the decline of quality in public education. 'This system is doing no less than producing a vast future slave class.'"*

"It was apparent to me," Jefferson remarked, "that our new nation must expand and explore, not only to break free of encirclement by Britain, France and Spain, but also to remain strong of sinew to perfect the mechanical, scientific, and survival arts, and to achieve the level of creativity that only the free and independent individual mind may attain. Thus, the Louisiana Purchase, doubling America's size at one stroke, raised its imagination to incredible heights. I would suggest that a vast new program of space exploration, industrialization, and colonization would bring even more political, economic, creative, and spiritual benefits than the Louisiana Purchase did.

"But only one of your candidates, the odd Governor Brown, has addressed this proposition. Unfortunately, he stresses development of the solar/microwave satellite, which would put electrical power generation in the hands of a centralized utility. It would prevent your moneyed Hamiltonian establishment from purchasing the sun. Every American should have equal access to solar power. Where are your candidates who stress not only national energy independence but also *individual* energy independence?"

"You're a decentralization man, then?" I asked.

"To the death," answered the Sage. "Let the nation become a park of reasonably self-governing neighborhoods, perhaps of two-thousand to five-thousand population each, with our eyes on the stars. Your computers could give each neighborhood access to the data banks of the others, of the central government, and of the large or multinational corporations. Your major defense against the dread tyrannies of an Orwellian 1984 will be such little republics."

At this moment Billie Larsen edged into the crowd. Trouble! She's the speaker of the House's Tough Lady Friday who goes onto the House floor and tells the representative darlings how to vote.

"All right, big man," Billie growled. "How would *you* go about getting elected with radical-brained programs like that? Do you think you'd have a chance just because you've read so damn many books and thought so far over our heads?"

It was a representative question from an operative of the old-fashioned back-slapping, hamstringing Irish pol Tip O'Neill, but its crude directness froze us in midthought. Even the raft of stuffed deer, bears, owls and sailfish on the Tune-Inn walls seemed to catch their breath. Joe Nardelli paused in the act of insulting a customer. The juke stopped playing. Silverberg shimmered and shunted to God knows when. And the Sage of Monticello took a long swallow of his screwdriver and gazed distractedly out the front window. A minute later the blue eyes turned cold and focused on Billie like a magnet.

"You want slogans," he asked rhetorically. "All right. An End to Emptiness. You want to know my constituency? Anyone who has read a single book this year, who has been abused in a credit check, who has paid ever-higher prices for necessities because of the abuses of monopolies, who has received a lower-quality education than he or she had hoped for, who is tired of Ralph Nader and of General Motors, any American Indian who believes the original Americans should have full control of the Interior Department and of former Indian lands, anyone tired of being asked a hundred thousand dollars for a small house or apartment. I could go on."

The Tune-Inn erupted. "An end to emptiness," we yelled. "For Jefferson and liberty." Another round of screwdrivers.

Silverberg shunted back, unfortunately materializing on the ceiling and crashing to the floor. After he had recovered, he said, "My God. I've made a terrible mistake. I was able to bring Jefferson here, but I don't know how to get him back." Whirling quickly toward the corner, I saw that Jefferson had left during the confusion.

"Good lord!" Marvin exclaimed. "What have we done?"

Thomas Jefferson was loose on Capitol Hill. ∞

UFO

CONTINUED FROM PAGE 28

leave us with little or no physical evidence or traces at all. However, there is the surgical removal of the animals' organs coupled with the appearance of mysterious lights during the time of the mutilations, which adds a bizarre aspect to the phenomena. The irony of it all is that the so-called cause of the mutilations, the predatory animals, will not go near the mutilated carcasses." In spite of all this, there is no incontrovertible evidence linking these two enigmas—UFOs and cattle mutilations.

Perhaps the answers lie elsewhere. With all the current evidence in, the case for cult intervention seems meager at best. True, Satanic cult activity does exist and has been reported in Butte, Montana; Blaine County, Idaho; Arkansas; and parts of California. Captain Keith Wolverton, of the Cascade County sheriff's office in Montana, remarked, "Some people believe the theory that mutilation is done by devil worshipers, and we don't discount it. It could be true." Cascade County sheriff's deputies feel that no idea is too strange and that all are worth careful consideration. Captain Wolverton stumbled on a cult site on April 14, 1976. What he found astonished everyone. About 75 yards up the side of a mountain near Butte, he found a complete circle of rocks 61 feet in circumference. It encircled a natural pit 4.5 feet deep, with a fire pit at the center. Inside the circle were two pine trees and stone tablets with various inscriptions. Five-pointed stars, swastikas, and the word *Isis* were inscribed on some of the tablets. Isis was a goddess worshiped in ancient Egypt. Her cult, whose symbol was the cow, used mutilations as part of the ritual in their ceremonies. Despite this find, if cults were responsible for the mutes, it would only partially explain some facets of the phenomenon, while others would remain unanswered.

Richard Sigismund, of Boulder, Colorado, a doctor of psychology, said, "Cultists? If so, we are then dealing with a large and very well funded nationwide organization of such cultists whose audacity must be matched by seemingly inexhaustible financial resources and outstanding scientific and technical capabilities. That such an organization exists and would or could continue its depredations over the course of at least a decade, leaving few if any clues, also seems hardly likely."

The degree of sophistication attributed to the mutilators by Dr. Sigismund led those professionals involved in the inquiries to take a hard-nosed look at the facts.

The plausibility of governmental agency influence (military and intelligence) relating to the mutilations obviously should be examined. After careful investigation by federal and state law-enforcement agents, assisted by pathologists, veterinarians, toxicologists, and others, certain patterns emerge.

Dr. Gary France, a veterinarian in Pea Ridge, Arkansas, who conducted postmortem examinations on three mutes in 1978, classified the technique used in excising the organs as "precision cutting." He said, "The sloppiest looked good, considering that it was done in darkness. I found bruises on the animals but no evidence of punctures that would account for the removal of the animals' blood. It seems to me that a powerful muscle relaxant was administered to bring the animals down before the blood was drawn out and selected organs [were] removed."

The widespread use of tranquilizers throughout the country as part of the mutilation process, the fact that more cows than bulls are found mutilated, the surgical precision of excising the organs, and the observance of unmarked aircraft before and after mutilations lead one to believe that a highly sophisticated organization is responsible. The techniques used by the killers are so evolved that the cause of death of the animals is seldom if ever learned. However, tranquilizing drugs used to immobilize the animals have been found and identified in the mutilated carcasses. The excising of organs of the drugged animal, especially the milk-producing ones, suggests the possibility of biological experimentation. Burgess posits the idea that perhaps a governmental agency is using livestock on which to test strains of bacteria, laser research, or microwave radiation.

Acknowledging that possibility, Ken Anderson, a Montana toxicologist, noted, "The reason more mutilated cows are found, as opposed to bulls, is that some lab specimens could be utilized more appropriately from the female than from the male. In the milk-producing system of the cow, the physiological anatomy would give you specific data, such as: What is being concentrated in the milk after it goes through the manufacturing and breakdown processes? Certain elements and substances would show up in the milk after a certain amount of time in ingestion. Also, if you took samples of the blood in large or small quantities, you could get, in twenty or thirty pounds of material, sufficient data for substances such as what the animal ate or perhaps constituents of the blood or the makeup of the plasma. It would be an ideal way to study various effects of exotic substances introduced into the animal."

Another area to be explored is the large percentage of "mystery helicopters" found at mutilation sites. They dramatically appear very near such sites, often hovering over the mutilated carcass. There have been instances of mutilations where clamp marks have been found on the legs of the slaughtered animals, possibly caused by their being airlifted by these craft. In two other "mute" cases, impressions of pod marks were found in the dirt at the site. These choppers, unmarked and varying in color, have been sighted by ordinary citizens and by a county sheriff in Colorado.

Sheriff Yarnell, of Elbert County Colorado sighted a helicopter at a 'mute site and gave chase, but to no avail. Three children spied a copter hovering near a 'mute' and were eventually chased off by the machine.

Dr. Sigismund summed up his feelings: "Let us reason for a moment together. Some law-enforcement officers from several states have suggested that perhaps the cattle mutilations are the work of some government agency. They came to this tentative conclusion because the equipment necessary to conduct these mutilations was seemingly beyond the financial means of individual citizens and also because the scope of the problem is so large. They suggest that perhaps a military or intelligence unit is surreptitiously gathering biological samples for scientific study. I say that this is an untenable hypothesis: for the act of leaving mutilated carcasses strewn about the country would surely provoke an outcry for the apprehension of the culprits. The public clamor would, of course, blow the lid off any secret project. It is highly likely that we are dealing with well-equipped, highly capable airborne entities using unidentified aircraft for the commission of their crimes. Unidentified aircraft, whether they be of man-made terrestrial origin or non-man-made and extraterrestrial, are by definition unidentified flying objects, or UFOs."

The list of explanations is endless, but one thing is certain: The livestock owners' losses are the mutilators' gain. The systematic destruction of personal property in several states is not a federal crime. Thus the federal government's inability to step in at this point has given the mutilators a license to kill.

In the past five years the severe economic losses of cattlemen and ranchers because of livestock mutilation has reached $2.5 million. New Mexico alone has experienced a three-year loss in damages of $45,000. These personal-property crimes have had a serious effect on their victims. In Franklin County, Arkansas, cattle owners have offered a $1,250 reward for the arrest and conviction of any persons responsible for the recent rash of cattle mutilations in Arkansas. The Wisconsin Livestock Protective Association has offered a $2,000 reward for information leading to the arrest of the culprits. The acute nature of the phenomenon in Colorado has resulted in an $18,000 reward offer. Seldom, however, do insurance companies issue insurance on cattle to ranchers. One exception occurred in 1977 in Taos County, New Mexico, when a claim was paid to a rancher for the mutilation death of a cow.

Perhaps this climate of fear brought about the need to define the scope of this problem further through the correlation of data on a national basis. On April 20, 1979, a conference on cattle mutilations was sponsored by Senator Schmitt at the Albuquerque New Mexico public library for the purpose of exchanging ideas relating to the mutilation question. Investigators from across the country met with state and federal law enforcement officials to voice their viewpoints. What resulted was the funneling of relevant information to the media and the public, with the understanding that federal assistance in the investigation would be forthcoming. Subsequently the Department of Justice authorized the FBI in Albuquerque to join in the investigation of the mutilations. In May 1979 the Law Enforcement Assistance Administration provided a grant of over $40,000 to conduct an animal-mutilation investigation under the auspices of the district attorney's office in Santa Fe, New Mexico. The size and scope of the problem, however, demand greater resources and more funding.

Senator Schmitt said recently, "I have been somewhat disappointed in the level of activity as a result of the conference in Albuquerque regarding the mutilations. There were indications that the Justice Department wasn't making any progress in funding. As a result, more definite language was added to the Appropriations Bill in order to appropriate funding necessary to move forward on this issue." The verbiage states: "Due to the widespread and continuing problem of livestock mutilation, it is the committee's recommendation that the Federal Bureau of Investigation investigate the incidents which have occurred and which are prosecutable under 18 U.S.C. 1152 and 1153." This bill, effective October 1, has been passed and now awaits President Carter's signature. I feel that over a two- or three-month period, using computer analysis, we should be able to bind together the available information and reach a solution."

In spite of this optimistic statement, one must not draw unwarranted conclusions concerning the nature of the phenomenon nor try to second-guess those responsible as to their reasons for their actions. To do so might possibly play into the hands of those who, over the years, have managed to elude detection.

To facilitate the ongoing cattle-mutilation investigations, anyone having additional information should send it to Ken Anderson of the THAR Institute, Raynesford, Montana 59469. All correspondence will be treated confidentially. ∞

Harry Lebelson is a New York–based investigator for the Aerial Phenomena Research Organization.

PHOTO CREDITS

Page 8, Tom Letterstrom; Malcolm Kirk. **page 14,** Robin Moyer/Black Star. **page 16,** Leonard Spaier, 1979. **page 20,** Geophysical Institute, University of Alaska. **page 22,** The Bettmann Archive. **page 24,** Channel Hill. **page 26,** Pat Hill. **page 28,** Dan McCoy/Rainbow. **page 36 left,** Mary Eleanor Browning/Photo Researchers. **page 36 right,** Tommy Weber. **page 37 left,** Dennis Brack/Black Star. **page 37 right,** *Movie Star News*. **page 38 left,** Christine S. Pullo. **page 38 right,** Leonard Lee Rue III/Photo Researchers. **page 39 left,** Naval History Division, Navy Department. **page 39 right,** UPI. **page 40 left,** NASA. **page 40 right,** *New York Times* News Service. **page 41 left,** *Movie Star News*. **page 41 right,** Ministry of Agriculture and Natural Resources, Department of Agriculture, Cyprus. **page 42 left,** Wide World. **page 42 right,** Lockheed-Georgia Company. **page 127,** Eric Meola. **page 113,** Cecil W. Stoughton/Department of the Interior.

MEDIA

CONTINUED FROM PAGE 26

writer named John W Campbell Jr described by Isaac Asimov in *The John W Campbell Memorial Anthology* as "tall broad light-haired crew-cut bespectacled overbearing overpowering cigarette holder waving opinionated talkative quicksilver-minded What has been called science fiction's golden age was dawning

"The other magazines paled beside the mind-blowing impact of *Astounding* Brian Aldiss and Harry Harrison recalled in the introduction to their anthology *The Astounding-Analog Reader* "Every issue was sought read coveted reread treasured" Damon Knight says "I haven't felt the same way about any magazine since When Campbell hit his stride in 1939 he was publishing single issues of the magazine that compare very favorably with best-of-the-year anthologies now

All of this adulation centered on a strange sanctum Frederik Pohl in his autobiography *The Way the Future Was* describes a visit to Street & Smith headquarters "a dilapidated old slum on Seventh Avenue . . . The lower floors were filled with printing presses shaking the whole structure as they rolled The building had a hydraulic elevator To make it go up or down the operator had to tug on a rope outside the car itself To get from the reception room to any editor's office involved going up and down staircases squeezing past rolls of paper stored to feed the ground-floor presses reveling in the fascinating smells of printer's ink and rotting wood" *Astounding* finally escaped from that slum in the early 1950s when for a time before moving to Madison Avenue the editorial office was located on East Forty-second Street The atmosphere remained the same A young author named James Gunn visiting glamorous New York and the famous editor John Campbell for the first time had the startled impression that his office was in a warehouse

Astounding fostered a special fraternity of science-fiction writers Clifford Simak remembers "In those early days after Campbell took over there was for me at least a feeling of fellowship with the other writers most of whom I had not met—a feeling that we were working together in an effort to develop a literary form that was very precious to me"

Even would-be writers were welcomed The experiences of the young Pohl and the young Asimov may not be typical, but they are indicative Tremaine saw Pohl regularly and even took him out to lunch (but never bought a story from him) Asimov describes many conversations—and many rejections—before he finally sold Campbell a story

Those who used the mails were likely to receive personal letters with their rejected manuscripts Knight writes, "I sent [Campbell] a couple of adolescent efforts the kind of thing that would get a printed rejection slip from any editor in his senses He wrote me polite rejection letters signed with his looping scrawl A young fan named Lou Tabakow submitted a story that was illegibly handwritten He got back a letter explaining the importance of double-spaced typewritten copy

The 1950s brought vigorous new competition in *Galaxy* and *The Magazine of Fantasy and Science Fiction* but *Astounding* and Campbell set the standards by which all science fiction was measured and being published in the magazine was a goal of science-fiction authors In the early 1960s I heard a young would-be writer exclaim as he examined a new copy of *Analog* "I just gotta sell to this magazine!" (He did.) It was a feeling that had been common to the fellowship of young would-be writers for 30 years

When Campbell changed the magazine's name to *Analog* in 1960 so strong was the affection for the old name that a reader revolution seemed in the offing Fan Alva Rogers who had been reading the magazine since 1934 produced a nostalgic book entitled *A Requiem for Astounding* Campbell died in 1971 but under his successors Ben Bova and Stanley Schmidt the magazine continued the high standards and strong leadership that Campbell had so firmly established

And now *Analog/Astounding* is fifty years old. I asked a gathering of young fans what this meant to them and I received answers like "Oh wow Fifty years. That's a long time isn't it?" These were veterans who first encountered *Analog* as long ago as 1972 or in an exceptional case 1966 One said thoughtfully "Hey I must have missed a lot of good reading

That is the ultimate measurement of 50 years of a magazine A lot of good reading I turned the pages with care as I examined a rare complete set of *Analog/Astounding* The paper of the early issues was yellowing and brittle because for 20 cents even in the 1930s a magazine could not be bound for the ages

It was a haunting encounter with one old friend after another in a strange setting So many of those stories have appeared in anthology after anthology have been read and reread have been enumerated among the science-fiction classics that those who did not read the early magazines will find it difficult to envision them there, in pulp-magazine format their presence emblazoned on a cover of the type that William Clayton wanted three more of to keep his press busy Here, in orderly ranks, month after month, march the classics of modern science fiction

It is the experience of being there of being a part of something remarkable and new and exciting that we who came late missed That can never be recaptured It belongs only to the survivors of the faithful band of early readers now graying but young as ever in spirit Theirs is the fiftieth anniversary

TELEVISION

CONTINUED FROM PAGE 24

When someone purchases a Channel One station he's getting the same equipment that regular television stations are buying a parabolic dish antenna to pick up the signal an amplifier a receiver and a modulator to allow him to pick the channel he wants to watch "It's completely safe" says Hopengarten "You don't need a license to operate it You don't have to worry about copyright infringement as long as you're only watching television not transmitting it to other stations"

But it costs about $20,000 Who is going to spend that kind of money to watch television? That's not so much really Hopengarten said "Dance with me through some of these numbers Fifty thousand Mercedeses are sold in this country every year and the minimum price on those is more than a Channel One setup Camping trailers such as Winnebagos go for about fifteen thousand and fourteen thousand are sold each year A used thirty-foot powerboat goes for about twenty thousand And the thing is my product is not limited to use on weekends or vacations I admit Channel One doesn't look like it's for the common man at this price but you might be surprised

I'm negotiating with a guy who owns a sports bar in Rhode Island He already has wide-screen television but the Red Sox are on only a few days of the week and other sports programming also is limited What's he going to do when people want to watch sports events while they have a few? Since he's going to use the device for a profit he'll have to pay a license fee on top of his installation charge So he'll end up paying about twenty thousand for the whole setup If you divide that out over five years it comes to eleven dollars a day for the use of the station In exchange for that he'll have over twenty-four channels, including several sports stations, superstations, Home Box Office Showtime the U S House of Representatives and others to choose from It's cheaper than getting a guitar player

A lot of people in this country are entertainment starved The sales potential on this idea is not overwhelming but I could see the market growing to a hundred thousand units one day I'm the first dealer in the nation and now Neiman-Marcus has joined me I'm sure as time goes on there will be more people coming into the marketplace but that's good because right now I have to sell a whole new concept in addition to the service itself I'll be happy when everybody knows about it and all I have to do is sell the service"

For more information about Channel One you can contact Fred Hopengarten at 68 Avalon Road Newton Mass 02168 Other would-be entrepreneurs are invited to submit ideas to *Omni* Arts for equal consideration in coverage

COMPETITION

By Scot Morris

Gravity brings me down. friction is a drag and if you re not part of the solution you re part of the precipitate

Our seventh competition asked for scientific graffiti learned graduate-level insights that might be found in the stalls of Ivy at Harvard or Stanford or taped to a computer console at NASA futuristic sayings that might be scrawled in the men s room of the *Enterprise* slogans that will appear on T-shirts and bumper stickers in the twenty-first century

Readers apparently were at home in this medium Well over 6,000 cards came in some with multiple entries Predictably there was much repetition Widely duplicated entries were out of the running Among these Clones are people two Have you hugged your droid today? I d rather have a bottle in front o me than a frontal lobotomy Does the name Pavlov ring a bell?, Mom and Dad went to Alpha Centauri and all I got was this lousy T-shirt Chemistry professors never die they just fail to react (alternately they just smell that way) Winners were chosen from uniquely original ideas If two or more entries were similar the earliest postmark won out

Since this was a graffiti contest we weren t surprised to learn over and over that black holes suck but never did we expect to see so many puns on the name of the seventh planet Our favorite among the unprintables was D M White s X rated parody of the platinum plaque designed by Carl Sagan and others that went into space aboard the Pioneer spacecraft Sorry we couldn t publish it D M but it has a place of honor on our bulletin board

GRAND-PRIZE WINNER ($100)

Microwaves frizz your heir
—Anthony Reynolds Sylmar Calif

RUNNERS UP ($25)

Laetrile is the pits
Kevin Connally Roanoke Va

Got Mole Problems?
Call Avogadro 6.02 x 10^{23}
— Ira Somach Island Park N Y

Reality is for people who can t face science fiction
—Greg Haas Bowling Green Ohio

MAN WOMAN NABISCO
—Vicki Brown Dayton Ohio

Bumper sticker
I D RATHER BE TELEPORTING!
B Schklair New York N Y

Bumper sticker
WARNING I BRAKE FOR HALLUCINATIONS
—Michael Motylinski Garden City Park N Y

Neil Armstrong tripped
— Robert Catron Colorado Springs Colo

Death rays don't kill people people kill people!
—Robert Malone Pleasantville N Y

God didn t create the world in seven days He rested for six and then pulled an all-nighter
Diana Jacokes Detroit Mich

HONORABLE MENTION

Fitzger d
—Bob Cram Portland Oreg

Promise her anything but give her Exxon unleaded
—Randall B Black New York N Y

Biology grows on you
—Frank Giuffrida Bloomfield Hills Mo

Neutrinos have bad breadth
—John F Freeman III Raleigh N C

Going the speed of light is bad for your age
—Pete Adkins Cleveland Ohio

While dwarf seeks red giant for binary relationship
—Gerald Graham Victoria B C Canada

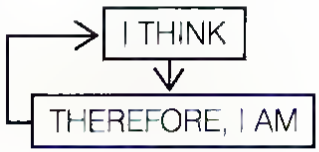
Field theories unite!
— Barbara Peterson Huntington N Y

All things are relative
All relatives are things
My relatives took all my things
— Bill Gatten Thousand Oaks Calif

Occam was a comparison shopper
—Kim Krogfoss Long Beach Calif

Klein bottle for rent inquire within
Lou O Malley Painesville Ohio

Reunite Gondwanaland!
Gregg Savitt St Louis Park Minn



—Ronald Corradin St Paul Minn

Your test tube wears combat boots!
Debbie Awl East Peoria Ill

Van Allen wears suspenders
—Joel M Levin Redondo Beach Calif

Kilroy occupied these coordinates
Jim Koch Goshen Ohio

Polymer physicists are into chains
—Ingrid Novodvorsky and Margarita Rivera Tucson Ariz

Time flies like an arrow
Fruit flies like a banana
David Eddy Goleta Calif

On the Space Shuttle bathroom wall
'Here I sit brokenhearted removed my spacesuit and insulating underclothes attached the plastic vacuum bag

strapped myself into the zero-g toilet activated the suction mechanism and only farted.

—Stephen George
Winnipeg, Man., Canada

E. coli eats shit
—David G. Hake, Lebanon, Pa.

Senator Proxmire is so dense he absorbs neutrinos!
—Teresa Phielschiefter, Houston, Tex.

Honk if you're horned
—Paul Chefurka
London, Ont., Canada

Think HONK if you're a telepath
—Bruce Binder, Northridge, Calif.

Schrodinger cut the wave equation down to ψs
—Charles G. Smith, Los Angeles, Calif.

Ecology is the study of who eats whom
David Wallace, Silver Spring, Md.

Vitamin C deficiency is apauling
—Robert Hayosh
Farmington Hills, Mich.

The meek shall inherit the earth. The rest of us will escape to the stars.
—Lorna Hopkins, La Jolla, Calif.

Free radicals now!
Jerome A. Smith, Wichita Falls, Tex.

For a real sweet time, call $C_6H_{12}O_6$.
—Mark Johannes, Great Falls, Mont.

Carl Sagan is a secret astrologer
—Donna Crozier, Wappingers Falls, N.Y.

Darth Vader sleeps with a Teddywookie
—Jan Howard Finder, Latham, N.Y.

On all lasergrams: Don't forget the Zap Code!
—Chad Eby Rogers, Ariz.

Quasars shift red/Hot stars burn blue/Space is warped/And so are you
—Cathy Rickabaugh, Phoenix, Ariz.

Walt Disney is in suspended animation
—John and Joyce Ryan, St. Louis, Mo.

Time is just nature's way of keeping everything from happening at once
—Yolanda Thomas, Flagstaff, Ariz.

Meteorologists have warm fronts.
—Shelly Gerselman, Jacobus, Pa.

There's no future in time travel
—Howard Griffin, Acomb, England

Warning: Due to the robot shortage, some of our bartenders are human and will react unpredictably when insulted.
—Vince Johnson, Tucker, Ga.

Alvin Toffler will be electrocuted tomorrow.
—Rob Kent, Summit, N.J.

Frank Borman flies coach.
Ron Young, Decatur, Mich.

Isaac Asimov hires ghost writers.
—Carol V. Chapman, Standish, Me.

Alfred Wegener was a drifter.
—Deborah Todd, Superior, Wis.

Cloning is the sincerest form of flattery.
—Janet Jacobsen, Phoenix, Ariz.

Pregnancy—a man's right!
—Noel Knapp
North Humberside, England

Help stamp out and abolish redundancy!
—Terri Hammers, Orlando, Fla.

Test-tube babies shouldn't throw stones.
—Darleen Vorrius, Port Monmouth, N.J.

Entropy isn't what it used to be.
—Lawrence G. Knight
Kadena Air Base, Okinawa, Japan

Free the Lagrange 5!
—Jeff Matthews, Honolulu, Hawaii

Very limited offer.
Collect your own set of tectonic plates.
Dan Edwards, Memphis, Tenn.

Kiss me twice. I'm schizophrenic.
—Mark Johnson, Berwick, Pa.

SUCKS SYNTAX
—Norm Peterson, Huntington, N.Y.

Mobius strippers never show you their back side.
—Mryl Burkett, Reading, Pa.

Invest in physics—own a piece of Dirac!
Charles Richardson, Richmond, Va.

Health is merely the slowest possible rate at which one can die.
—Larry Stimmell, Coronado, Calif.

If it wasn't for Newton, we would not have to eat bruised apples.
—Martyn Lanes, Newark, England

Sign on a nuclear containment building: Warning: Radiation area. Prefaded genes only.
—John Therreld, Fort Worth, Tex.

Mr. Spock wears vulcanized rubbers.
—E. L. Schroeder, Grand Haven, Mich.

The reason computer chips are so small is computers don't eat much.
—Gary Otake, Fresno, Calif.

The problem with the gene pool is that there's no lifeguard.
Ben Price, Sharpsburg, Md.

Watson and Crick were into acid.
—Scott Young, Toronto, Ont., Canada

Oscillating between career choices? Become a wave mechanic.
Randall Dunkin, West Union, Ohio

T-shirt in 21st century: Disco *still* sucks.
—Mike Dudley, Gibsonburg, Ohio

Herman Kahn but Immanuel Kant
—M. P. Sanchez
Albuquerque, N. Mex.

Microbiology Lab: Staph Only!
—Judith A. Rose, Orlando, Fla.

If you've seen one nuclear war, you've seen them all.
—Bob Muron, Appalachia, Va.

Support your local scientist. Invest in chemical bonds.
—Carmella Tellone, Philadelphia, Pa.

Wernher von Braun settled for a V-2 when he coulda had a V-8.
—James Hardie, Quincy, Mass.

On the wall of the women's restroom in the *Enterprise*:
Where no man has gone before.
—Royce W. Sykes, Jr., Florissant, Mo.

The FORCE is looking for a few good men.
David I. Frank, White Oak, Pa.

Ski Olympus Mons.
—Paul Morrison, Dorchester, Mass.

Take an astronaut to launch.
—Drew Snider
West Vancouver, B.C., Canada

186,000 mps: It's not only a good idea, it's the *law*.
Frank Wu, Corvallis, Oreg.

Go climb a gravity well.
—Robert Fenske, San Antonio, Tex.

Neutrinos are into physicists.
—Jennifer Harper, Boudreaux, La.

One genotype—one vote!
—Richard Crockett, Rochester, N.Y.

I support Little League Rollerball.
—Lemoine Erhart, Westport, Wash.

Radioactive cats have 18 half-lives.
—Randy K. Builder, Pease AFB, N.H.

Thor was a flasher.
—Tom Maenpaa, Dundee, Ill.

Give. Support the helpless victims of computer error.
—John Nelson, Mishawaka, Ind.

Frodo lives, and reads *Omni*.
—T. Wodke, Milwaukee, Wis.

SPACE

CONTINUED FROM PAGE 20

geomagnetic field is the "electron gun" that is the source of particles.

Aristotle got somewhat close when he explained that an aurora was caused by vapors rising from the earth colliding with fire from the sun, and bursting into flame. The vapors, though, are there all along in the form of tenuous gases, mostly nitrogen and oxygen, more than 100 kilometers up.

Just as a neon bulb glows when electricity flows through it and has a characteristic "neon color," each variety of atom or molecule in the upper air is excited by collisions with the incoming particles and glows with its own characteristic color. Nitrogen and hydrogen are red, and oxygen may be either red or green.

How far the incoming particles penetrate the atmosphere depends on their energy. Since most of the electrons have similar energy they are almost all stopped at the same height. For this reason the lower boundaries of the auroral curtains are sharp, about 100 kilometers above the earth. The upper edges of the curtains are fuzzy and frayed. While a curtain may be several thousand kilometers long from east to west, it is only a few hundred meters thick. The display can move at up to 100 meters a second, sometimes faster than the speed of sound. Consequently some auroras produce infrasonic sonic booms. Many observers have reported "swishing" noises associated with bright auroral displays. The exact nature of these sounds is still under investigation.

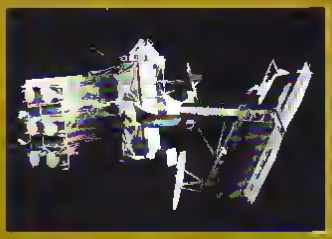
Auroras almost always appear in an "auroral oval," a sort of halo around the north and south magnetic poles. Since the magnetic poles are not in the same place as the geographic poles, and since the aurora is influenced by sunlight, the halos are askew. Auroras glimmer most commonly around latitude 70 degrees north and south. When a particularly energetic burst of particles rains down from the Van Allen belts—magnetic bottles that trap and store particles near the earth—the auroral oval expands toward the equator. Then those living farther south may get a show in the sky.

There are still many details to learn about how the energy of the solar wind—the stream of particles from the sun—is converted into the light of the aurora. We know that Earth is not alone in having auroras. Jupiter's strong magnetic field produces auroras seen by our space probes, and we could expect them in the atmosphere of any planet that has a magnetic field. Satellite and space-probe studies in the future hold a fuller explanation—both of our planet and of others.

Even when we know the source of the northern lights, their drama and the beauty of the spectacle are undiminished. Scottish poet John T. Hughson summed it up:

Fir dis is Naetir's firewaarks graand.
An bates aa rockets ivver seen. ∞

NEXT OMNI



COMET CATCHER

SKI-CHUTING

THE NEW MEDICINE

COMET CATCHER—When Halley's Comet returns in five years, we'll have a spacecraft there to meet it. The Halley's Comet rendezvous mission, already under way, will mark the first use of a new kind of rocket. It's powered by the sun, and its engines use high-voltage electricity to eject a thin stream of glowing mercury ions. Their thrust is tiny, but the highly efficient engines can run for years at a time, eventually pushing the probe far faster than chemical rockets could. In next month's *Omni* Dr. Robert L. Forward describes what may become the ultimate "star engine."

THE NEW MEDICINE—Have you had your vitamins today? Your minerals? Maybe a few pumpkin seeds? If so, there's a small band of hardy medical pioneers who'll be glad to hear it. They call themselves orthomolecular physicians, and they say that mass-produced medicine simply doesn't work. To get well and keep well according to the New Medicine, stay with the natural compounds and carefully calculated diets that "health-food freaks" have been advocating for years. For a look at the future impact of vitamin C, adrenal cortical extract, glucose tolerance, and a host of other innovations that rankle traditional doctors, see the February *Omni*.

SKI-CHUTING—A new sport, combining movement through air and over ice, is enabling a few pioneers to overcome—momentarily, at least—the force of gravity. It's known as ski-chuting, and enthusiasts all over the globe are strapping on parachutes to ski *up* mountains. Photographer Matthias Wendt captures the thrill and beauty of this futuristic alpine sport in pictorial fashion for the February *Omni*.

SCIENCE FICTION—One of the most exciting projects coming up this year is *Medea: Harlan's World*, containing original stories by ten top science-fiction writers about the specially designed planet of Medea. An advance look at that book appears in our next issue with Ted Sturgeon's first major length work in eight years, "Why Dolphins Don't Bite." Sturgeon explores the explosive conflicts between normally bred humans and genetically engineered people. The unpredictable situations that follow produce a haunting vision of the future by an acknowledged SF master. Also in this issue will be stories by Stephen Robinett and Ian Stewart.

FUTURE CURVES—What was the outstanding scientific paper of the past decade? *Omni* put this question to the oldest scientific society in the world, the Fellows of Britain's Royal Society. In the upcoming issue Bernard Dixon and John Gribbin report on the areas in which consensus emerged among the luminaries, along with some downright unexpected responses. Would you believe that one respondent chose a study entitled *The Life Cycle of the Coccidian Parasite*? Even more surprising, you may agree when you discover why in the February issue of *Omni*.

COMMUNICATIONS

CONTINUED FROM PAGE 10

sky will for all intents and purposes be starless. Although astronomical research may continue from observatories in space far above Earth's light polluted atmosphere, there will be nothing to see for those of us still bound to terra firma.

In essence we should preserve for future generations a spectacular view of the heavens. It would be most unfortunate if at some time in the future the firmament of the planetarium were to be our only acquaintance with the universe.

Rick Kurczewski
West Paterson, N.J.

'Uncanny Perception'

The article "The Lost Culture of Deli," by Jean Shepherd [October 1979] was an uproariously comical masterpiece of the first magnitude. It should be required reading for all advertising-agency TV-advertising- and fast-food chain-outlet executives. I beg of you gentlemen, on humbly bended knee please make "The Lost Culture" a regular monthly feature. I'm sure that the author could be gently coaxed with a bit of friendly persuasion to continue with this saga of our progeny in the distant future and the dilemmas they will encounter while deciphering remnants of our culture. There may still be some hope for our children's children's children's children's children in the deep and mysterious future. Author Shepherd appears with uncanny perception to have courageously lit the light for that far-off day of reckoning.

Ralph H. Sarson
Toronto, Ont., Canada

I've just read Jean Shepherd's "The Lost Culture of Deli." I have only one word to describe it: beautiful!

The article just goes to prove that *Omni* not only shows both sides of the coin, it shows all of the edges.

Tash Yokahama
Hicksville, N.Y.

New Design

I was pleased to see your tribute to Martin Gardner [Games, October 1979] a man I have admired for years. I am glad to see you used my "designature" of his name. However I have recently discovered a new version of "Martin Gardner" which has the advantage of combining both first and last names in one design. Hope you like it.

Scott Kim
Stanford, Calif.

Burning Issue

To determine whether there is any connection between resistance to sunburn and resistance to cancer and aging processes we request that people contact us if they are white and never tan or burn regardless of how long they are exposed to sunlight. There is no obligation. All information will be confidential. Please send a brief note to: Sunburn Survey, Department of Chemistry, Brooklyn College, Brooklyn, N.Y. 11210.

The Sunburn Survey notice in the October 1978 *Omni* was in fact successful in getting us in touch with a number of sun-resistant individuals, however we need to reach more people before we can make any firm conclusions.

Our many thanks to the editors of *Omni* for their assistance with this study.

Rolf Martin
Brooklyn College
James E. Cleaver
University of California at San Francisco
John B. Little
Harvard School of Public Health

Psychosomatic Cancer

I'm sure the scientific cancer community is indebted to *Omni* for its informative article regarding the psychosomatic causes of cancer [Life, October 1979]. Perhaps if more people were aware of how directly their emotions influence their cancer risk rate there would be a greater attempt at keeping an "even emotional keel" throughout one's life. It is my opinion that the cigarette ad that appears opposite your article should include as an addition to its health warning: Do not smoke in stressful situations. Perhaps if we all think pleasant thoughts, the sufferings of the 50,000 people per year who die from cigarette-induced cancers will go away. Keep up the good work. No doubt the article by Dr. Bernard Dixon has influenced a number of potential cancer victims.

Neil Sidell, Ph.D.
Research oncologist
University of California
Los Angeles, Calif.

Skinner

I read with interest through parts of the interview with B. F. Skinner in the September *Omni*. His antireligious stand is quite clear and regrettable. The view of man as a motivated mouse is a quick road to an amoral society and the 1984 behaviorists' dream.

Tom Shuster
Sussex, England

Distasteful Tongue

Thanks so much for the fascinating piece concerning the amazing ability that only a select group of individuals possesses. I refer, of course, to the genetic gift that allows one to roll his tongue into a lengthwise tube, as reported in your October Continuum.

On tongue twisting, you suggested a possible correlation existing in the personality traits of the able-bodied vs. non-tongue twisters. It seems that a genetic survey conducted at a major Welsh university disclosed that 80 percent of life scientists surveyed could roll their tongues, while only 65 percent of the school's art students had this genetic skill. I have been an avid tongue roller and all-around contortionist for as long as I can remember. I also happen to be an art student who delights in producing biological renderings (lungs, intestines, gall bladders, etc.). Consequently, I'm downright confused.

Finally, I found the accompanying photograph most distasteful. Might I suggest using some sort of cartoon character, e.g., Mickey Mouse or Popeye, rolling his tongue next time. It seems an utter impropriety to depict a closeup shot of a man's saliva-laden tongue protruding from his wrinkled lips. Who possesses the mouth responsible for this outrage?

Gerit Vandenberg
Rolling Hills Estates, Calif.

Intelligent Fallout

It is ironic that October's *Omni* contained two articles on intelligence so strangely related. Both could have genuine application in the future. The first, a Continuum item, examined a new and frightening theory behind the declining SAT scores; the second, "Intelligent Machines," studied the possibility of artificial intelligence.

Professor Ernest Sternglass, of the University of Pittsburgh, correlates the falling Scholastic Aptitude Test results with high levels of radiation in certain regions. And isn't it apropos that we are working on synthetic intelligence at this time? If utilities and industries turn to nuclear power as a major energy source, and if Dr. Sternglass's theory proves correct, machines may very well have to perform various cerebral functions.

In light of this warning, perhaps more effort should be made to develop a reliable mental crutch while humanity is in full possession of its intellect. At some future date this fragile commodity might not be so readily available. The Kurzweil Reading Machine could be that first small step for mankind.

Rosalind Ellis
New York, N.Y.

Serious Science Fiction

In the July issue of *Omni* James Delson [The Arts] degrades science fiction by throwing it on the disgusting slag heap of horror and fantasy films. Films such as *Halloween* (horror) and *Star Wars* (science fantasy or "sword and sorcery") are works intended to frighten, excite, and thrill their audiences. These films are completely devoid of any theme and serious scientific speculation.

Walt Kailey
Rosemount, Minn.

Erratum

Yogis

The photograph printed in the lower right-hand corner of page 57 in the October 1979 issue was not meant to depict any individual referred to in the accompanying text material. —Ed.

10 9 8
7 6 5 4
3 2 1 0
0 3 2 1

OMNI

Art by Peter Caras

Countdown to the Eighties

and take off with OMNI—the first magazine of the twenty first century Light years beyond the technological potential of today's science—alert to the myriad possibilities of the future—OMNI foresees a world of growing intellectual vitality expanding dreams and infinite hope, a world in which the magical has become real the impossible commonplace

Editorially OMNI pursues that which is probable within the context of that which is known Each month OMNI presents the latest developments in science and technology and strives to predict their impact on the future The most adventurous and forward-looking members of the scientific community like Carl Sagan Alvin Toffler Buckminster Fuller Stephen Hawking, Robert Jastrow and I J Good have their work featured or are profiled and interviewed Top science fiction writers such as Arthur C Clarke, Isaac Asimov, Robert Heinlein and Ray Bradbury, prophesy the philosophical emotional, and structural realities of the world to be OMNI is the world s first publication to combine science fiction and science fact, the first publication to afford paranormal phenomena the simple dignity of a proper ongoing scientific inquiry OMNI s aim is to heighten and enliven the world we live in—to discover, clarify, and inform OMNI s range editorially and graphically, is as broad as the universe as infinite as time

Lift off with a subscription!

OMNI

P.O Box 908, Farmingdale, N.Y 11737

YES! Count me in! Enclosed is $18 00 for a one-year (12 issues) subscription to OMNI Send it to

Name

Address

City

State Zip

☐ Check or money order enclosed
☐ VISA (BankAmericard)
☐ American Express
☐ Master Charge

Interbank #
(Master Charge Only)
Expiration Date

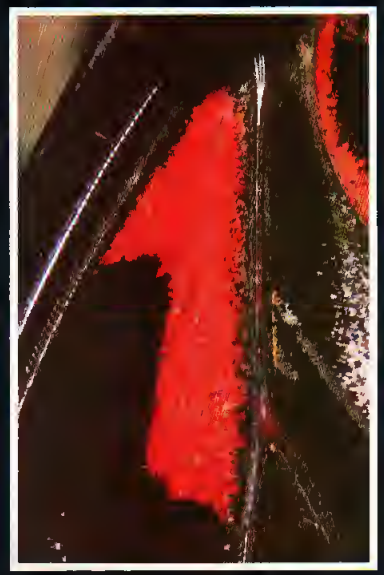
Account #

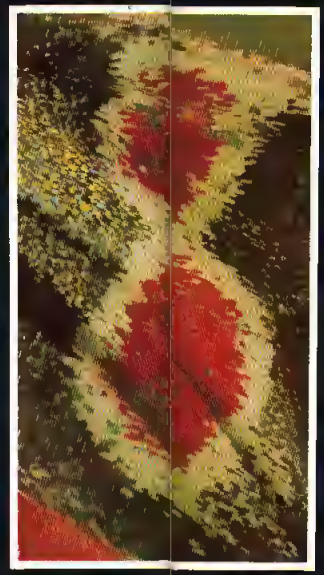
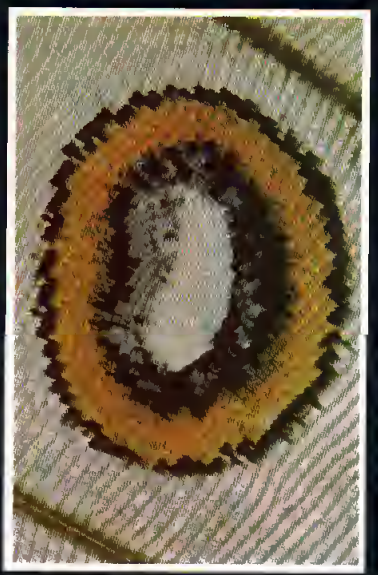
Signature

Print clearly please Rates for U S APO and FPO addresses Canada and elsewhere add $6 00 per subscription Allow 6-8 weeks for shipping of first issue Payment must accompany order 30180







PHENOMENA

Welcome to the 1980s!

Kjell Sandved, a researcher at the Smithsonian Institution, found this "alphabet soup" on the wings of different butterflies and moths. A photographer with a keen interest in the macroworld, Sandved at first disregarded his discovery. Then, after noticing more and more lepidopteran monograms, he began a collection, which took more than 15 years to assemble and also required travels to 30 countries.

The "M" displayed here, for example, is from an Australian moth known scientifically as *Donuca lanipes*; the zero is from a Mexican butterfly named *Morpho polyphemus*.

Sandved, who designs and constructs much of his own equipment, uses a Nikon camera with Zeiss Luminar lenses and Kodachrome to capture these images.

FORUM

CONTINUED FROM PAGE 12

is not enough. As soon as I get the issue, I read it all.

Another thing I find lacking is short stories by Philip K. Dick. I feel he is one of the best, and he should be included in your magazine. I would very much like to know what he has been doing lately.

Phillip Long
Riverside, Calif.

Ben Bova replies: *Many thanks for your kind words about the fiction in Omni. I'm glad you're enjoying it, and we'll try to keep the best writers in the magazine regularly.*

Philip K. Dick hasn't written much of anything lately that I know of, and he hasn't produced any short fiction at all for quite a while. Many writers prefer to concentrate on novels rather than on short stories. I myself find novels better suited to my writing talents than shorter works.

Living in the Shadow of Doom

In reference to Douglas Love's letter in October's *Omni* [Forum], the Three Mile Island argument is definitely not a poor one. Imagine that you, your relatives, friends and belongings are all located near a nuclear plant that one day has an "accident." Pregnant women and preschool children are evacuated within five miles of the plant, and broadcasters are advising people to stay indoors and keep their air conditioners off and their windows closed. You live from news report to news report. It has no smell, no color. You cannot stop it. You know how it kills both good and bad cells. You know that if you stay, you might die. You know that if you leave, you may never be able to come home for years. Those who take the pronuclear stand loudly proclaim that no one has ever lost his life because of this industry. It almost happened in Middletown, and someday it might happen in New York. Mr. Love, then you will be the one to suffer the strain. I've had my turn!

Beth Bright
Middletown, Pa.

Worm Runner

The article "Saraswati in the Bronx" [September 1979] struck a resonant chord primarily because the work that Arani Bose is performing stems from my own early experiments on memory transfer in planarians, and because I have for years edited and published *The Worm Runner's Digest/Journal of Biological Psychology*, which Stuckey cited frequently. I found Stuckey's article reasonably accurate, but I wish to dispute one sentence in which he evaluates the "memory transfer" experiments. Stuckey states: "Well, very few scientists were able to reproduce the results." This statement sticks in my craw. In 1970 James Dyal, of Waterloo University in Canada, published a lengthy article in which he lists more than 500 articles on memory transfer, the majority of which are successful replications of the memory-transfer effect. In the mid-1970s the U.S. Army published an extensive bibliography of some 1,000 articles on the topic, and, again, most of them were successful replications. In truth, more than 100 scientists in some two dozen countries have succeeded in repeating part (or all) of our early work, and I assure you that there are damned few "findings" in the field of biopsychology that have been successfully replicated that many times.

It is true that not everyone who tried was successful, but we know the reasons for many of the failures. William Byrne, a noted biochemist, failed the first time and reported on his failure in *Science* in 1966. Even before the article appeared, Byrne had discovered what had gone wrong and had gotten successful results (as he did frequently thereafter). Yet people cite only his 1966 article and none of his later work. The fact is, memory-transfer work disturbs many neuroscientists as much as UFOs or ESP does. One Nobel laureate who never worked in memory transfer once told me it couldn't be true since it implies that specific chemicals "code" for specific memories and that "God works His unknowable way at the molecular level." Another laureate got successful results but refuses to acknowledge them. A noted biochemist (who has consistently attacked our results) found, to his embarrassment, that his own graduate students had successfully replicated our work in his own laboratory. He suppressed the results and ordered the graduate students not to repeat the work.

Oh, well, that's science, which is just as "human" as any other part of life and just as filled with bias and prejudice. I take delight in the open mind of such young scientists as Arani Bose. You might like to know, incidentally, that the "unrepeatable results" we got have been repeated by at least 5,000 high-school students and that the National Science Fair winners (1960–70) included memory-transfer studies almost every year during the Sixties. I'd much rather have people like them—and Bose—following in our footsteps than I would have senior people who "know" that our results can't be true because they're "theoretically impossible."

Thanks for putting out such an excellent mix of science and fiction. You've got a real winner on your hands!

James V. McConnell, Ph.D.
University of Michigan
Ann Arbor, Mich.

Silicon Appetites

In his article "Life in Darwin's Universe" [September 1979], Gene Bylinsky discusses the possibility of silicon-based life, stating, "Silicon-based life simply doesn't work. Silicon molecules don't have the properties of organic, carbon-based molecules." He later goes on to point out that most of the free-floating molecules in space are organic and that organic life is virtually the only possible probability.

However, in the book *Planets and Life* (Funk and Wagnalls, 1970), author P.H.A. Sneath states the very reasons counted by Bylinsky against silicon life but adds: "This, however, is only true from our own special viewpoint, which assumes an abundance of oxygen." Later in the same paragraph he continues: "If we consider other environments, however, the options are wider, particularly in the absence of free oxygen."

Bylinsky's obsession with carbon-based life seems to exclude ammonia-based ecosystems. Sneath expounds upon the possibility of ammonia-based life inhabiting giant gas planets. However, as Isaac Asimov points out in his book *Extraterrestrial Civilizations* (Crown, 1979), such life would be ocean life and, therefore, a nontechnological intelligence. However, Asimov's view, as Bylinsky's, was directed toward organic life, while Sneath points out that ammonia-based life could use ammonia analogues to water compounds, citing the examples of methyl alcohol and acetic acid as substitutes for water.

I feel that I should stand up for "silicon-eating monsters" and others with "ammonia flowing through their veins."

Michael David Conner
Kansas City, Mo.

Szeretettel Erdélyből

After reading the "discussion" between Bruce Wallace and "Count Dracula" [Forum, October 1979] and recovering from the fit of gagging giggles that ensued, it occurred to me that maybe I could contribute somehow to the magazine's socially redeeming value. The following rhetorical/informative compendium is intended for your delight and edification. Did you know that

- in my 20 years in Transylvania (I was born there) I never heard of Dracula?
- nobody in Transylvania ever heard of Dracula or vampires (save the South American ones) until British and American tounsts started visiting?
- there is no word *Dracula* in any of the known languages of the world except English? Dracula (the Devil) is masculine exclusively and, therefore, the ending must be a consonant. Vlad Tepes, aka Vlad Dracula, a Muntenian leader (*not* Transylvanian) was the closest that Romanian folklore ever got to Dracula. Moreover, it was the Turks who called him *dracul*, mainly because he liked to impale them.
- Transylvania is usually called either Ardealul (in Romanian) or Erdély (in Hungarian)?

All in all, however, maybe it wouldn't be such a wise idea to meet me after midnight. True files have done wonders for my teeth and QT took care of porphyria, but atavistic tendencies have a way of cropping up at the most lugubrious moments. Awhoooooo . . . !

Andras József Rozsa
Tallahassee, Fla.

LASER SOUND, FAR-OUT BATTERIES

INNOVATIONS

For the audiophile the most exciting development in recent years has been the introduction of digitally recorded discs

However, digitally recorded music is only half a revolution since these superdiscs must be played back on existing home sound systems, and that means reconverting the "clean" digital signal back to the traditional "dirty" analog signal so that standard records can be pressed

Though digital record/analog playback produces undeniably superior sound, the results only hint at the aural potential when both record and playback are digital The transition to consumer audio digital/laser playback systems is set to start The technology is here and so are working prototypes from Sony Corporation and North American Philips Corporation

Sony's prototype the DAD-1X, plays an LP-sized (12-inch) disc spinning at 450 rpm The one-sided reflective disc containing two and a half hours of recorded sound is played back by the DAD-1X's low-power helium-neon laser The performance specifications are impressive a dynamic range (or acoustic "distance" between softest and loudest volumes) of 95dB at least 50 percent better than current technology

While Philips's system aptly named the Compact Disc is similar to Sony's in operation and performance the two systems are not compatible Philips's unit plays a 4 5-inch-diameter disc containing up to one hour of recorded material A small aluminum-gallium-arsenide diode laser located under the record, is focused on the track to play it back

Sonic results from both the Sony and the Philips systems are awesome digital audio is to analog what beef Wellington is to a Big Mac In analog recording the sound is encoded in a standard record that contains a wavy groove that replicates the original sound A phonograph stylus or needle follows the groove and generates electrical energy variations that then drive the speakers

However the needle a "dumb" piece of hardware responds equally well to dust dirt turntable rumble and tone-arm resonance The stylus, in other words will play whatever it bumps into, whether a record groove or a cat hair

In digital recording, the sound-wave form is analyzed 44,000 times per second and each sample is assigned a numerical value These samples are then quantized and converted into binary 14-bit "words"

Philips's disc contains up to 6 *billion* bits linearly encoded along a helical track of pits and flats which represent 1's and 0's in binary computer language As far as the playback laser is concerned pits and flats are all that exist. The laser considerably smarter than the stylus knows and never forgets the difference between music and dirt

One final fascinating detail Since separation between tracks on Philips's disc is only 1 66 microns the 4-5-inch disc's groove if laid out in a straight line would stretch 2 5 miles

Neither Sony nor Philips has announced release dates or prices but informally it is suggested that a working disc player will be in the stores before Christmas and be sold at a price making it competitive with currently available turntables

We happened upon a cartoon recently that presented as a gadget of the future sheets of paper each of which contained a built-in calculator The cartoon was a wry comment on our fascination with the disposable and the dizzying pace of miniaturization We were amused mildly Then, within hours we came upon a press release from Matsushita Electric announcing the development of an almost paper-thin (one-thirtieth-inch-thick, to be exact) battery The sample enclosed was about the size of a stick of chewing gum with a weight of 1 9 grams and a nominal voltage of 1 5V The chewing-gum shape of our sample is arbitrary This item can be made into just about any shape imaginable and will supply sufficient current to power a wristwatch a calculator or a camera It will in short eliminate the restrictions of battery size and shape that have heretofore severely limited designers' options

Matsushita Electric's new paper-thin battery can be made into almost any shape imaginable

The old wives ride again, and an anagram challenge

GAMES

By Scot Morris

"A lie travels round the world while Truth is putting on her boots."
—Charles Haddon Spurgeon, 1885

Answers to this quiz begin on page 129. Fold the page inward to avoid peeking.—*Ed*

Who knows where they start—the apocryphal tales, popular anecdotes, folk remedies, lore, and advice? Whether they are true or not, they are believed, and so they are repeated, trusted, and followed. They are the old wives' tales, "common knowledge." Sometimes they are put to the test, and we find out that these "facts" are fiction. But it often turns out that the old wives were correct.

Sources that have been helpful in constructing this quiz include Carol Ann Rinzler's *The Dictionary of Medical Folklore* (Crowell, 1979), Leo Rosten's *The Power of Positive Nonsense* (McGraw-Hill, 1977), Philip Ward's *A Dictionary of Common Fallacies* (Oleander, 1978), Tom Burnam's *The Dictionary of Misinformation* (Crowell, 1975), Ashley Montagu and Edward Darling's book *The Prevalence of Nonsense* (Dell, 1967), and finally, Bergen Evans's classic *The Natural History of Nonsense* (Knopf, 1946). Readers are invited to call our attention to other "wives' tales" for inclusion in future quizzes.

The following quiz lists 25 popular tales. Your task is to mark them true or false, then check the answers, which begin at right.

THE WIVES' TALE QUIZ

1. ___ When sleeping persons thrash about in bed, it means they are probably having a dream.

2. ___ Bulls are enraged by the color red.

3. ___ Eating carrots can help you see better at night.

4. ___ Female athletes often have difficulty delivering babies.

5. ___ A woman who breast-feeds her infant does not get pregnant as easily as a woman who bottle-feeds.

6. ___ Newton was inspired by the fall of an apple to formulate the law of gravity.

7. ___ Milk formula should be warmed before it is fed to a baby.

8. ___ A slightly higher rate of childbirths occurs at the time of the full moon.

9. ___ A bit of alcohol—"a hair of the hound that bit you"—is an effective means of relieving a hangover.

10. ___ After eating, it is best to wait at least a half-hour before going swimming.

11. ___ Lemmings are occasionally driven to a "mass suicide" when they swim into the sea and drown.

12. ___ A glass of warm milk at bedtime helps you to sleep.

13. ___ The man responsible for developing blood banks died when a hospital refused to admit him for a transfusion because he was black.

14. ___ The Navajo language is so complex that the U.S. military once used it as a secret code.

15. ___ A good way to protect woolens from being damaged by moths is to store them in a cedar chest.

16. ___ Filter cigarettes are less dangerous to your health than unfiltered cigarettes.

17. ___ Chicken soup is an effective remedy for the common cold.

18. ___ W. C. Fields's tombstone reads "I'd rather be here than in Philadelphia."

19. ___ You can avoid anemia by eating apples that have had nails pounded into them and were left to sit for 24 hours.

20. ___ Charles Lindbergh was the first person to fly across the Atlantic Ocean.

21. ___ A horse can sleep standing up.

22. ___ Of all household foods, cheese is probably the best to bait a mousetrap.

23. ___ Indian snake charmers put cobras into a trance with their music.

24. ___ Very spicy foods can make your skin break out with acne.

25. ___ The state of Illinois is east of the Mississippi River.

OLD BUSINESS

Readers have responded in force to two apparent errors in the October column—errors all the more glaring for being attributed to *Scientific American* columnist Martin Gardner. John Doell, of Rochester, New York, wondered whether Gardner could be wrong. "According to your column," he wrote, "there are three numbers that are the sum of their cubed digits, with 370 being the middle and 371 the highest. But *LOH* there is one higher."

The error was mine. What Gardner apparently told James Randi was that, besides 370, there were three *other* numbers with this property, and the story got scrambled in the retelling. Wishing the column to be a surprise for Gardner's sixty-fifth birthday, I did not check everything with him as fully as I might have. For the record, there are four numbers (excluding 0 and 1) that are the sum of their cubed digits: 153, 370, 371, and 407. The classic version of this problem is to find numbers that have the same number of digits as the exponent. Thus, there are considered to be only three four-digit numbers that are the sum of the fourth powers of their digits. (Answers, page 110.) Interested readers may find the problem generalized to *n* digits in Gardner's *The Incredible Dr. Matrix*, pages 36 and 205–209.

The second error concerned the problem of cutting up the truncated equilateral triangle into four congruent parts. This is an old puzzle, and the

solution we gave (below) was traditionally considered unique as stated in Harold R Jacobs's textbook *Geometry* (W H

Freeman, 1974, page 188) and in Gardner's own *aha! Insight* (W H Freeman, 1978, page 47) Just months ago, however, a Washington D C, mathematics teacher Richard Brady informed Gardner that one of his pupils, a high-school junior named Andrew Miller, had found a different solution

Mathematicians who had considered this problem a 'closed book' were needless to say astounded In Miller's solution the four parcels do not have the same shape as the larger figure but they are identical if one or more may be turned over Miller's solution sent in by many *Omni* readers, appears on page 110

WIVES' TALE ANSWERS

WARNING Below are the answers to the Wives' Tale Quiz at left If you haven't taken the quiz yet, fold this page inward to keep the answers out of sight

SCORING 0 – 9 correct—well below chance you should have guessed 10 – 15 correct—pure chance you probably did guess, 16 – 18 correct—there's some hope 19 – 22 correct—respectable showing, 23 – 24 correct—excellent you've a mind of your own 25 correct—faultless! Old wives have no tales on you

1 *False* Thrashing of arms and legs in bed occurs when the sleeper is *not* dreaming Dream sequences are correlated with the REM (rapid-eye-movement) phase when the sleeper's skeletal muscles are limp

2 *False* It is the cape's motion, not its color that arouses the bull The redness is for the benefit of the crowd because bulls cannot see color In fact all mammals are color-blind with the exception of primates and possibly cats which may see shades of red Color vision evolved in birds fish, and insects but was lost to mammals until we primates came up with the idea, independently all over again

3 *True* The pigments in carrots are turned into vitamin A by the body, a substance that is necessary for the synthesis of rhodopsin (visual purple) which helps us see dim light but not color Complete deficiency causes night blindness Since most people already get enough vitamin A in their diets don't overdo it Eating too many carrots can make your skin turn yellow

4 *True* Women athletes often do have troubles in the delivery room But the problem is not caused by their athleticism (women with well-exercised muscles actually have an easier time in labor) but by factors that led them to become good athletes in the first place The narrow pelvis that allows a woman to be an exceptionally fast runner may also have too small an opening for a baby to pass through without difficulty

5 *True* A 1977 University of Michigan study supports the wives' tale that breast feeding tends to delay the return of regular menstruation after childbirth and also inhibits conception after menstruation does return A survey of 5,000 new mothers in Taiwan showed that among nonnursing mothers there was a 65-percent pregnancy rate within six months after menstruation resumed Among nursing mothers, the rate was only 45 percent

Answers continue on page 110

COMPETITION #11 ANAGRAMS

In last month's column readers were asked to rearrange the letters in names and words to form meaningful anagrams We gave the examples that *Florence Nightingale* transposes to "Flit on, cheering angel" and *Presbyterian* can be shuffled to form "Best in prayer"

Some name anagrams are clearly appropriate

Adolf Hitler— "Hated for ill"

Henry Wadsworth Longfellow—"Won half the New World's glory"

Robert Louis Stevenson—"Our best novelist señor!"

Oliver Wendell Holmes—"He'll do in mellow verse"

Those classics come from Willard R Espy's *The Game of Words* They're nice, but dated, and largely literary What we want are anagrams that are more current and *Omni*esque We tried to anagram *Omni* Competitions and got "I'm not stoic in poem" We're not sure what it means (we're not stoic in prose either), but at least all the letters fit Sometimes a setup is necessary For example

What would *Isaac Asimov* make out of a shredded credit card? A MOSAIC VISA

What does *Omni* managing editor *Ande Dorman* say when writer Daniel S Greenberg asks for a higher fee? DREAM ON, DAN

How does *Omni* art director *Frank DeVino* vote on the ancient-astronauts theory? FOR V DANIKEN

What does the physicist do after a day studying *black holes*? HE LOCKS LAB

The Competition Submit one anagram for the name of any familiar person or phrase The more "appropriate" the anagram and the less tortured the setup, the better No setup at all is best Postcards only please, with one entry per card All entries must be postmarked by February 15 1980 First-prize winner will receive $100 Runners-up (2 through 10) will receive $25 each All entries become the property of *Omni* and will not be returned Send to *Omni* Competition #11, 909 Third Avenue, New York N Y 10022 ∞

LAST WORD

By Les Waas

Omni has asked us what to expect in the 1980s

Us, because we are the ones who correctly predicted for the 1970s Watergate, galloping inflation, jogging, gas lines, a spacecraft on Mars, a nuke scare, gay rights, cloning, disco, and the marriage of Mickey Rooney. In addition, we predicted the exact end date of the war in Indochina, a U.S. congressman replacing a vice-president and a president and losing an election to an unknown peanut farmer, and women obtaining the privilege of voting in Switzerland.

We enjoy a 100-percent perfect record for accuracy, which is difficult to beat. Actually, it's *impossible* to beat, but that fact we are loath to cite because to do so would smack of superciliousness.

At this point you are asking who 'we' are. Your question is appropriate. We appreciate your interest, and if you promise not to rush us, we'll tell you right now. We are the Procrastinators' Club of America, dedicated to putting off that which needn't be done immediately. And therein lies the secret of our predictions. We simply make them later.

Purposeful (or positive) procrastination, the only kind we advocate, provides untold benefits beyond that precious ability to aftcast (as opposed to forecast) with such impeccable exactitude. We have found, for example, that the more we postpone, the more we never get around to doing at all. Nonprocrastinators are always accomplishing things that really never had to be done in the first place. Time is too valuable to fritter away on the inessential.

We are often told that there are many things that must be done on time, such as paying income taxes. The fact is that one need only file on time. Paying later is fine as long as you pay the fine. But because the penalty carries a lower interest rate than many financial institutions pay on the same money, it's practical to procrastinate in paying Uncle Sam—another illustration of procrastination paying off.

Positive procrastinators are better organized than do-it-nowers. We have the natural tendency to postpone trivial and/or unpleasant chores. This allows us time to fulfill the more important and more pleasurable pursuits, such as writing this piece (and for you, reading it). There is no way we can do everything immediately. In fact, few of us can do more than one thing at a time. (Even a recent president proved that.) Procrastinators consequently are selective, placing priorities where they belong, to live happier, longer lives.

You'll find that problems in general become less important, often disappear entirely, when you postpone fussing about them. When our club schedules an event, it's usually not planned until the very last minute. This gives us little time to worry about details and whatever might go wrong. Surprisingly, our get-togethers are consistently successful. Of course we have had as many problems as any other organization, but we don't devote an excess of up-front time on agitation. At a recent annual awards banquet, for example, when the special envelope was opened, a blank piece of paper was pulled out. The selection committee hadn't yet selected a winner. But nobody experienced the disappointment of losing.

At earlier awards banquets, each of which was held at least a year after the event was originally scheduled, we had less lackadaisical selection committees and so we actually bestowed awards. Our first award, in 1957, went to a stripteaser for "putting things off slowly." Others have been conferred upon Jack Benny (for never getting around to turning forty), Murray Rappaport (for breaking the world record in holding an overdue library book), and the Illinois Central Railroad (for the latest train ever reported which left the station in 1903 and hasn't arrived yet).

Though procrastination is fun, we do have our serious moments, and we often work for the public interest. This year we wrote to President Ford requesting WIN buttons and offering to help "Whip Inflation Now." In 1970 we visited the Whitechapel Bell Foundry in London to demand that they honor the 200-year warranty on the Liberty Bell, which, after we bought it from them, cracked. Our 1967 protest against the War of 1812 was a supersuccess. A peace treaty has been signed. Two years ago we went to the Netherlands to relieve the boy whose finger was in the dike so that he could relieve himself. In 1974 we attended the Circus Maximus in Rome to see the Christians battle the lions.

Otttimes procrastination gets a bum rap from certain individuals who are ever in a hurry to badmouth anything good. These miscreants associate procrastination with sloth, lethargy, shiftlessness, indifference, and even lymphatism—a term I refuse to dignify by looking up its meaning. Those who attach such stigmas to procrastination should be aware that our organization is the only one that has persistently been expounding the idea of postponing World War III. (How could anyone in good conscience fault us on that?) It's these "now people" who never pause long enough to take a walk, watch the girls, or smell the flowers, and tragically they're the selfsame souls who rush to catch the airplane that crashes.

The growth of our organization gives evidence to the fact that more and more sensible folk are coming over to the procrastination philosophy. Currently we have more than 600,000 members throughout the world. Unfortunately, only about 3,300 of them have so far actually gotten around to joining. (In reality, the unregistered are truer procrastinators than the ones who have signed up.) Incidentally, in case you're interested in becoming one of us, we're currently in the middle of our 1977 membership drive. By filling out your application and returning it to us right away, you'll be rejected.

But getting back to the 1980s—we strayed slightly—please remember that in order to maintain our record for accuracy we must move cautiously on this project. Give us ten years, and we'll come back with a collection of predictions so incredible that they'll stretch far beyond your wildest imagination. ∞

We asked Mr. Waas whether he was president of the club, and he told us he didn't know. He was elected in 1956, and the 1957 election hasn't taken place yet. PCA is at 1111 Broad-Locust Building, Philadelphia, Pa. 19102. —Ed