

# SCIENCE

DECEMBER 1979 \$2.00



SEVEN WONDERS OF THE UNIVERSE  
OUR MARTIAN AIR FORCE · FUTURE ANIMALS  
EUROPE'S GROWING LEAD IN SCIENCE  
ETHICS OF HUMAN EXPERIMENTATION  
NIGHT BEFORE CHRISTMAS, 2001

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Cover art for this month's *Omni* is a painting in acrylics entitled "Uranus from Umbriel" painted by space artist David Egge in 1977. Egge inspired by Lucien Prék and taught by Ron Miller calls himself "the first space artist born in the space age" (p. 99/106).

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RALEIGH  
WARNER, JR.

• *What our industries need are clear and easily understood ground rules, not arbitrary day-to-day decisions that contradict those made yesterday* •

One doesn't require too long a memory to recall when the phrase world power instantly evoked a mental image of America. The phrase was not limited to military prowess. Among other strengths, it encompassed diplomacy, fiscal stability, scientific advancement, production of capital goods, and international trade.

In the last-mentioned area the United States for more than four decades was the world's undisputed leading exporter of high-technology goods. But the margin began to narrow in 1970. Our balance of merchandise trade showed a \$21-billion deficit in 1977. Last year the deficit rose to \$34 billion. Under present conditions the trend is not likely to reverse itself.

There are three principal reasons for the downturn. First, few American companies have aggressively sought to create foreign markets for their goods or have left the road to do so. In 1977 only 1 percent of the companies in the United States accounted for 80 percent of the exports. Second, some countries have raised tariff and non-tariff barriers against imports from the U.S.

But the most compelling reason for the decline is the fact that the U.S. government itself has put obstacles in the way of international trade and has also fostered an inconsistent, stop-and-go policy that has tripped the efforts of American companies. This lack of direction has been compounded by the failure of America's leadership to understand the revolution in international trade over the last 30 years.

As a result, our nation has reached the point where we must increase our exports simply to pay for what we import.

Because foreign trade is so competitive it comes with it a high degree of risk. A company intending to export a product often commits the necessary funds for plant and equipment long before the first shipment is made. This requires consistency and consistency in government policy. What our industries need are clear and easily understood ground rules, not arbitrary day-to-day decisions that contradict those made yesterday.

These are, of course, U.S. tax law provisions designed to provide support for companies engaged in overseas commerce. But the future of these provisions is uncertain. For example, the foreign tax credit protects U.S. companies against being taxed twice on the same foreign-source income. Without such protection, U.S. companies could not hope to compete with foreign-owned companies whose governments routinely provide safeguards against double taxation. Yet Congress is now considering a proposal from President Carter that U.S. oil companies be sharply curtailed in their use of this credit. This would make the U.S. already dependent on foreign oil, also dependent on foreign oil companies

for the imports it requires.

Another important form of support is the right of U.S. controlled foreign companies to defer payment of U.S. taxes on income earned abroad until the funds are repatriated. Yet there have been suggestions on Capitol Hill that the tax deferral clause also be eliminated.

The Export-Import Bank, which finances American companies' exports of capital goods—the leading item in our foreign trade—could be an important influence in export growth. But despite the expansion of its lending authority last year, the bank still offers U.S. exporters only a fraction of the assistance provided by other major nations to their exporting companies.

The imbalance is best demonstrated in the manufacture and sale of commercial airplanes. The two major builders of American-made airplanes are the United States and Airbus, a consortium of European manufacturers. Any Airbus plane sold outside the European community automatically qualifies for export credit support. In contrast, the Export-Import Bank determines the credit worthiness of American-made airplanes sold overseas on a plane-by-plane basis. Moreover, planes sold by Airbus are totally financed through the participating countries' central banking systems. The Export-Import Bank relies on the resources of U.S. commercial banks and American ancillary makers, as a result, pay higher interest rates than Airbus does.

It should be clear that many of the elements needed to increase exports are the same as those needed for optimum functioning of our domestic economy:

- Sufficient profitability to furnish capital for investment, to support borrowing, and to create additional jobs.
- Sufficient predictability of government policy to permit orderly planning.
- Abandonment of punitive attitudes and policies toward private business.

In short, we need support by the federal government of the private sector's essential contribution to American society. But we can't afford to stand idly by merely hoping the government will aid American companies abroad. As citizens, we must ensure that our elected representatives understand the urgent need for clear, consistent, and competitive trade policies.

Thanks in large measure to American economic aid, many nations have advanced to the first rank of economic strength and development during the last 35 years. The U.S. government should be doing all it can to help U.S. industry compete with these new industrial powers. That must be the path of the future if the U.S. position in foreign trade is to regain its former preeminence. □

Raleigh Warner, Jr., is chairman of Mohr Corporation.

# CONTRIBUTORS

## OMNIBUS



FORD



WOLFE



GREENBERG



MOORE



WARGO

**A**fter more than three decades as the world's leading technological nation, the United States now finds itself making room for a new and formidable force on the frontiers of science: Western Europe, the long ago birthplace of modern science, is undergoing an unprecedented scientific and technological renaissance, the effects of which are already being felt. Daniel S. Greenberg, columnist and publisher of the biweekly newsletter *Science and Government Report*, recently journeyed to Europe's leading research centers and institutions and has brought back the inside story of why British, French, and German scientists have moved into the forefront of the scientific community. "The Old World is astir with ambitious, well-financed, high-quality research," Greenberg writes. "The Common Market countries collectively possess 'a formidable assemblage of intellectual power and physical resources.'" Europe's Scientific Renaissance "an exclusive report," starts on page 76.

Barbara Ford's fondness for white-tailed deer spurned her interest in animals, particularly in animal survival. In her article "Survivors" (page 116) Ford provides a glimpse of some of nature's "more successful" creatures that, somehow, have managed to hang on in the face of fast-disappearing natural habitats.

Some species have not only survived, Ford writes, "but are actually increasing in number." A science writer and columnist

Ford has also written *Future Food* (William Morrow, 1978).

Omn's senior editor Scott Moore explores the world of "Prizes" in this month's issue. Moore, who's also our Games editor, says he got the idea for the story while covering the building of the Gossamer Condor, the first workable man-powered airplane. While talking with some of the builders, he began reflecting on the shared vision of the man who inspired all this work, by offering a prize and, by extension, on the economic advantages of offering prizes in other fields of science. The end result is an appeal for more new prizes. See page 108.

The words human experimentation make the heart pound faster and evoke visions of Nazi concentration-camp brutalization of prisoners. Yet testing with human guinea pigs is as fixed an element of research as test tubes are. Science writer Dave Sobel examines the ethical and moral perplexities concomitant with human experimentation and discloses how the medical world is trying to unravel the complicated regulations governing human-subject research. Her provocative report begins on page 52.

Though not a physician himself, Pulitzer Prize winner René Dubos has become known as "the conscience of medicine" reaching out to the layman in countless books and articles. He is a teacher and researcher at Rockefeller University and his accomplishments include the discovery of the first useful antibiotic and the first tuberculosis vaccine. Medical

writer Clare Wargo profiles the biologist extraordinaire in this issue's interview on page 86.

Author Gene Wolfe told *Omn* that he began writing science fiction in 1956 in hopes of earning money to buy furniture. Seven years later his novel *The Death of Doctor Island* won him a Nebula Award. In 1977 he received the prestigious Chicago Foundation of Literature Award for his novel *Peace*, and in 1978 his "Computer iterates the Gaudier trumpet" won the Rhysling Award for science-fiction poetry. As a rule present, Wolfe offers "War Beneath the Tree" (page 62), an enchanting tale about a rather unusual Christmas. (Yes, he now has serend enough to buy the furniture.)

Jairing Wolfe are two masters of science fiction: Spider Robinson ("Soul Search," page 66) and Dean Ing ("Sam and the Dirty Mudder," page 96).

Finally for its December edition, *Omn* commissioned the great Dr. Jason D. Argonoff, who, with his starship, searched the farthest reaches of the universe for some "decent" tourist attractions. He has just returned, bringing with him a portfolio of the most astonishing intergalactic marvels, which we call the Seven Wonders of the Universe. You won't want to miss this peek at the Floating City of Wexary, the Light Dams of Hesperaggoria, and, of course, our very own Yonkers Airport, 17 miles high and about 12 centuries into the future. Philip Durr provides the text on page 80. ☐



influence of both parties in the situation. This kind of unbiased investigatory work by Allan Hendry does a great service to better scientific approaches to ufology.

Gina Guthrie  
Atlanta, Ga

#### Capitalized

You have managed to capture the interest and curiosity of a sixteen-year-old boy, which is something few science magazines can do. One day I took your June issue to school to show to some of my teachers. My English teacher drew us all to take your World's Hardest Spelling Test, and he really liked the format of the article "How to Write an SF Novel." My physics teacher became so captivated by your articles on neutrinos and by "In the Matter of Space Law" that he bought my issue. You can bet I went and bought the same issue again for myself!

Sloven Hogue  
Quebec, P.Q., Canada

#### Fritz in Mood

Kenneth Jon Rose is correct (Continuum, August 1979) in attributing the invention of the rocket launch countdown to Fritz Lang. The motion-picture director in his 1928 SF film *Woman in the Moon*.

You may be interested to know why he did it. I discussed this with Lang some years back, and I mentioned it in my textbook *Television News: Anatomy and Process*, published in 1969. His answer "Well (in a German accent) when you count up—*one, two, three, four, five, six*—you don't know when you are done."

That's the simplicity of genius. Lang certainly deserves some mention along with the SF writers who "invented" so many of the concepts we now take for granted in aeronautics.

Maury Green  
Studio City, Calif.

#### Silicon Paradise?

I enjoyed your article on the Santa Clara Valley ("Wizards of Silicon Valley," August 1979), but I must take exception to the way the authors described the valley itself. It was once a beautiful, pleasant place to live, but because of the high tech and other growth it is now one big city from San Francisco to San Jose.

The people probably are more friendly than they are in the big eastern cities, but few people would walk the streets alone at night. The city of Santa Clara, in which I've lived for 25 years, has gone from a small agricultural town to a crowded suburban city. Crime is up year after year, the cost of living is astronomical, and the wages for labor are very low. I commute 100 miles a day to earn enough to own a house in Santa Clara.

Silicon Valley may be a better place to live than many others, but paradise it is not.

T. R. Gabriel III  
Santa Clara, Calif.

#### Thanks

The participants of the third Intensive English Institute on the Teaching of Science Fiction at Lawrence, Kansas, under the direction of James Gunn, wish to thank you for bringing the institute to our attention. Most of us were directed to it through your Continuum rubric.

We were immersed in science fiction for three weeks in July 1979. We shared thoughts and experiences with Feederik, Pohl, Gordon Dickson, Theodore Sturgeon, and Lloyd Biggle. We read and heard about the growth of the magazines. We followed the changes in style in the works of the Hugo Award winners.

Thanks to the dedication of James Gunn and his colleague Stephen Goldman, another group of teachers has increased its ability to present science fiction in the classroom accurately, vividly, and with empathy. We have grown in understanding, increased our knowledge, and learned to share along with writers and publishers the experience of the creation of a new cosmos or a novel idea.

Science Fiction Teaching Class  
Intensive English Institute  
Lawrence, Kans.

#### Environmental Savant

When I first read the introduction to your interview with John D. Isaacs in your August 1979 issue, I said to myself, "Who is this lunatic who wants to dump waste into the oceans?"

That introduction made me mad enough to read on, and I was completely turned around on the first page by his explanation that raw sewage should be dumped into the oceans to replace the nutrients that man has harvested from them. Isaacs criticized various environmental agencies and acts, which I admittedly almost worshiped as the lifeline of humanity and nature in the growing self-made lull of pollution and obliteration of entire species. He pointed out some distasteful holes in the agencies' thinking.

Thank you, Omni, for bringing such a man as John Isaacs into your magazine. His interest and insight into the universe are as rare and original as those of the famous men whom he mentioned.

Vincent Stucker  
Camer, Okla.

Thanks for publishing the interview with John D. Isaacs. What a marvelous man Isaacs must be! I have known several Nobel Prize winners who struck me as being less creative than Isaacs, and I can't remember having met an "environmentalist" who made as much sense as Isaacs does. I wish I knew the man personally.

James V. McConnell, Ph.D.  
Ann Arbor, Mich.

#### Who?

Omni, unlike many magazines that ignore the identities of the artists whose work

illuminates their pages, has made a point of giving the credit to these artists, printing their names adjacent to their work in a type size that's actually visible to the naked eye. In view of your usual conscientious attitude toward this matter, I found the omission of this information in the August 1979 issue surprising. I'm referring to the eight prime paintings that were an integral part of the excerpts from *The Notebooks of Lazarus Long*.

Caroline Hewitt  
Hartford, Conn.

As printed in the photo credits on page 128 of the August issue, the names are Lemuel Linn, Gervasio Gallardo, and Carlos Ochoyegawa. —Ed

#### Prizee

The short story "Graveyard Watch" (September 1979) was super. A story about time travel with a plot so simple, yet so ingenious. Was a joy to read. The accompanying painting of tall trees reaching for a bright blue sky was in perfect accord with the story's idea of timelessness.

I hope Gandy will have another short story appearing in the near future.

Charles Stude  
Vancouver, B.C., Canada

My congratulations and heartfelt thanks to Rick Gauger for "The Vacuum Packed Planet" (September 1979). It was truly the funniest piece of fiction I've read in Omni.

Jerry Jeddle  
Laurens, S.C.

#### Educated Tongue

Yes, I can roll my tongue (Continuum, October 1979). What with a B.S. degree and a close interest in the field of science for many years, I can now roll my tongue with particular pride.

My wife can roll her tongue as nicely as I. She has very little interest in matters of a scientific nature. She is an artist and wins national each year for her paintings at our National Pet and Festival and County Fair. How can I tell her that she is a mink? She is likely to tell me to go roll my tongue someplace else.

William Waitman  
Dothan, Ala.

#### Encouragement

I find myself in strong agreement with Stan Kent (First Word, September 1979) concerning the hiring of young people to work in the space business.

Being a young engineer myself, I wish to become involved in space research. But I am often frustrated by the seeming decay of the space program.

I was heartened by Kent's words, speaking for a large group of young scientists and engineers.

Stan, thanks for the encouragement.  
Kim L. Wincigand  
Grand Forks, N. Dak. **DD**

# DIALOGUE

## FORUM

In which the readers, editors, and correspondents discuss topics arising out of Omnis 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 Omnis Forum, Omnis Magazine, 909 Third Avenue, New York, NY 10022.

### UFO over Iran

James Oberg's article for UFO Update in Omnis August issue is rhetorical prose at its worst. Oberg has used innuendo and guilt by association, he has introduced facts that were not part of the original story and then shown them to be false. He introduced the presence of Jupiter and all, but he said that it is the cause of the event while choosing to ignore radar lock-ons by the F-4 chasing the object. I could go on, but it would serve no purpose. Those of us who have studied the Iranian case know that Oberg's presentation of the facts is distorted by his perspective. The fact of the matter is that neither Oberg nor the National Enquirer's blue-ribbon panel was in Iran that night. The events occurred three years ago and are becoming dim memories in the minds of the people who experienced them. All we have left are second- and third-hand stories. This is the fate of all UFO events to date.

I was on the Enquirer's panel that judged this case as "the most scientifically valuable UFO case reported in 1976." I would like to think that we did somewhat more than "merely agree that it sounded like a good story," as Oberg stated.

Oberg takes the Enquirer's blue-ribbon panel to task for endorsing the Iranian case without a thorough investigation. The panel is not a scientific investigative body; it is a group of scientists who meet once or twice a year to discuss stories selected by the Enquirer's mixpanel of representatives from the major civilian organizations NICAP, APRRO, and MUFON. We have not seen a reported case strong enough to be considered proof that UFOs are vehicles, but we have seen many cases that provide us with tentative scientific clues, which may help someone in the future unravel

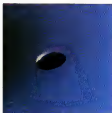
this mystery.

What would be scientific proof? The only acceptable proof is a "close encounter of the third kind," as depicted in the movie of that name, or the neatly completed wreckage of a flying saucer in the Smithsonian Museum for all to look at. I do not think that we will see either during our lifetime. I think that we must take the clues that we have, although many of them may be false, and try to explain them by mathematical theories and then by laboratory experiments.

John L. Warren, Ph.D.  
Los Alamos, N. Mex.

James Oberg replies: If Dr. Warren thinks he can take "second- and third-hand stories" and conclude from them that the Iranian UFO was a doorway into space through which material from another universe can enter our dimension, then he is welcome to keep contributing to the National Enquirer. I cannot see that he has anything of value to contribute to science. Nothing personal, but I think those ideas are some of the most ridiculous UFO fantasies I've run into this year—and the compulsion is pretty stiff! Sorry but the quality of the evidence cannot support such speculation.

In regard to the UFO Update ("UFO over Iran") James Oberg seems to have a problem with his information concerning



the F-4 Phantom's fire-control system.

I believe I would qualify as an expert on that matter. I've spent several years as a radar technician in the U.S. Air Force on the F-4, the same model that [was] sold to Iran. As a matter of fact, Iranians trained with us at Lowry Air Force Base, in Denver.

The "broken weapons control panel" is very ordinary. Since both heat-seeking and radar missiles are usually armed by the radar set, they have an intimate relationship with that radar. Radar enables the missile to be fired. Unless the radar is receiving a target that is within the missile's range, the missile will not be fired. The button, when pushed, would have no effect. It would then seem as if the panel was "broken." Jupiter needn't to say it is out of range of the missiles.

As for Oberg's experts from Tactical Air Command, unless they were radar technicians, they wouldn't be of much help. They are correct, however, in stating that the missile is fired from an electrical circuit separate from the fire-control panel. Even though this is true, the missile button is not a light switch that, when pushed, completes an electrical loop to fire the missile. It is, instead, a complex system that integrates in the logical circuitry of a computer (the fire-control computer) many signals from all parts of the plane. Airspeed, airspeed, airspeed, speed to target, heading of target, missile range, etc., are involved in the decision of the computer to fire the missile. In effect, the pilot asks the computer to fire the missile, the computer then decides and has the final say.

Was, another terminal explanation!

David Holzer  
Denver, Colo.

### Anti-intellectual Ploors

This letter is sent in response to the article in Omnis September issue entitled "Satanism in the Bronx."

Several years ago I attended a small public high school in Florida, which was similar in design to Bronx Science, though perhaps not quite so rigorous or demanding. Reading the article reminded me of my own experience in a special

academic program and brought to mind some of the controversies inherent in a program for gifted students.

The notion of such an elite school as Bronx Science seems an American. It runs counter to our goal of an egalitarian society where opportunities for growth and development are provided equally to all students. To pay for Bronx Science, resources have been diverted from areas of greater need (i.e. from the regular public schools) to benefit only a select few. One wonders whether segregating these bright students from their "anti-intellectual peers" encourages an arrogant and haughty disregard for their fellowmen. These were criticisms leveled at the school I attended.

Implicit throughout the article is an overgeneralization of the role of scientific research in shaping our future. No one can deny that scientists will continue to have enormous influence on our society in years to come, but what about the contributions of art, literature and philosophy? It would be unfortunate if those talented youngsters missed out on these other important human experiences. William K. Stuckey claims that the students of Bronx Science "are being groomed to shape the twenty-first century for us." In fact, the future will be shaped by all of us, scientists and nonscientists alike.

Sean Eaton  
Lansing, Mich.

#### Wild-eyed Doomsayers

I missed the March issue of *Omn* but have just seen in the August issue Brenda Cella Thomas's letter mentioning the Arthur Clarke interview and The Jupiter Effect. I suspect Clarke knows, but Thomas clearly does not, that the book does not prophesy global calamity in 1982. Rather, Steve Paganianni and I prophesy a modest but significant increase in global seismic and volcanic activity with a strong probability that the southern part of the San Andreas Fault, now overdue for a major shift, will be among those triggered. Los Angeles may suffer, but that wouldn't be the end of the world.

Critics of the idea should read our book before pulling their criticism into print, equally those wild-eyed doomsayers who cite us as scientific support of their crazy ideas should read what we really have to say before claiming that "the end of the world is nigh." If they did, the book might then really become a best-seller, instead of the modest success it has actually been so far.

Dr. John Gribbin  
Bighton, Sussex, England

#### No Gardens to Tend

I want to respond to Daniel W. Preston's letter in *Forum* (September 1979) concerning our species' expanding into space.

I share similar feelings about expanding into space. Considering the present world situation and the direction in which we

seem to be heading, however, I cannot help thinking that if we do not expand our "gardens" elsewhere, we may not have a "garden left to tend."

Alfred B. Davis  
Fort Collins, Colo.

Daniel W. Preston's "Tending Our Gardens" letter in *Forum* seems to convey the idea that expanding our spaces into the galaxy would be a waste of time and that we should learn to live together before venturing into space.

I don't mean to say that all is well here on Earth. I feel, considering the lifespan of a galaxy that we have come a long way and have learned a lot in a short period of time. And I believe that with our ability to obliterate our planet completely, our species is doing quite well. When would the world be without exploration anyway?

Remaining here on Earth to tend our gardens with hopes of better success will only prolong our agony or perhaps quickly put us out of our misery. I would gladly leave my garden in someone else's capable hands for two tickets to the stars to do my part in making sure our species survives.

Timothy R. Philpott  
Besseff, Va.

#### Health Risk

I am writing the letter in response to the article "Brain Pollution" by Douglas Coligan (Continues, August 1979) concerning the combination of the two gases carbon monoxide and nitrogen dioxide. Coligan claims in his article that the two may cause alcoholism and brain disorders.

My concern is that I work in an environment in which there is a high concentration of both of these substances. What are the dangers? And what are the steps involved in protecting myself and my fellow workers?

Stephen LaScala  
Bayonne, N.J.

Douglas Coligan replies: The article didn't say the two gases carbon monoxide and nitrogen dioxide cause alcoholism and brain disorders, just that they seem to aggravate the conditions when they are already present. People with these problems are more sensitive to these gases. As far as protecting yourself goes, probably the best thing to do is to get a job in a cleaner environment. Short of that, the other things you can do are not to smoke, or to quit smoking if you already do, and make sure your working conditions comply with those laid down by the Occupational Safety and Health Administration. The most immediate danger with any kind of air pollution is to your lungs, but if the St. Louis study is accurate, it looks as if air pollution may take it's toll on the brain as well.

This may help a little. The important thing is not to assume that these pollutants can cause alcoholism and brain problems

#### Sinus Sunrise

I should like to comment on Carl Sagan's remarks about Sinus ("White Dwarf's and Green Men," August 1979).

The only mystery as to why some ancient astronomers observed Sinus as red lies in some modern writers' inability to see obvious facts. Most ancient observations of Sinus were conducted to determine when it was going to rise with the sun in other words, when it was rising near dawn. Naturally at these times, it was near the horizon and its light would pass through a thicker layer of atmosphere than it would when the star was at its zenith, where stellar observations would be made. The atmosphere would filter out the blue wavelengths of light from Sinus, and so the star would appear red, just as the sun would when rising a little later. Such observations were no more seeing a red dwarf star in the neighborhood of Sinus than they were seeing a red dwarf star in the neighborhood of the sun.

Gema Daines  
Brooklyn, Poughs, Wisc.

#### Bylinsky's Unravel

In his otherwise impeccable article "Life in Darwin's Universe" (September 1979) Gene Bylinsky makes a statement that at first blush sounds so logical that it might be unhesitatingly accepted at face value: "... based on a larger planet, for instance, would be short and squat." Gravity is an absolute decelerator of the vertical dimensions of living, growing things. Gravities greater might inhabit a low-gravity forested planet," referring obviously to a nearby illustration depicting two such creatures, the neck of one appropriately bent in the shape of a question mark!

We have but to look about us, on our own planet, to see abundant refutation of such a supposition. For instance, the tall giraffe versus the squat turtle, the towering redwood versus the sprawling ground vine, and innumerable grasslands in between, all on the same planet under the same gravity pull. Differences in gravities may not be as effective as Bylinsky assumes.

Ken Deardorff  
St. Louis, Mo.

#### Second-guessing

In response to the editor's comment concerning a letter from Douglas Lowe in *Omn's* October issue, why doesn't *Omn* show some initiative and send a correspondent to the Three Mile Island area and ask residents there how they feel instead of second-guessing them?

Stephen T. Pelzner  
Riverton, Wyo.

We have already sent a reporter to the Three Mile Island area for a first-hand account. You can read Stuart Diamond's comments for yourself in September's Last Word! — Ed. **OO**



# VISIONS OF MONO

## EARTH

By Kenneth Brower

**T**he alkali storm thinned; its white curtain turned diaphanous, and behind it a vast desert lake materialized. The lake's blue developed like a photograph before my smarting eyes. I dropped the bandana covering my nose and mouth. The wind still blew hard, but the last lagging furies of alkali had accumulated, and the thin air was as flawless and life-giving as any I had breathed on Earth.

The lake's blue was the only primary color in a basin of desert pastels. The lake seemed to be a mirage in the endless, an enormous improbability. There were two islands near its center, both of volcanic origin, one whitish and the other blackish, both capped by dark conical cones. The white island had a special appeal. I found my attention lingering there.

The lake's western shore was a lofty serris. In isolated spots on the highest mountain slopes lay patches of what appeared to be water snow. There might have been some water ice as well—the valleys of the range had the U shape

characteristic of glacier-carved valleys—but the glacial ages on the world were clearly long past. North, south and east of the wide alkaline bowl that contained the lake stretched low foothills of open desert.

The lake was patchingly saline. Its concentration of dissolved solids—mostly chlorides, sulfates, and carbonates—was three times that of the oceans. Its pH was almost 100 times as alkaline. Its buoyancy was so great that the measuring stick tried to jump out of my hydrometer.

And yet the lake was inhabited. The water teemed with primitive, crustaceanlike creatures that I decided to call shrimp. My companions were tiny but numerous. They had clear-cut heads with black eye specks at either end. They propelled themselves with a wavelike motion that traveled through the caud on their sides. The water was a thick soup of shrimp, the lake must have held billions. They seemed to be all of one species, yet they were of different colors, mostly red or green, but sometimes ochre and

turquoise. Was it different things they ate? Different metabolic phases? Or some sort of invertebrate caste system? I had no idea. I watched with admiration as they rowed themselves about, looping up or down occasionally in limnelmann turns. Somehow in the utterly basic chemistry of that water they carried on their own internal chemistry. In some way they maintained internal fluids against the monstrous pull of that salinity. There was a testament to the ingenuity and dumb courage of life in this universe.

In the next few days I seldom ventured far from the lake. Perhaps I was drawn by the life there, the mute but multifarious companionship of the shrimp. I explored the endless ghettos. Here and there on the alkali flats stood towers of calcium carbonate. A few were solitary but most were in rows, looking for all the world like the columns of ancient parthenons. Some stood knee-deep in lake water, like the ruins of Atlantis finally exposed. Some stood inland, vast and trunkless legs of stone against which dunes gathered. I would have believed them to be remnants of dead cities, except that here and there a tower had toppled, exposing its cross section. There was no marble inside. The outer layers of calcium carbonate simply coated inner layers.

I wandered from one false city to the next, seeking shade. For the towers provided the only shelter from the sun. In the heat of midday I napped under them, moving often to follow the thin apron of shadow revolving around them with the sun. When the temperature had dropped a bit, I set off for the next false city. Water mirages shimmered at the alkali plain, and the white towers ahead danced there, welded in a coolness that did not exist.

I discovered freshwater springs. They bubbled up in dark, circular pools on the alkali flats or seeped out from the dunes at the edge of the foothills. Most of the spring water was too hot and sulfurous to drink. Some of it was marginally potable, if you forced yourself to swallow. And a few of the springs had water that was cold and good, lanted only slightly by sulfur.

This world had been called Mono by



Deposits of calcium carbonate from fossil springs have created these white spires of Mono Lake.  
20 ENVY

observers seeing it for the first time. The name must have been derived from the seating monotony of the place when seen from above. And yet, like much of the terrain we too quickly describe as wasteland, Mono is lovely.

I became the James Hutton and Sir Charles Lyell of Mono's geology. I came up with a theory that explained its towers naturally. Noting the resemblance of the towers to the stalagmites of limestone caves on Earth, and realizing that most of its springs occurred near the towers, I decided that the towers were simply fossil springs. They were ancestors of the geeration I drank at. Bubbling up through the lake bottom, calcium in the fresh water combined with carbonates in the lake water and precipitated out.

This first theory led to a second and more ominous one. My towers could form only deep in the lake, below the influences of wind and surface currents, yet many now stood high and dry. Some were several kilometers from the lake, marooned on old beach terraces. The lake was shrinking. The alkaline flats surrounding it were expanding. Mono's lake was nearing the end of its time, or at least the end of a cycle.

The lake was not left at a first had seemed: an ecosystem of just one organism. A second creature occurred in numbers nearly as overwhelming as the shrimp. I wanted to call these others flies but, to avoid prejudice, named them muscoliforms. They looked, even buzzed something like our houseflies.

Farther out on the lake were ornithoid creatures of several species. The largest were white, the smaller kinds more drably colored. They were all good fliers but spent most of their time on the water.

I often came upon dead birds that had washed ashore. They were encrusted with an alkaline precipitate—the tale of anything that remained indelible for long enough on the lakeshore—yet they still showed a remarkable resemblance to earthly birds. Again I felt uneasy.

On the lesser corpses, the alkali gave the breast feathers a stiff sponginess, as I found when I poked with my finger. On older corpses, the breast feathers were as hard as rock, on their way to becoming fossils. The same would happen to me. I realized, once I ceased moving, my beard and hair would feel go white and as stiffly porous than turn to rock. I quickened my pace.

I found my interest returning, again and again, to the whitish island at the center of the lake. The island had an attraction—perhaps just the attraction of all islands, the magnetism in the idea of insularity.

One day on reaching the shore near its sister island, the black one, I saw that the latter was not an island at all. It once had been, but the shrinking lake had recently exposed a land bridge, making it a peninsula. I walked to the peninsula's southern end. There, across a narrow

channel, I faced the white island. I paused for a moment, then made a buoyant crossing.

The northeastern tip of the island was a black peninsula of fumaroles and steaming vents. A number of white ornithoid creatures had gathered just off the shoalier rocks, paddling about slowly in the fumarole-heated water. I was watching them, wondering why they were drawn here. Did the hot water kill their mates, or did they come for the hydrogen reasons for which humans go to spas? Then I saw the two dwellings.

They stood overgrown by scrub vegetation on a sandy flat above the peninsula of fumaroles. I bushwhacked my way toward them with a growing apprehension. In 15 minutes I stood, sweating, before the first. It had a green patina, as if it were made of bronze. It had an odd, walled, pressure-vessel ceiling. It had windows at about the right height for humans to look out at the lake. I didn't know what to make of it. It looked like

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something I saw at a sale by Jules Verne.

Outside the second building, I saw the ancient tractor. It was crumbling with rust. The emblem on the grill said "DeLion." I fell to my knees, driving my fist into the sand. There was no way convergent evolution on another planet could have produced these settlers that English name.

"Earth!" I roared. They did it if they finally did it. They turned Earth into a desert."

Of course I didn't really grow that. (I had known all along what planet I was on.) I stole the gear from the time warped Charlton Heston, when, at the end of Planet of the Apes, he sees the ruined Statue of Liberty. But everything else is true. The lake was named Mono by the people of the first probe—a probe conducted not by remote carthase but on foot—by early North Americans. Mono is a Paiute Indian word, nearly an acronym for monotony. It means, beautiful. Mono is the largest lake entirely in California. The shrimp that inhabit it by the billion are brine shrimp, genus *Artemia*. (Brine shrimp really do conduct all their business by

waving their arms— their phyllopodia, rather. Nobody knows why they occur in so many different colors. The muscoliforms are brine flies. The white ornithoid creatures are California gulls, one fourth of whose world population breeds here. The smaller ones are eared grebes, phalaropes, egrets, and ducks. The towers of calcium carbonate are indeed fossil springs. The mountains to the west are the Sierra Nevada. The white island is named Pasha and the two buildings on it are the bathhouses of an abandoned spa.

Mono Lake is indeed shrinking. We are indeed turning much of the eastern side of the Sierra into desert. Mono demonstrates the problem with that old myth about making the desert bloom: you create another desert, someplace else. It's hardly a new lesson in this part of California, nor one that needs repeating. The whole story was played out before, in Owens Valley to the south. Owens Valley was once fertile rangeland and Owens Lake, a great sailing body like Mono. Los Angeles, to water its phenomenal growth, drained Owens Valley and rendered Owens Lake a dustbowl. The ranchers of the valley were no match, politically or financially, for the water masters of an enormous city hundreds of kilometers away. In recent decades Mono's water level has been dropping steadily as its feeder streams, in their turn, have been shunted south to Los Angeles. The lake has fallen 10.5 meters as the result of diversions. The alkali flats grow larger, more and more alkaline, dust to come aloft in the wind, and great clouds of it threaten human, plant, and animal life for hundreds of kilometers around the lake. The lake's salts have been concentrating and may prove too much even for the excretory systems of the brine shrimp. The great flocks of migratory birds that depend on the shrimp are thus endangered. The recently exposed land bridge that I crossed to the black island (which is named Negit) can be crossed by coyotes just as easily. Coyotes do cross, and their trails now ramify through a coyote paradise of gulls' nests. About 30,000 California gulls traditionally nest on Negit Island. This year, for the first time, they refused to do so, and not a bird was fledged on Negit. San Franciscans will notice the difference in the next several years. Los Angeles is making a desert of California's coastal skies, as well as of its inland ranches.

This year the Interagency Task Force on Mono Lake has recommended that Los Angeles give up 85 percent of the water it diverts from Mono and that the lake be allowed to fill 5 meters above its present level. Such measures will be necessary if the lake is to be saved. The Los Angeles Department of Water and Power has loudly protested the task force's recommendations, and it is grating for a long fight. In the next few months the fate of the lake will be decided. ☐

# THE REEFS OF SPACE

## SPACE

By Mark R. Chartrand III

**W**hat do the following have in common: Russia and Indiana, Ankara and Tokyo, Sapporo and Brumfiel, Kleopatra and Kepler, The NOFC and Esperanto?

Guess again: They are all asteroids named for some favorite of their discoverers.

But why should anyone care about these myriad tiny bodies, each less than 1,000 kilometers across, which play cosmic bumper cars between Mars and Jupiter? Their total mass is hardly one-thousandth that of Earth's, most never get close enough to be seen clearly, and certainly none harbors life.

Their attractions are many: the chance to name some cosmic real estate, the continuing challenge of understanding how our solar family moves, the hope of studying primordial material, the prospect of mineral resources and way stations to the outer planets.

The first asteroid discovered—most astronomers now call them *minor planets*—was spotted on the first night of the nineteenth century by Italian

astronomer Giuseppe Piazzi. He named it Ceres, after the patron goddess of Sicily. Astronomers congratulated themselves on finding a planet that filled in a large gap in the orderly spacing of the planets.

Soon other planets were found, and by 1800 about 300 were known. Most had been given names from an international pantheon of gods, demigods, and heroes/mermaids. With the invention of photography, the number of discoveries swelled, and the supply of deities' names was nearly exhausted. The names of winds, lovers, dogs, laws, and African shrubs crept in. However, except for the orbit calculators, few astronomers were interested in these planets.

But in the past decade we have come to realize that these bodies preserve an important record of the formation of the planets. Unlike the major planets, which have been greatly altered since their formation, these time capsules have remained unchanged for 4.5 billion years except for some collisions. They should still be similar to the protoplanets that astronomers call *planetesimals*. They

could be Rosetta stones to decipher our solar system. For this reason, space scientists hope to send up an asteroid rendezvous probe in the late 1990s.

The 1979 catalog of minor planets lists 2,042 objects with well-known orbits. Hundreds of others are less well known. We estimate that there are 100,000 asteroids bright enough to be photographed from Earth and that there are millions of undiscovered chunks.

Science-fiction stories used to depict the asteroid belt as the reefs of space into which rocket ships ventured at great risk. Since then we have sent several spacecraft through with fewer collisions with small particles than we expected. That's not to say that collision with a large rock—fist-sized or larger—couldn't destroy our probes. But such encounters are rare in the vastness of space.

The composition of asteroids is still a puzzle. Some seem to be made of metal, the remains of bodies big enough to heat up and melt, thus forming an iron core similar to Earth's. Other asteroids are of a light, rocky material, quite unlike the moon but similar to one kind of meteorite.

Most of the tiny fragments that appear as meteors are probably chips of asteroids, flung free by collisions. So far they are the only pieces of asteroids we have been able to get our hands on.

It's the asteroids themselves that would-be space colonists are after. One plan would have us travel to the asteroid belt, build rockets on a small asteroid, and boost it back to Earth. Other asteroids might be hollowed out for use as space stations. The rocky asteroids could supply water, oxygen, and other light elements lacking in the lunar soils colonists would be using. The metallic asteroids would supply almost pure iron alloy. (An asteroid only one kilometer in diameter contains as much iron as is produced on Earth in eight years, about four billion metric tons—and it's already refined.)

In the meantime, if you discover an asteroid you can name it whatever you wish, with the approval of the International Astronomical Union.

Hint: So far, there's no Ormsel! ☐



A comet cuts through the asteroids, remnants of the solar system as it was 4.5 billion years ago.

# SYNCHRONICITY

## LIFE

By Dr. Bernard Dixon

**E**fter this year I drove to Heathrow Airport, near London to fly over on a visit to Olin's offices in New York. I arrived at the parking lot, stopped outside the reception office, collected a ticket, and got into my car.

But I want my car. It was precisely the same model and color as mine and had been parked right next to mine. Just as I was doing a double-take, its owner appeared from the office. We gazed at each other and drove off to our allotted places in the maze of automobiles. As we locked our vehicles—again alongside each other—I noticed the man's suitcase it was virtually identical to mine. We boarded the minibus and commented on this extraordinary coincidence. There was more to come. When the driver inquired which terminal we wanted, our replies were identical. We were booked on the same flight.

I've long been skeptical about the "meaning" of coincidental events. But this episode shook me. I pondered it for weeks afterward and even tried to work out the odds against such an incredible sequence. You start backward: What proportion of people arriving for that particular flight would be expected to use the airport's parking facility? What fraction of those might own a particular model of Fiat car? And so on. Even using the most helpful suppositions, the odds against that precise experience were astronomical.

The whole thing came back to me when I read two fascinating books recently. They are *The Tao of Psychology* by Dr. Jean Shinoda Bolen (Harper and Row) and *Unsolvable Coincidence*, by Alan Vaughan (Lippincott). Both set out to explore the concept of synchronicity, as used by the psychologist Carl Jung to describe "meaningful" coincidences that have no apparent cause.

Although Bolen's work is the more scholarly and Vaughan's is journalistic, each hangs upon the perception of significance in the sort of occurrence Jung himself employed to illustrate the idea of synchronicity. He wrote about an unusually logical patient, someone he felt was not an ideal candidate for analysis, and of his

hope that "something unexpected and irrational would turn up, something that would burst the intellectual reform into which she had sealed herself." During one of their sessions, it happened. The woman was telling Jung about a dream in which she had been given a golden scarab—an expensive piece of jewelry. At that moment, Jung heard a gentle tapping at the window behind him; it proved to be a scarabized beetle, whose gold-green color closely resembles that of a golden scarab.

As Jung reflects, "I handed the beetle to my patient with the words, 'Here is your scarab.'" This experience punctuated the closed hole in her rationalism and broke the ice with her intellectual resistance. The treatment could now be continued, with satisfactory results.

Jung built much upon experiences of the sort, as do his two present-day followers. All concede—indeed positively urge us to understand—that synchronicity is a subjective phenomenon rather than an objective one. The subject participates

actively, giving his or her personal meaning to the coincidence. And what is true of specific experiences is clearly true of people who ponder these things. Dr. Bolen sees synchronistic events as "glimpses into the underlying oneness that also comes through to us in Tao experiences." Vaughan reviews a mass of evidence—a 1972 novel whose plot closely parallels the 1974 kidnapping of Patricia Hearst, a lead coffin that floated 2,000 miles home after having been swept to sea in a storm—and tries to persuade us that nothing happens by chance.

Although neither of these two authors has convinced me, I take their central point. We all encounter surprising coincident events—between events, between our imagination and reality, between dreams and conscious or "false reality." Most of us ordinarily dismiss them as capricious accidents and minimize them by calling upon the innumerable instances in daily life when random events do occur. This rational stance is broken only when a coincidence strikes with such telling clarity that it cannot be pigeonholed.

What occurred at Heathrow was the first event I'd ever experienced that approached the category. It bothered me, but not because I saw any deep meaning in the happening. It was simply the realization of how profoundly baffled and disturbed it had left me. If the sequence of events had had emotional substance instead of being centered on humdrum details like the make of an attaché case, I might well have become a disciple of Dr. Bolen or Mr. Vaughan's. Imagine, for example, a comparable series of three or four consecutive occurrences involving a "chance" meeting at an airport with a stranger reading a copy of the same book you are carrying—a book that had deep personal significance for each of you. You then discover that you are booked on the same flight and are both going to visit a friend who is dying of cancer.

Such an experience would have emotional impact, and I do not believe that I could accommodate it intellectually—as I was able to deal with an otherwise similar course of events at Heathrow. **DD**



Tao integrates synchronicity with aesthetics

# THE ARTS

By James Dolsen

**J**oe Hershaw is vice president in charge of production for American International Pictures. In the summer of 1979 two AIP films made under his supervision, *Love at First Bite* and *The Amityville Horror*, raked up an incredible \$100 million in box-office grosses, making them the two most successful movies in that company's history. Hershaw becomes keenly involved with his projects at AIP just as he did in his years at 20th Century-Fox and Cinema Center Films, for which he brought *Little Big Man*, *The Poseidon Adventure*, and *The Towering Inferno* to the screen. "I made the original deal for *Star Wars*, too," Hershaw said, "but the rest of the credit goes to George Lucas and his incredible production team."

While supervising postproduction work on *Meteor*, Hershaw took on the task of correcting the errors he saw in director Ronald Neame's hybrid of disaster and space-hardware films. "There wasn't anything wrong with the film, really," Hershaw said. "It just ran slowly. Howard Hawks once told me that it's not what you

take out of a movie that counts; it's what you put back in. Sometimes making it longer can make it seem shorter. All I'm doing here is putting back some of the things Neame cut out, re-arranging things so the picture will run better."

"Neame and I watched the first six reels together the other day, and Neame was pleased with what I've done."

Hershaw admitted to me, in September, that *Meteor* would cost about \$20 million, \$3 million over budget, and its release date had been moved from June to October. Hershaw estimated the picture would take in better than \$25 million in the United States alone.

Since its inception three years ago, the *Meteor* project combined the best and worst of contemporary filmmaking. One good point was its unique financing plan in which its backers put up their money in exchange for distribution deals in the regions they chose to cover. Thus, American International paid for U.S. distribution; Warner Bros. bought most of Europe; Shaw Brothers Ltd. of Hong

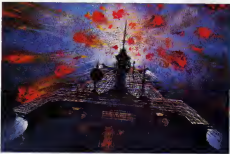
Kong paid for the Crown Colony and other parts of Asia; and Nippon Herald Film, Inc. of Japan, Stockholm Film, A.B. of Sweden, and Naz Film Company of Iran, each paid for their respective territories. This tactic enabled the producers to raise the money they needed, but other problems developed soon afterward.

The financing was based on a finished script and on an "package deal" that guaranteed the presence of the film's stars: Sean Connery, Natalie Wood, Karl Malden, and Brian Keith. Also included was its distinguished director, Neame, whose previous credits include *Times of Glory*, *The Poseidon Adventure*, and *The Prime of Miss Jean Brodie*. Unfortunately, the film couldn't begin production until its many special effects had been properly designed, laid out, and perfected.

As *Meteor*'s production schedule chugged along, Neame was on or below budget in all areas except special effects. His failure to bring these crucial sequences in on time began causing delays. "There's no villain here," Hershaw said, "in effects you can write out a budget, but it's impossible to be accurate."

"It's simply that mechanical things don't always go right. You can get a dump tank to run late the set with thousands of gallons of mud, but if something goes wrong, you've just got to do it again, even if it means having to wait three days while the set is cleaned and the stunt is rigged again. You can go with the first take, or you can do it over until it comes out right. Taking the time and spending the money on getting the effects perfect is an investment, not to mention a necessity when audiences are concerned."

Taking no chances with the film's outcome, Neame dismissed his first effects unit after they proved unable to deliver the required sequences. His next team was better, but they, too, had their limitations. Finally, last May, a third effects unit, led by *Star Wars* Academy Award winner Robby Bottick, took over. By September a few other effects houses had been called in to supply the remaining shots needed for the film's release.



Special effects are more difficult, intricate, and expensive in *Meteor* and *The Black Hole* (above)

A JOURNEY THAT BEGINS WHERE EVERYTHING ENDS

# THE BLACK HOLE

## THE BLACK HOLE

STARRING MAXIMILIAN SCHELL, ANTHONY PERKINS, ROBERT FORSTER,  
JOSEPH BOTTOMS AND YVETTE MONTEUX AND ERNEST BORGNINE

PRODUCED BY RON MILLER DIRECTED BY GARY NELSON

SCREENPLAY BY JEB ROSEBROOK AND GERRY DAY

STORY BY JEB ROSEBROOK AND BOB GARBASH, RICHARD LANDAU

PRODUCTION DESIGNER BY PETER ELLENSHAU

MUSIC COMPOSED AND CONDUCTED BY JOHN BARRY

FROM WALT DISNEY PRODUCTIONS

READ THE BALL-NET BOOK

STORY BY GUY DE MOBIUS

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WALT DISNEY PICTURES PRESENTS

COMING AT CHRISTMAS

Meteor is only one of several science-fiction films that have run up against the increasing difficulty of shooting a film's special effects. Each movie must be brought in on time and on budget yet be sophisticated enough to convince post-Star Wars audiences. Meeting these needs has hindered a number of 1979 pictures. Alien, committed to open on May 25 under its worlded release schedule, had to be less elaborate than originally planned. Star Trek's original effects team was replaced after months of inconclusive work. The flying sequences in Superman were never properly filmed.

At root, the problem rests with the film community's misunderstanding of what effects are. After Star Wars, film studios left over one another trying to be first out with super SF movies. The result was a series of pictures whose story lines should have been heightened by strong effects not built around them. Instead, the effects teams, unprepared and rushed into filming before they had worked out ways to achieve their visuals, simply could not present work equal to Star Wars or Close Encounters. The strong films suffered, and the weak ones died. This didn't sink the field, but nothing since has done as well. Yet the potential has been there in several instances. I am convinced, for instance that if Ridley Scott had been allowed more time to complete Alien on his own terms, it would have done far better at the box office.

Perhaps Hershaw's efforts will pay off. Filmmakers planning big effects pictures should heed his advice.

It was very quiet on the giant soundstage at the Walt Disney Studio in September as workers diligently prepared a miniature model for one of the many special-effects shots that will appear in the \$20-million space adventure *The Black Hole*. The film was entering its final weeks of production, and the feeling around the studio was that, at long last, a Disney movie would rival any other picture produced this year in its sophisticated effects, excitement, and more important, broad audience appeal.

"This could be the one," said director Gary Nelson, whose previous credits include TV's epic *Washington Behind Closed Doors*. "Everyone around here is counting on *The Black Hole* to bring Disney out of the lull in the market and place it in the general audience alongside other major studios."

Announced several years ago under the title *Space Probe*, *The Black Hole* faced numerous delays, including the untimely death of its first producer, Winston Hibler. Then Ron Miller, Disney's executive vice-president in charge of production and creative affairs, reactivated the project. He brought in Peter Ellenshaw to design the film's overall look and special effects and Ellenshaw's son, Harrison,

who had done brilliant work on *Star Wars*, to supervise creation of an astounding 150 matte paintings.

With a budget twice that of *May Poppins*, Disney's greatest live-action hit to date, *The Black Hole* must pull in an enormous audience to show a profit. Consequently, the film will be Disney's first PG-rated movie. Its cast, which includes Maximilian Schell, Ernest Borgnine, Anthony Perkins, Yvette Mimieux, and Joseph Bottoms, has been carefully chosen to appeal to as wide an audience as possible.

For a long time Disney films looked like reruns of Oz and Harriet, with generally white, Protestant, middle-class "kids" living out 1950s fantasies in the same old way. But as the Seventies progressed, a few chicks began to show in the world that Disney created and the coast line came on.

Blacks began appearing in featured roles, e.g., John Amos in *The World's*

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*☛ All the artwork resembled state-of-the-art spaceships, like you'd see if you went into NASA. Who's to say whether we'll be building the same spacecraft in the future? What's the need of sleekness when you're in a vacuum? ☛*

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*Greatest Athlete*. New realities about life began insinuating themselves into plots, too. With such projects as *Land at the Top of the World*, *Bedknobs and Broosticks*, and *Pete's Dragon*, villains of more than cardboard dimensions appeared. Production values improved over the old studio feeling that had dominated Disney products for a decade, and Miller's stamp slowly became apparent.

With *The Black Hole*, Disney staffers have begun to hope the studio can become part of the Hollywood mainstream, no longer a cloistered sanctuary for virgins, mall shops, and high-school pranks. But will Disney really take its place alongside the other major studios? Will its films be seen by general audiences, not just school kids and babysitters?

The *Black Hole*'s design was pushed far beyond Disney standards, reflecting Peter Ellenshaw's desire to go out with a memorable effort.

"As this is my last film," he said, "I want people to see it as the climax of my career, not just the last work of a tired old artist. I've tried to make this as different as

possible from the other space films coming out from top to bottom, especially with our giant space platform, the *Cygnus*."

When Ellenshaw joined the project Miller had been working with noted space artist Bob McCull on designs for the massive space ship, the set for much of the film's action. "Ron took me round to show me what Bob McCull had done, as one shows off a new baby," Ellenshaw recalled. "He didn't want anything but praise. Well, I said very little. What could I say? They were wonderful, but something worried me about them. Ron was understandably perturbed."

"Then I realized what it was. Here we were planning a futuristic film, and all the artwork resembled state-of-the-art space ships, like you'd see if you went into NASA. Who's to say whether we'll be building the same spacecraft then that we're planning on for the next ten years? What's the need of sleekness in a vacuum? These things could have the most awkward, open-scaffolding look because there's no friction in space. So I persuaded Ron to let the fear away the slab-sided shell of the ship and show its inner workings."

Ellenshaw's marvelous ship, built from scratch by Disney technicians, took more than six months to construct, and it took another year to film it with the other major Disney innovation on *Black Hole*, the ACE (Automated Camera Effects) system. Similar to the automatic camera systems used on *Star Wars*, *Close Encounters*, *Star Trek*, *Battlestar Galactica*, *Black Panther*, and the other hardware films, this system allowed the Disney production team to create better visual effects than were possible in the company's earlier films.

"It was really a great idea," Harrison said. "The camera system was designed to become more sophisticated as its operators stored new knowledge into its memory systems. We've made this picture under ideal conditions. Unlike the other special-effects films coming out when we do, we're on schedule and under control. If *Black Hole* works, then I'm sure they'll use the ACE system again and make an even more sophisticated series of effects films with it."

But to do that, they've got to keep pushing for better scripts, better talent behind the cameras, and a more universal approach to filmmaking.

Much the same can be said for the Disney Studio. The fabulous organization that Walt Disney welded together over his lifetime presented the best animated films of their day and often released classic live-action children's pictures as well. But since Disney's death the studio has fallen on its disrepute among serious filmmakers and with audiences, too. *The Black Hole* must be only the first step toward reviving Disney's slipping fortunes. Its success would mean a new era of first-rate entertainment from the studio, making it again one of the major Hollywood powers. **DC**

## THE ARTS

By Bibi Wein

There has always been something special about the reality of different ensembles making music in the same physical space. It is as if the whole of the universe was swallowed up, leaving us in a sea of music and color, writes Anthony Braxton in his liner notes to *For Four Orchestras* (Arista), the first work of its scale to appear on a major-market American record label.

Recorded at Oberlin College under the direction of four conductors connected by television monitors, the two-and-a-half-hour piece is scored for 160 musicians, most of whom sit in revolving chairs so that the trajectory of each sound or sound collage can be controlled. *For Four Orchestras* represents the first of nearly a dozen multiple-orchestra works that Braxton, an internationally acclaimed jazz artist, is conducting from a central pool of sound/space relationships.

Series A concludes with a work for 100 orchestras in four cities. Series B starts with a piece for three planets and proceeds to works intended for a performance between galaxies.

The skeptical insist that Braxton is kidding or attributing such projections to a grand and preposterous whimsy akin to the spirit of certain outrageous monuments conceived by the sculptor Claes Oldenburg. But Braxton is absolutely serious.

In the 'Twenties and Thirties," he argues, Edgard Varèse postulated the whole period of electronic instruments and he wrote for those instruments when they weren't available. So why can't I talk about a piece for galaxies? Multiorchestralism is directly related to intergalactic creative possibilities, and I'd like to have some music prepared for that juncture when it's complete. It's never completed. I haven't lost anything.

Born in Chicago 34 years ago, Braxton has recorded nearly 30 albums, on which he plays nearly as many instruments, including all members of the saxophone, clarinet, and flute families. He plays bebop, he plays space, linear riffs, he plays fierce clusters of sounds in dense masses. His work in the jazz idiom spans

an emotional and stylistic range from the somewhat stiff, intelligent "Lustino/Konitz" Marsh school to the liberated radicalism of Ornette Coleman and Albert Ayler. As a composer, Braxton continues to imitate his own forms, frequently intertwining notation and improvisation in structures that open and close. In Braxton's music, one can hear echoes of Stravinsky, Weber, Gerstwin, Cage, Ives, and Mingus—sometimes within a few bars of one another. *For Four Orchestras* has musical roots in Xenakis and Stockhausen, as well as a spiritual precedent in American Indian forms, in which exact performance spaces were calculated with a different spiritual meaning ascribed to each degree.

Braxton is working toward a coding of zones and trajectories of performance space, based on a complex set of variables he calls time/space coordinates. "Let's say the composition would be two hours long," Braxton explains, "and for another variable it would start at twelve o'clock in the period of Cancer. And so maybe at twelve thirty a particular information line of notes would come in this direction in time and space. Remember

it's not just a space. Time and trajectory are very important. I'm in the process of coding all these elements. I'm researching all kinds of things, including the properties of shape and color and what I call principal information in world culture—the history, the usual, the function of what principal elements used to mean."

Braxton's ambitious thrust toward a work in which "the total performance is not separate from what is being performed" has origins in the parade music he loved as a child and in the big-band battles that were legendary in his neighborhood. But his music's reputation for being difficult is not entirely undeserved.

Many of his compositions, concerned with space and time, have no dominant melody for the ear to grab, harmonies are frequently dissonant, and Braxton's bold exploration of the highest and the lowest registers of such instruments as the eight-foot-bell combi-tone saxophone, which hardly anyone else plays, produces sounds few of us have heard before.

Braxton himself says, "Anyone who hears the music should understand it. It's for the average person. I am the average person. My music makes sense to the time zone that I'm in. I'm not the only person in zone five-oh-six. I got to zone five-oh-six by passing five-oh-five."

But Braxton's philosophy implies that his work will be best understood at some future time, when art will be perceived and interpreted very differently. My belief is that we're moving toward a period of total vibrational change—a change I would call transformational. I am hopeful that suppressed peoples will move into a stronger defining position, and that will mean a complete transformation for given areas of information and how they are interpreted. I'm not saying the world will be just one big, sweet roll. But I like to think we'll be dealing with the next set of problems with higher aspects of information.

"I'm trying to understand how music is perceived and how it's been perceived," Braxton told me during a long conversation at his home near Woodstock, New York. "What we call music is merely



Braxton and combi-tone spatial dynamics



one discipline related to a lot of other disciplines. At the heart of the inquiry, I'm trying to align, I'm trying to contribute an alternative methodology that's relevant to all musicians—the improviser, the composer, the instrumentalist.

Every aspect of this methodology comes with a broader implication. Take direction: if the sound is played straight at you or if it comes from the back or if it's played at your feet, it should mean something. That's what I'm interested in correlating all these various information lines. Not applying a meaning but, I hope, aligning things in such a way that they are conducive to meaning.

I really feel that this planet is just one small part of what's happening. This is not it. This is part of it. But... I need more research.

Braxton laughs at himself, then goes on to state a major premise of his work. By understanding and codifying the laws common to world music, he believes, one could discern or create a music for every information line—music that could cure a headache or relate to problems in nuclear fusion or guide you to the best way of going from A to Z.

Although Braxton has heard only a handful of compositions from a repertory already 300 works deep, he's too busy writing, researching, composing and playing to complain about his adversaries who laughed when a work for five tubas appeared in *The Complete Anthony Braxton, 1977*. Some of the critics who lavished praise on the stunning jazz ensemble *Creative Orchestra Music* have dismissed the more ambitious *For Four Orchestras* with a few snide remarks and a shudder. The classical or new music community if it is aware of the recording at all, has, of this writing, ignored it. But obscurity is often the fate of work that crosses closely guarded borders. Braxton himself considers everything he does to be a piece. "There's diversity, yes, but within my universe."

In Braxton's simple, red frame house instruments are everywhere, half a dozen clarinets and saxophones occupy a corner of the living-room couch. An upright piano and a set of orchestral bells nearly fill a small bedroom. Upstairs in the studio, sober gray file cabinets line the walls, and a snowy lab coat with "Dr. Braxton" embroidered in red hangs over the back of a chair. The "mad scientist" image with which he has alternately been blessed and cursed has become a family joke. It is an image earned in part by Braxton's insistence on wordless "alternative coding" to title his work.

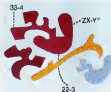
Some of the titles are mathematical formulas, in that they describe various coordinates of the composition's structure. "One number might have to do with velocity on a scale of one to ten, another might refer to tempo.

Some of the coordinates are selected before the piece is written, almost like

serial music, but not serial music. It doesn't quite match up as though a given piece of music is an empirical manifestation of a particular formula.

Braxton's schematic titles—colors, geometric shapes, diagrams—refer quite literally to "the order of information as it occurs in a given composition from beginning to end." He also uses "heteroglyphs, yet not heteroglyphs. I'm looking for a substitute word having to do with the language of shape and color and figures. Another kind of writing. What I really want to do is create another language."

Many have misperceived this intention and interpreted Braxton's titles as if they were drawn directly from mathematical or scientific systems. "It has nothing to do with that," the composer insists. "KELVIN, for instance, which refers to a repetition series in my music, has nothing to do with the Kelvin temperature scale; it's based on info's, names of friends. It's very



Braxton's spatial coding for the composition *Between Golexes* to be composed by 2000.

elaborate in terms of what it will ultimately mean if I'm able to produce what I want. It has to do with coding for the whole spectrum of my work. At the time some of it makes sense and some of it doesn't. Some of it's based on astrology, numerology, chess moves. And there's a whole color system related to music, too. But right now I choose colors based mostly on what I see, as if I were a painter."

Braxton likes to discuss his work in patient terms, referring frequently to shape and color, seldom to formula, in his solo saxophone work, for example, he works "from different languages which involve shape, with the understanding that a given shape has a multitude of implications."

By what science (or magic) does Braxton translate shape into sound, heat what is essentially visual? Seated at his kitchen table, having activated a few lines on a page, the composer demonstrates with arm movements, finger pops, a vocal phrase. The burst of sound and movement happens faster than my eyes and ears can follow. Patiently he breaks it down, explaining that a long bar shape

represents a long sound, while Morse-code blips imply staccato bursts. Simple. And add the coordinates of rhythm, velocity, timbre, and it grows more complex. But for Braxton, its importance lies in what is elementary.

"I'm looking for principles that will tap the reservoir of what primary elements used to mean. Like the concept of F. The note F means more than just F. It has to do with a part of the body, a certain information line. I'm interested in what it really is, what it used to be, and what it would be.

"To love to have a music where every note means something, every movement is photographed."

Possibly, the universe of Anthony Braxton embraces the mathematically precise and the mystical in equal parts. He lives, with their implicit equations, suggested precision, while they evoke also the torsion of movement within structure, the idea that a composition is not an object, fixed, but a living, dynamic entity.

Much of avant-garde jazz emphasizes the absence of structure and accents the free expression of feeling. Anthony Braxton's work proves that traditional structural foundations and a few old tricks don't necessarily inhibit feeling or make old-fashioned houses

"Yes, I'm going forward and backward at the same time," Braxton admits, "because it's the same direction. The seeds that dictated the dynamics of information in the past are directly relevant for the next level of creative postulation."

Braxton's quest for primary elements to carry his music into the future is not unlike that of any generous artist striving to create work that will endure. It would be presumptuous for us to attempt to judge whether he will succeed in tapping the fundamental source that he seeks. But here are indicators:

As *Creative Orchestra Music* fills my living room with some of its discordant, spacy pieces, outside the open window the birds at the feeder react. These same birds, tolerant neighbors all, have daily endured a variety of idiosyncratic sounds, none of which they have honored with the slightest attention. Now they mass, chitter, vociferate wildly, as if responding to an urgent message from a fellow creature. One thing is clear, they are listening to Anthony Braxton's music. I can't help wondering what they hear. **CC**

#### PARTIAL DISCOGRAPHY

Anthony Braxton, *Anata Records For Two*, Anata Records  
*The Complete Braxton, 1971*, Anata Records  
*Montreal/Berlin Concerts*, Anata Records  
*Quests (1976)* with *Mural/Richard Abrams*, Anata Records  
*Creative Orchestra Music, 1976*, Anata Records  
*Silence, Freedom FLP 40123 (England)*  
*5 Pieces 1975*, Anata Records  
*Quest and Two*, Backville Records



# WHAT BETTER PRESENT THAN THE FUTURE?

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# UFO UPDATE

By Robert Anton Wilson

**M**ost people see the UFO debate as a battle between True Believers and Skeptics. The true believers, according to the model, are dogmatically—even religiously—committed to the idea that UFOs are interstellar spacecraft; the skeptics hold that UFOs are nothing but hallucinations and misperceptions of ordinary zonal phenomena.

It might be better to picture the debate as involving two rival bands of true believers: the spaceship fans on one side and, on the other, those who will not renounce the doctrines they learned in high school and college.

The true skeptics are those who are not dogmatically committed to any theory who are willing to consider both these positions and late-published theories as well.

Two new books, written from entirely different perspectives, seem to represent true skepticism. The first is *Space-Time Transients and Unusual Events* (Nelson-Hall, Chicago, Illinois) by two psychologists, Michael A. Persinger and

Gyslaine F. Lafrenière. The second is *Messengers of Deception* (And/Or Press, Berkeley, California), by Dr. Jacques Vallee, astronomer, cyberneticist, and longtime gadfly of ideology.

Persinger and Lafrenière have examined not only 1,242 reports of UFOs but also 4,618 other anomalies. Something of the feel of this remarkable compilation can be gained by looking at just 6 of the 6,060 reports: In Casterton, England, in 1885, a 12-pound quartz stone fell during a lightning storm; in Huntington, West Virginia, in March 1962, a telephone operator picked up part of a phone call that was made the previous Christmas; in Bedford, Indiana, in 1967, a UFO witness' head was covered with burns; in Rapid City, South Dakota, in 1911, the temperature dropped 47 degrees in 15 minutes; in Budapest, Hungary, in 1921, unexplained fires and jumping furniture beset a house; in Madison, Wisconsin, in 1954, a driverless car was pursued by police.

Such occurrences are unusual but not that uncommon. They are often reported by families and appear in statistical

clusters. Using an IBM 360-40 computer, Persinger and Lafrenière have found several provocative clusterings. These oddities tend to take place in the same localities many times, recurring after decades or even centuries. Areas of high tornado activity and those along fault lines are also unusually susceptible to strange phenomena. And where there have been reports of UFOs, there have usually been reports of other oddities. Bigfoot has prowled; houses have been "haunted" by poltergeists; electrical equipment has misbehaved; or people have had visions, nightmares, or amnesia or have suffered burns or been paralyzed.

A partial explanation, the authors suggest, lies in the recent finding that Earth's geophysical behavior suffers local fluctuations at times of high solar flux activity. These fluctuations, they propose, create electromagnetic anomalies and energy shifts leading up to earthquakes or tornadoes. Hence, the clustering of these events in earthquake and tornado areas and their tendency to peak before earthquakes. The same fluctuations, they argue, can promote the formation of ball lightning and plasma in the sky and can interfere with normal brain functioning in animals and humans, causing both the panic so often reported in animals in these areas and the amnesia, blackouts, and/or hallucinations in humans.

This hypothesis fits nicely with most—also not all—of the data presented. It also explains why some of the craziest and most implausible "contact" stories have come from places where independent witnesses have also reported strange occurrences. In such cases, those on the outskirts of the energy flux report baffling electromagnetic oddities, lights in the sky, and other events. Those closer to the flux experience odd physiological sensations—terrible odors, paralysis, and such—along with such strange phenomena as objects jumping and dancing. Those at the epicenter report all of the above and, with equal honesty, their own hallucinations. The experts then sweep into the area and announce that the hard evidence was hoax and all the rest, hallucination. Small

CONTINUED ON PAGE 138



Lenticular clouds, such as this one seen over Poveung, Wales, have inspired many UFO reports.

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# CONTINUUM

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## FIND THE W

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**T**he search for a world system has dominated scientific thought since the earliest records. A world system is the key to understanding the universe and, interwoven with magic, superstition, and an assortment of tutelary gods, is an attempt to find rational principles to account for the incredible diversity of the world in which man finds himself embedded—deserts and forests, the darkness of night and the glory of sunrise, the cycle of the seasons, lightning and thunder, birth and life and death. How can all these be explained by a few simple objects obeying a few simple principles?

World systems have gone by many names. Empedocles in fifth-century (B.C.) Greece proposed his four elements (air, earth, fire, and water) and two forces (love and strife). Democritus of Abdera proposed atoms as the indivisible building blocks of matter. Atomism was rediscovered in the eighteenth century and lasted until the first decade of the twentieth century when the atom was found to be divisible into smaller things—electrons and nuclei.

The search for an ultimate world theory is as much an obsession today as it was 4,000 years ago. There have been partial victories. A famous example is Newton's law of universal gravitation. A falling apple, the moon in orbit, or the planets in their cycles and epicycles would all seem to be very different things yet they are all beholden to one simple mathematical formula. Even more dramatic was the grand synthesis of 200 years of fragmented experiments on electricity and magnetism accomplished by James Clerk Maxwell in 1870. In four crisp equations Maxwell brought all these phenomena into one coherent framework—electromagnetism—out of which came an understanding of the true nature of light, be it visible light like that from the sun, invisible light like X rays, or ultraviolet and infrared radiation. Out of this, too, came radio waves and radar and even, forgive us, television. More recently the modern theory of electromagnetism, embellished by Einstein's theory of relativity and the quantum theory, has provided a better understanding of atoms.

Because of these victories, the number of distinct forces at work in the universe has been reduced to a mere four—gravity, electromagnetism, and the strong and weak forces in atoms. The strong force is that which holds the nucleus together. The weak force has to do with the phenomenon of radioactive decay

of many subatomic particles—that which produces radioactivity.

Now there is great excitement over the prospect of a new synthesis. It may be that electromagnetism and the weak force are one and the same thing. A theory was first proposed by Enrico Fermi in 1933. He said that the weak force was perhaps analogous to electromagnetism in which the force between electrically charged objects is carried by bundles of light energy called photons. The corresponding weak carrier was called the W particle. All properties of this hypothetical W were known except for its mass. A breakthrough was made in recent years. Theodor Seewan Weinberg, Gerhart 'Hooft', and Abdus Salam conceived independently to show that everything would fit, provided the mass of the W was about 70 times the mass of the proton. In their theory the photon (mass 0) and the W were two congenial members of one family and Maxwell's and Fermi's theories were combined into one neat dogma that ruled over the elected space, the time alone, magnetism, and radioactivity.

But there is still one crucial test. Does the W exist? To prove this takes higher energy than is currently available in any of the world's particle accelerators (atom smashers). A conventional accelerator would have to be 100 times larger than the one at Fermilab, the largest in the United States, or the SPS, its European rival. There is, however, a trick. If two particles circulating in opposite directions in an accelerator collide, the energy available for making new objects is vastly greater than that obtained by simply smashing particles into a target at rest. Fermilab and SPS are racing to build facilities that will allow these collisions. The European scheme is scheduled to operate in late 1981 with collisions of protons and antiprotons having an energy of seven times the presumed mass of the W. Our effort at Fermilab is bided by as much as six months to a year. However, it will provide more than 30 times the energy needed to catch this object—sometimes called the scientific prize of the century.

Culmination? Already there are hints of further synthesis, of also uniting the strong force with this new 'electroweak' theory. To do this, the greater power of the Fermilab machine may be crucial. Or so say the Fermilab scientists, perhaps concealing the W to their European rivals but determined to lead the next advance toward the grand objective—a complete world system.

—LEON M. LEDERMAN, director of Fermilab

# CONTINUUM

## GLUONS

**Spot quiz:** How do you hold three quarks together?  
**Answer:** With gluons. (Yes, the name comes from glue.)

For over a decade, physicists faced with this quiz have done what most people would have done: They've guessed. This past fall an international team of physicists, headed by Nobel laureate Dr. Samuel C. C. Ting, of the Massachusetts Institute of Technology came up with evidence that the "glue solution" was a pretty good guess.

Using one of the world's most powerful colliding-beam accelerators, the PETRA, at the Deutsches Elektronen Synchrotron in Hamburg, West Germany, the physicists cranked up about 15 billion electron volts and smashed beams of electrons and positrons against one another. From

that collision, in a time span of roughly one hundred-millionth of a second, came indirect evidence of a gluon.

The gluon is a subatomic particle vital to the theory of quantum chromodynamics or QCD, which is used to study and explain the world of the atom. Among other things, the theory holds that elementary parts of the atoms nucleus, such as protons and neutrons, are made up of particles called quarks, a name lifted from James Joyce's *Finnegans Wake*. (As in the book, the word quark has no apparent meaning.)

The theory states that three quarks make up a proton. To distinguish them, physicists assigned to each one a color—red, white, and [what else?] blue. Physicists call the force that holds these quarks together the color force, and they call the particle that carries this

force the gluon. Without this particle, the QCD theory, like the hypothetical triplet of quarks, would fall apart.

When the physicists examined the detectors set up to study the aftermath of electron-positron collisions, they found traces of three streams, or jets, of energy. The two larger ones, they knew, were from the energy decay of quark/antiquark pairs. More important, they found a third, smaller stream—exactly what would be expected from the energy decay of a gluon. QCD is now safe—for a while.

Most physicists agree that this is a Nobel-quality discovery. But since a total of more than 250 scientists contributed to the search for the gluon, no one has yet figured out who should get the prize. —Douglas Colligan

## LOBSTER VACCINE

And now the latest news from the immunization front: A vaccine to prevent gillkermis, the most deadly lobster disease.

Gillkermis, which is caused by a bacterium normally present in 1 percent of the lobster population, has been a scourge in some lobster pounds where 1,000 to 100,000 of the crustaceans are held for fattening and higher prices between August and mid-winter. In Maine, the country's leading lobster-harvesting state, about one quarter of the 16 million lobsters caught each year are held in these saltwater coastal pounds. There, gillkermis, which is incur-

able, wipes out about 400,000 lobsters a year. In some pounds, the disease has been known to kill every lobster within two weeks in the past two years.



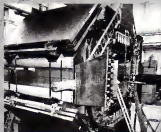
Lobster pounds can increase size, but also the death rate.

however, the department of animal and veterinary sciences at the University of Maine has developed a vaccine from dead gillkermis cells. In a test with 20,000 lobsters individually vaccinated in the soft underside of their tails, the gillkermis rate in one pound dropped from 12 to 3 percent.

Robert C. Bayre, associate professor in the department, said that researchers are negotiating with a pharmaceutical company and that the vaccine will probably go commercial within a year. —Stuart Diamond

"He might have been a scientist if he had not been so versatile."

—George Mason



The PETRA. Beams of electrons and positrons were smashed together and revealed the trail of the elusive, but cohesive, gluon.

## TALKING WATCH

A solar-powered talking watch that not only literally "tells" the time but also reads you awake with such alarm messages as "Time to get up, go, go, go" will be marketed in January by the Winkler Watch Company of Los Angeles, California.

Available in four languages—English, French, German, and Spanish—the talking timepiece will include an accumulating register snooze control that warns, "You are now ten minutes past your alarm time" you are now twenty minutes past your alarm time.

Called the Communicator, the watch uses a 64-kilobyte chip (containing 64,000 words of computer memory), which is twice as big as anything now on the market and which "should produce twice the voice clarity of

present synthesizers," said Winkler's Alex Weiss. The watch will retail for less than \$100.

Second-generation talking watches and clocks will be externally programmable and voice-identifiable. "The buyer will be able to request the message he wants, and we'll be able to do it in a celebrity voice," Weiss said. "It's only a matter of time before the Dick Tracy watch makes its appearance. Once we get to work on it, we'll have watches with TV screens and voice transmitters. The future is wide open." —Ailan Maurer

## CASUALTY COUNT

An all-out war between the United States and the Soviet Union would kill initially about 250 million people in both countries—slightly more than half their combined populations. Equally important, perhaps tens of millions of people would continue to die for years afterward because of radiation from the initial attack and starvation and disease following the collapse of each nation's industrial and social structure.

Those conclusions were made recently by the congressional Office of Technology Assessment (OTA) for use in the Strategic Arms Limitation Treaty (SALT) discussions. "Nuclear war could reduce societies to medieval levels," it concluded. Food- and medical-delivery systems would be shattered. Trade would be local, not regional or national. Equipment

would deteriorate and go unrepaired for lack of skilled labor. The psychological shock to each population would be enormous. The precise nature of these ef-

fects, however, cannot be precisely calculated, says the OTA. The OTA also analyzed three limited nuclear attacks against a large city or oil-finesse, and military targets. Even in these cases, the researchers said, "the impact would be enormous" with the death toll as high as 20 million.



Joosting anyone? A government report says nuclear warlike with Russia could reduce society to medieval levels.

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For an idea of the potential damage, A one-megaton atomic blast produces a fireball 2.5 kilometers wide. It would flatten everything in an area 50 percent larger than Manhattan, give people second-degree burns in an area eight times the size of Manhattan, and kill most people over an area the size of Rhode Island.

fects in cities, the Soviet economy would suffer more long-term damage because it is smaller and less efficient. —S D

"Discovery consists of seeing what everybody has seen and thinking what nobody has thought."  
—Albert von Szent-Györgyi

"As far as I can judge, I do not look upon any system of wireless telegraphy as a serious competitor with our cable lines. Some years ago I said the same thing and nothing has since occurred to alter my views."

—Sir John Wolfe-Barry, at a meeting of the stockholders of the Western Telegraph Company 1907



Prototype of the Winkler talking timepiece.

# CONTINUUM

## DREAMING

A Webster's unabridged dictionary of dream language will probably never see the light of day for the



*Dreams of falling may indicate helplessness, loss of control*

simple reason that the meanings of specific dream symbols depend on the private lexicon of the dreamer. But certain universal themes tend to haunt the nocturnal repertoires of all of us, and according to a survey of experts, this is what they usually mean:

- Being chased: emotions out of control, events closing in on dreamer, guilt, or the dreamer is projection of sexual impulses onto others
- Falling: helplessness, loss of control, fallen woman self concept (in women), a fall from grace, or the fall that follows a leap toward the heights
- Losing a valuable object: loss of love, loss of status, guilt about responsibility is close

- Taking an exam: dreamer faces confrontation with personal-adequacy issues
- dream of a long-past exam often comforts the dreamer with memory of past successes, sometimes exam dreams refer to sexual maturity
- Freud himself was plagued with examination dreams
- Being caught naked or inappropriately dressed: social embarrassment, non-conformity or "specialness", fear of being "seen" through shame vulnerability
- Flying: tooth anxiety about aging, loss of something taken for granted, vulnerability or powerlessness, being at a loss for words
- Flying competence, power, mastery, spiritual upliftment, sexual potency (in men)
- Missing the boat (train, bus, plane): a missed opportunity
- Freud considered a dream of botched departure a reassurance against fear of death (the final journey) — Judith Hooper

That the Left in this country has never been enthusiastic about the space program is no surprise. The Left wants to spend all the available money on last month's social problem. The reason for a similar lack of enthusiasm on the Right is more problematical. Just a guess: There is no private property in outer space, and the Wangers and Manners and Voyagers and Pioneers can't kill Russians.

—John Leonard in  
The New York Times  
September 12, 1979

## FOSSIL FOOTPRINTS

A Times Square traffic in footprints has been discovered in the Laetoli Beds of Tanzania, by Drs. Mary Leakey and R. L. Hay.

Depressions in the surface of exposed rock have turned out to be footprints made more than 3 million years ago by various birds and mammals including hares, rhinoceroses, elephants, hyenas, perhaps a large saber-toothed cat, griffins, and buffaloes, and even apparently hominids, early ancestors of man.

The footprints, Drs. Leakey and Hay write in *Nature*, were possibly preserved by an unusual combination of climatic, volcanic, and mineralogical conditions. It might all have occurred, they say, during the onset of a single rainy season that coincided with the eruption of light ash showers from a



*Trail of hominid footprints well dated; early man walked upright*

nearby volcano. Sadman

The patterns left by the hominids show that they had begun to walk upright. While the patterns are still being examined, say Leakey and Hay, it is immediately evident that the Pliocene hominids at Laetoli had achieved a fully upright, bipedal, and free-standing gait—a major event in the evolution of man that freed the hands for toolmaking and eventually led to more sophisticated human activities. —Alan Balkeless

## GINSENG AND CANCER

Dr. James Duke, a botanist for the Department of Agriculture and chief of the USDA's Plant Taxonomy Laboratory, has returned from mainland China with four kilograms of a plant called the spiny ginseng. The herb was imported for a program run by the National Institutes of Health, which is looking for plant extracts that can be used to treat cancer.

How effective is this rare plant against cancer and other ailments? The Chinese gave us some figures for the spiny ginseng. Dr. Duke reports: "But these should be called uncontrolled clinical studies, because I don't see them directly."

According to the Chinese, says Duke, patients afflicted with bronchitis who were treated with the herb showed an 80 percent improvement for male impotence, the improvement rate was 69 percent for hypertension, a 63-

to 90 percent improvement, and for cancer of the stomach. Duke quotes from his report to the NIH: "All of the 39 patients had their lives extended one to four years beyond expectations."

Adds Duke: "Now this was my interpretation of my interpreter! It was the most muddled part of the translation."

Duke says he is personally not optimistic about either the spiny ginseng or its more abundant relative, the common ginseng plant, which is sold widely as a medicinal tea. He does think it might ameliorate the bad side effects of chemotherapy, however.

Could the spiny ginseng become a fad, as *lactaria* has become? It's possible for a lot of Chinese folk medicine to get swallowed up by some people. Duke admits: "And the placebo effect is such



Spiny ginseng: Chinese say it makes spectacular medicine.

that it might work for some." But it will be at least a year before NIH tests of the spiny ginseng are completed.

—Joel Davis

### IMHOTEP'S TOMB

New light has recently been shed on one of ancient Egypt's most closely guarded secrets: the location of the tomb of Imhotep, an astronomer-physician who lived approximately 5,000 years ago, or some 1,500 years before the boy-king Tutankhamun.

George Michanowsky, a linguist and expert in ancient astronomy, discovered a clue to this mystery while deciphering hieroglyphic texts. He has since concluded that Imhotep's tomb can be found in an area south of the famous Step Pyramid at Saqqara.

The tomb has long been sought by Egyptologists not only for the wealth of information it could provide about the early inhabitants of the Nile but also because Imhotep was considered an unrivaled genius of his time. Prime minister to Pharaoh Djoser, he actually built the Step Pyramid, where Djoser is buried.

Past searches for Imhotep's tomb have focused on the general area around the pyramid, since the ancient Egyptians believed that those close to a pharaoh in life should be buried near him in death.

In the 1960s the late W. B. Emery undertook a massive excavation to uncover the tomb in the area north of the Step Pyramid. Up until

Emery's death in 1971, an incredible number of mummified animals thought sacred to Imhotep were found but no tomb.

Michanowsky says Emery



Step Pyramid: Imhotep's tomb may lie to the south.

should have looked south of the pyramid, not north. He cites a hieroglyphic passage in which a scholar and contemporary of King Tut is compared to the long-dead Imhotep. Both are referred to as "obspiring of Seshat," who was the patroness of scribes, scholars, and architects.

Michanowsky's studies put forth in his book *The Onco and Future Star* have established that this mythological figure was the star goddess of the southern sky. A sage so closely associated with Seshat, nations Michanowsky "could only have been buried in a location south of the pyramid enclosure of the pharaoh he served.

—Kathleen McAuliffe

### TOXIC TEAS

The natural-foods fad has led to the popularity of herbal teas. But take note:

Some herbal teas may be dangerous to your health. *The Medical Letter on Drugs and Therapeutics* recently listed some of the serious side effects from different leaves, seeds, and flowers used in herbal teas. For example:

- Herbal teas containing buckhorn bark and senna leaves caused severe diarrhea in six persons in New York and Pennsylvania. At least one person who drank half a cup of buckhorn-root tea ended up having halucinations and exhibited bizarre behavior and speech, not to mention difficulty in defecating.
- Licorice root in large amounts can cause hypertension, heart failure, and cardiac arrest.
- Certain substances in mefetoa (which is used in some herbal teas) have the same effects in animals as the toxin in cobra venom.
- Ginseng, a root often used in teas, has been reported to cause swollen and painful breasts (See "Ginseng and Cancer" opposite page.)
- Sassafras-root bark has an oil in it that is 70 percent salinole, and salinole is carcinogenic in animals.
- And chamomile flower heads, used in one of the most popular of all herbal teas, can cause severe hypersensitivity in people allergic to ragweed. If you suffer from hay fever, it doesn't pay to drink chamomile tea. —J.D.



# CONTINUUM

## SPACE FOR HIRE

And you thought the plumber was expensive! The U.S. space agency NASA has released a preliminary

\$300,000 to \$500,000, plus the cost of each additional day in orbit, a person can have his or her payload plucked and returned from cosmic heights



NASA's list of shuttle labor prices is bad news for consumers. Each space-walking activity costs between \$700,000 and \$250,000.

space-shuttle-services price list that is truly out of this world.

You say you've got a brilliant idea to build the first space hotel, perfect for the tourist pining to really get away from it all? Hiring the necessary astro-workers is tentatively priced between \$100,000 and \$250,000 (in 1975 dollars) for each space-walking activity required for the job.

Keeping the space shuttle spinning around the earth for extra days increases your tab by \$300,000 to \$400,000 per day. Just launching the shuttle on a typical mission rings up a rocket-bottom fee of approximately \$28 million.

For a modest charge of

With the space shuttle now up for rent, are regular space-commuter routes for average earthlings far behind?

Mike Smith, chief of customer services for the NASA shuttle program, cautiously explains: "It's a misconception that the U.S. government will fly anything or anybody that asks for a launch. When we think of firing the shuttle, you just don't light those engines for a trivial purpose. The nation has to benefit in some significant way."

As yet, the Space Administration hasn't detailed an official policy. "What we would look for are what I call discovery people," Smith says. "These people would

have the ability to make discoveries in space that will benefit the public."

For NASA, there is one obvious question: Would such discovery-oriented citizens be selected from just scientific disciplines, or are there other categories, such as the arts?

Smith thinks so. "We've had inquiries by reputable people about flying musicians in orbit, where they could improvise their music. Perhaps some creative discovery in the arts could be made. —Leonard David

## CHRISTMAS CURES

This Christmas, when you're standing under the mistletoe or chopping onions for turkey stuffing, consider the fact that you'll be close to two potentially powerful medicines.

The Druids prepared drafts of mistletoe as a cure for sterility and a remedy for poisons. Medieval herbalists recommended it as a tonic for nervous-system disorders and heart disease.

Time marched on, and men thought of mistletoe only as an excuse for kissing.

Now the magic powers of mistletoe are under scientific scrutiny. Within the past decade an extract made from its twigs and leaves showed anti-tumor activity in mice that had cancer.

A similar substance was used in Europe as chemotherapy for the treatment of postoperative cancer patients.

Researchers think they have identified the secret in-

gradient in mistletoe. "It might be an alkaloid," says Dr. Hashem A. Khwaja, professor of pathology at the University of Southern California's Comprehensive Cancer Center in Los Angeles. Dr. Khwaja is continuing his study of mistletoe in hopes of learning more of its medicinal secrets.

Meanwhile, at East Texas State University in Commerce, researchers Katherine and Moses Atorp are probing the effect of onions on high blood pressure. The Atorps have identified a prostaglandin-like compound in yellow onions that lowers blood pressure in rats.

Dr. Moses Atorp says, "It is too soon to conclude that onions are useful for blood-pressure control in humans. But the identification of prostaglandin, in onions might explain why onion juice has long been a folk remedy."

—Phyllis Wolfman



Mistletoe: A cure for sterility and maybe cancer.

## STONED CLAMS

A common food clam might make a significant contribution to the treatment of kidney stones.

The sunny Venus (*Microcallista nimbosa*) supports a large fishery business in the Southeast and makes a good, sweet chowder. However, fishermen for years have advised the removal of a "black gritty mass" from the clams before they are eaten.

Now Dr. Bill Tiffany of Mote Marine Laboratory, Sarasota, Florida, has made an interesting discovery. While studying the sunray's excretory system to see how the clam processes pollutants, he noticed that the gritty mass you're not supposed to eat was, in fact, a pile of kidney stones. The kidneys of the thousands of clams he opened were jam-packed with calcium

phosphate stones. The majority of human kidney stones are calcium-based.

Until Dr. Tiffany's discovery, scientists had no naturally occurring model on which to base their study of kidney-stone development. Tiffany plans to use his colony of sunrays as a living lab to investigate kidney-stone morphology. "The way is paved to treat these stones by dissolving them in place," he said.

In human beings, the only effective treatment for kidney stones is surgical removal.

"It's difficult," the marine biologist asserted, "to use a human model and hit it with a variety of drugs that might dissolve kidney stones. However, there are very few ethical problems posed by doing this on a clam."

How dissolving its kidney stones would affect *M. nimbosa*, which seems to function just fine with them, has yet to be tested.

—Kathleen Stein

## YOUTH CULTURE

Three to six thousand years before the advent of surfboards, motorcycles, or hang gliders, members of the ancient La Jolla Culture, in southern California, had a life expectancy of only 16 to 17 years.

According to studies of skeletal remains conducted by scientists from Columbia University and the University of California at San Diego, the La Jolla Culture flourished—if you can call it that—from 4500 to 1000 B.C. along a 75-mile section of the Pacific Coast. Today the

area is made up of the northern part of Baja California and San Diego County.

The La Jolla people are the oldest civilization in the Western Hemisphere to have

Stone Age. La Jolla people were simple food gatherers, living on mollusks and other seafood and nuts, vegetables, and wild grains that they ground with milling



Life in southern California seems best suited to sixteen-year-olds. A new study shows conditions weren't much different in 4500 B.C.

their life expectancy calculated.

The next oldest people are the Mayans at Atlatz de Sacafocce, in Mexico, who lived between 1000 B.C. and A.D. 950, although no individual Mayan made it past age twenty.

A short life expectancy in past eras was also the rule in the Eastern Hemisphere, the researchers say, and skeletons for analysis have traditionally been more plentiful in that half of the world than in the Western Hemisphere.

Although today's southern Californians can plan to live to seventy-three, the American average, they might look on the life-styles of their predecessors with envy. The

stones and mortars. It was a righteous life, for sure.

—Dava Sobel

"Scientists, especially when they leave the particular field in which they have specialized, are just as ordinary pig-headed and unreasonable as anybody else."

—H. J. Eysenck

"Knowledge never hurts. It is the use of knowledge, what we call technology, that can hurt or harm. In the hands of a Carnegie, a furnace makes steel. In the hands of a Hitler, it burns corpses."

—Howard T. Menck, chief judge of the Court of Customs and Patent Appeals



Clams: Key to a nonsurgical treatment for kidney stones.

# CONTINUUM

## COMPUTER THREAT

Computer scientists at Massachusetts Institute of Technology have given an alarming analysis of the computer threat to human society. The scientists, speaking before the World Conference on Faith, Science and the Future, stated that computers were engulfing almost all functions of human society.

Dr. Joseph Weizenbaum, a computer scientist at MIT—and one of the pioneers in the field of artificial intelligence—said: "We are rapidly losing, have perhaps already lost, physical and mental control of our society."

The scientists said that computers are removing people from their work, becoming more powerful than humans, and destroying people's self-image. They also agreed that computers

are destroying the creativity in man.

Going even further, they said that computers are taking on a new role—that of expert diagnostician and adviser.

Dr. Weizenbaum added: "Once we accept that human beings are machines, merely symbolic manipulators and information processors, then the final step has been taken to replace the human species with a silicon-based intelligence."

"Will computers eventually take over completely? People can sell the computer's plug," Weizenbaum said. "However, we may have to work hard to even maintain that privilege." —Tom R. Kovach

## MARTIAN AIR FORCE

Strange shadows may cross the planet Mars in future years if space decision makers and budgets permit.

As a follow-on to the Viking landers on Mars, NASA planners have created a vast list of unmanned probes to reconnoiter the red planet further. Among them a Mars airplane—in effect, a mechanized Martian pterodactyl—complete with outstretched 21-meter wings that would ride the thin atmosphere of Mars.

Initial schemes entail a virtual "Martian Air Force," with as many as 12 unmanned planes dispatched from a spacecraft/aircraft carrier orbiting Mars.

Each plane would carry color-television cameras and

sensitive instruments, drop ping various probes at selected sites. Employing crash-avoidance radar and having a 10,000-kilometer range, the planes could

peer deep, dive into canyons, or circle the majestic volcanoes of Mars.

Victor Clarke, a Jet Propulsion Laboratory (JPL) engineer, envisions an eventual



The X-45 hypersonic cruise missile (above) and its powered by a hydrogen engine.

reach any location on the red world, with the ability to land and take off.

Part of a part cruise missile, the Mars airplane is designed to stay aloft for 30 hours, propelled by a hydrogen engine, which requires no air for operation.

Abu Kerem, project engineer of the airplane for Developmental Sciences, believes the design provides the "maximum bang per dollar." Compared to Viking, building the airplane would be a relatively easy task, Kerem claims.

Television audiences on Earth would be treated to live Martian telecasts and be given a pilot's-eye view as the planes sweep over the

planet. There's enough weight-lifting capability to carry an astronaut, Clarke asserts. Using a runway prepared by the Martian expedition, the JPL space engineer says, the airplane would be the "ideal complement to a manned mission, allowing the mobility to fly around the planet."

—L. D.

"My expectation is that the sky will fall. My faith is that there's another sky behind it."

—Stewart Brand

Science has become adult, I am not sure whether scientists have."

—Victor Fredrick Weiskopf



Weizenbaum: "We must maintain our right to pull the plug."

# SO THAT OTHERS MAY LIVE

*Concern for the welfare of human guinea pigs has introduced needed safeguards that may frustrate the future of medical science*

BY DAVA SOBEL

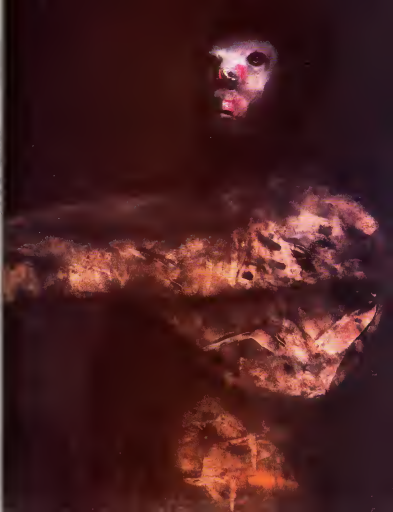
**S**omebody always has to be the guinea pig because everything that's ever learned about medicine gets tested, sooner or later, on a human subject. Many of those subjects have been scientists themselves, inflicting their own bodies with mystery diseases or instructing that certain surgical procedures be performed on them first. Many more have been patients whose doctors have experimented during therapy, trying several different paths toward a cure. And an untold number of humans have been the willing or unwitting subjects of experiments performed not for their benefit but in the interest of science.

Human experimentation is as fixed an element of research as theories or test tubes are. Yet the words make the skin crawl and consume up visions of flayed doctor horrors and the brutal exploitation of prison-

ers, poor people, and hospital patients. Knowledge that such things can and do happen has gradually made suspect for a variety of ethical reasons, all kinds of human experiments—from test-tube fertilization to questionnaires on sex. Today new regulations have produced safeguards that have actually stopped certain studies altogether, put limits on many others, and frozen the rest in landfills of red tape. We can't help wondering how all this will affect the future course of medical discovery.

Consider the frustrations of Dr. Pierre Soupart, a professor of obstetrics and gynecology at Vanderbilt University, in Nashville, Tennessee. Soupart's goal is to study what he calls "the unknown realm of the first six days of pregnancy"—research that involves test-tube fertilization. But he has been unable to obtain a federal grant because, in August 1976,

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the federal government withdrew funding of all projects involving the fertilization of human eggs in laboratory glassware.

Apparently reeling under the ethical implications of the work, the Department of Health, Education and Welfare (HEW) charged its Ethics Advisory Board with the task of considering the moral issues raised by test-tube fertilization. Unfortunately, the 14-board members were not appointed until February 1978 and they made no recommendations until March of the year when they deemed Soupart's work ethically acceptable. As of this writing, however, HEW is still collecting public response to the board's decision and the ban remains in effect. So while Soupart continues to conduct peripheral studies and give lectures, other researchers at private American facilities proceed unhindered. And a baby named Louise Brown was born in England.

Commenting on why his study has met such resistance, Soupart cites the "slippery slope argument"—fear that once in-vitro fertilization and embryo transfer are proved feasible, a brave new world of test-tube babies and imagined horrors will follow. Soupart's intention is not to produce test-tube babies. He is not even sure he would want to implant one of his laboratory-bred embryos into a woman's body, although the Ethics Advisory Board sees nothing wrong with the idea, provided the sperm and ovum come from a married couple.

In any kind of human-subjects research, Soupart says, "The only way to determine the validity of the research proposal is by balancing the risks against the potential benefits. You don't get anything for nothing. So you must decide whether the benefits from the new knowledge justify the risks you take to get the knowledge."

And who should make that decision? The scientist who may underestimate the benefits?

In the usual course of human-subjects research today, the subjects themselves are the ultimate judges. When a scientist applies for money to start a research project, the funding agency asks other scientists to review the idea. If these peers judge the experiment scientifically unnecessary or excessively risky, they kill it with their disapproval. In addition, the Institutional Review Board (IRB) at a scientist's home institution weighs the risk to human subjects and determines how the subjects will be informed of those risks. Even after getting IRB approval and agency funding, a scientist must still invite people to participate as subjects, and they are free to say yes or no.

Imagine Edward Jenner trying to perform his landmark vaccination experiments in this climate. How likely would he have been to get institutional approval of plans to inject eight-year-old Master Phipps with fluid from a milkmaid's cowpox blister? And

only two months later to inoculate the same child with smallpox, the most dreaded disease of the day, to test his hoped-for immunity?

Beyond the protection of peer review and informed consent, a willing subject can sign the informed consent papers, participate and learn decades later that he was not really fully informed. At that point he could sue the investigator for any effect he felt he had suffered. Human-subjects research might thus become nearly as fertile a field for legal action as medical malpractice is. And in the social sciences, other ethical problems arise. Even if a subject agrees to answer survey questions about his criminal activities or his sexual preferences, how can we ensure that his answers are kept confidential? If someone gains access to the data files in a computer, what is a scientist's legal or ethical liability?

The problems have grown so tangled and so numerous that a new periodical called IRB appeared in March of this year, promising ten issues annually to help practitioners unravel ethical dilemmas posed by research regulations governing research and the decision-making process itself.

The publisher of IRB is the Hastings Center, just outside New York City, where staff members make a practice of consulting unwieldy questionnaires in biomedical and behavioral research from the right to life to the right to die. When asked how the restrictions on human-subjects research might affect important investigations in the next several years, medical ethics associate Robert Veatch said, "I don't think that any kind of drug- or disease-related studies will be hampered at all. We're convinced that these can be done ethically. But many kinds of social research that we've seen could not be funded in today's climate of ethical review."

## UNLTD VICTIMS

Popular concern for the welfare of human subjects is relatively new. This concern dates from the 1945-46 Nuremberg trials, when the crimes committed in the concentration camps were openly discussed and moral codes for conducting "experiments" were formalized. Before that, all the way back through 4,000 years of records kept by doctor-priests and scientists who experimented on people, researchers had just let their conscience be their guide.

Even after Nuremberg, there was no appreciable change in ethical standards. Many misguided zealots continued to involve human beings in dangerous experiments with catastrophic results. As recently as 1966, a Harvard University physician had to call public attention to the inexcusable treatment of human subjects right here at home in America's leading medical schools, university hospitals, private hospitals, military departments (the army, the navy and the air force), government

includes the National Institutes of Health, Veterans Administration hospitals, and industry. Writing in the *New England Journal of Medicine* (June 16, 1966), Dr. Henry K. Beecher cataloged examples after chiding one example:

"Artificial induction of hepatitis was carried out in an institution for mentally defective children." Beecher reported. "The parents gave consent for the intramuscular injection or oral administration of the virus but nothing is said regarding what was told them concerning the appreciable hazards involved."

"Live cancer cells were injected into 22 human subjects as part of a study of immunity to cancer. According to a recent review, the subjects (hospitalized patients) were mainly told they would be receiving 'some cells'—the word cancer was entirely omitted."

"Twenty-six normal babies less than 48 hours old were exposed to X rays while their bladder was filling and during voiding. Multiple spot films were made to record the presence or absence of ureteral reflux. None was found in this group and fortunately no infection followed the catheterization. What the results of the extensive x-ray exposure may be, no one can yet say."

Beecher said his point was not to identify or condemn individual researchers or even to document the worst cases he could find. Rather, he was trying to prove how many kinds of "ethical errors" were possible and how these would multiply as funding for medical research grew.

Crying for a way to enforce "responsible" investigation, he suggested that journals refuse to publish results that were unethically obtained. And he implored researchers to "strive to expose the aim of their experiments and especially the hazards to their potential subjects so these people could either give informed consent or refuse to participate."

The infamous Tuskegee study of syphilis involving hundreds of intentionally untreated cases of the disease was not even mentioned in Beecher's paper. This experimentation was sponsored by the Venereal Diseases Division of the U.S. Public Health Service. The subjects of this research were 399 black men from Macon County, Alabama, all twenty-five years old or older who were selected because they had advanced cases of syphilis and had never received any treatment for it. There was also a control group of 201 nonsyphilitic males, also black, and 275 more who had been inadequately treated for syphilis years before. The point of the study was to observe the men and trace the course of the untreated disease so as to understand its "natural history."

In 1932, when the study participants were selected, penicillin was unknown, although mercury had been prescribed for syphilis since medieval times and newer treatments (arsphenamine, introduced in 1910; bismuth compounds in 1922) were proving to be more effective. Many people

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with syphilis never sought treatment? yet they sometimes seemed to recover spontaneously, leading a few doctors to believe one might be better off without the dangerous chemicals. Nobody knew for sure, however, and that missing bit of knowledge ostensibly justified the study's objective.

After the first critical report of the Tuskegee activities appeared in *The New York Times* on July 26, 1972, public interest and revelation gathered so quickly that the study was terminated within four months and no monograph of the 40 years of data has ever been published.

#### PRISONERS OF SCIENCE

In Arizona prisons, men who served as "human experimental material" based even worse, receiving \$1 a day in 1971 to be fed vitamin-deficient diets through stomach tubes until they developed sores; to be exposed to cholera or poisonous neocadols; to receive (in 1962) toxic injections to test their pain tolerance; to submit to daily applications of caustic substances on their skin to be bitten by mosquitoes for ten minutes at a time; or to have pieces of muscle tissue removed from their arms.

When Jessica Mitford wrote her prison exposé, *Kind and Usual Punishment*, in 1971 in *University of California* scientist said to her: "If the researchers really believe these experiments are safe for humans, why do they go to the prisons for subjects? Why don't they try them out in their own laboratories on students or other 'free-world' volunteers? Because they know the university would never permit this. And furthermore, it would never enter their minds to do these things to people they associate with in daily life. They make a clear distinction between people they think of as social equals or colleagues and men behind bars, whom they regard as less than human."

The U.S. government began to phase out medical experiments in federal penitentiaries in 1973, and no new studies have since been started. The last ongoing federal prison project ended in 1977, although there is still some scattered activity in a few state prisons. One of the decisive arguments against the use of prisoners—even when they are fully informed and paid for their services—is that they are in no position to give consent with freedom of choice. ("If a man is in a cell with several other violent men," one philosopher proposed to me, "and you offer him a private hospital room with a TV if he'll participate in an experiment, what do you think he'll say?") Drug companies, which relied on prison populations for testing new compounds have turned to students and other so-called organized populations, just as Milford's friend suggested. The more dangerous experiments have apparently been stopped.

As I write this, new evidence of past ethical infractions is emerging in Illinois, where the Cook County public guardian claims that researchers removed the adrenal

glands from an unknown number of mental patients at a University of Chicago hospital during the 1950s and 1960s.

Offending the painful accounts of human exploitation are the unending stories of ethically conducted research and the tales of investigators who tried nothing on a human subject before putting themselves to the test first. Dr. Lawrence K. Altman, a medical writer for *The New York Times*, has been collecting case histories for 15 years to write a book about autoexperimentation which will be published soon by Random House. Chapters will tell of

- Anton Storck of Austria, who swallowed hemlock in increasing doses for more than a week, proving in 1780 that the substance could be taken without undue danger for the treatment of cancer tumors, ulcers, and catarrhs.

- William Blaik of England who at age twenty-nine put himself on a diet of bread and water, "voluntarily" augmented by sugar, eggs, olive oil, salt, figs, or various meats

• *Human experimentation is as fixed an element of research as theories or test tubes are. Yet the very words make the skin crawl and conjure up visions of Nazi-doctor horrors.* •

to test which foods were "harmful," which "innocent." He died for his efforts in 1770, before his thirtieth birthday.

- Roscoe R. Spencer of Hamilton, Montana, who administered to himself the first test on a human being of the Spencer-Ranker Rocky Mountain spotted fever vaccine in 1924 and

- Wimar Försmann of Germany, who proved the feasibility of cardiac catheterization in 1929 by maneuvering a 65-centimeter-long "well-oiled ureter catheter" into a vein near his left elbow and on through to his heart, recounting later how "even the rather long trip in our institution from the operating room to the x-ray department" during which I had to climb stairs "traveling on foot with the catheter located in the heart" was not associated with any annoyance.

The federal authorities have no truck with self-experimentation because, clearly those who subject themselves to their own research at least understand the risks involved. It's everybody else who needs protecting.

How can this be done?

With sanity. Or, more specifically, with

the threat of withholding money.

The government through HEW will not fund any research that involves the unethical treatment of human subjects. And one lone researcher at an enormous university starts an experiment without first getting informed consent from the subjects, the entire institution could lose all its support from HEW and the National Institutes of Health (NIH). The government requires every university receiving federal money to police its own scientists and has established laws and guidelines for doing so. Obey or forfeit all grants: it's that simple.

All large drug companies, where most research is funded by profit, the government exerts a different kind of leverage. All drugs and devices must be approved by the Food and Drug Administration (FDA) before they can be sold. Steps toward approval include animal trials and various tests on human subjects. And if the human experiments don't match the FDA's ethical standards (which approximate those of HEW) the drug will not be approved.

Most human-subjects research is now covered by these safeguards. But according to Charles Mackay, deputy director of the NIH Office of Protection from Research Risk, no federal law applies to the operations in privately funded institutions. Thus David Reink's tale of human cloning—financed in secret by a millionaire who wanted a son exactly like himself—was legally, if not scientifically, feasible.

#### IN DEFENSE OF DECEPTION

The diverse kinds of valuable social research that Robert Veitch says "could not be funded in today's climate of ethical review" would probably include Stanley Milgram's obedience experiments at Yale in 1960-62, where more than 1,000 participants had to be misinformed in order to learn which behavior was the more typical: obedience to authority or compassion for a person in pain. Milgram, now a professor of psychology at the City University of New York, described the work himself in his book *Obedience to Authority: An Experimental View* (Harper & Row, 1974).

Milgram writes: "Two people come to a psychology laboratory to take part in a study of memory and learning. One of them is designated a teacher and the other a learner. The experimenter explains that the study is concerned with the effects of punishment on learning. The learner is conducted into a room, sealed in a chair, his arms strapped to prevent excessive movement, and an electrode is attached to his wrist. He is told that he is to learn a list of word pairs; whenever he makes an error he will receive electric shocks of increasing intensity.

The real focus of the experiment is on the teacher. After watching the learner being strapped into place, he is taken into the main experimental room and seated before an impressive shock generator. Its main feature is a horizontal line of 30 switches, ranging from 15 volts to 450 volts

CONTINUED ON PAGE 114

# WHITE CONTINENT

BY ERIC ROSEN

**A**t the bottom of our planet lies an environment that may be more alien than the far reaches of space. Its secrets may yield new breakthroughs in disease control, a deeper understanding of evolution, and even new supplies of food and water.



PHOTOGRAPHS BY ELIOT PORTER



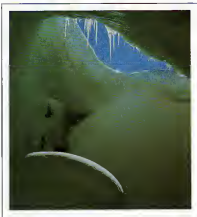




Antarctica is a forbidding land. Winds blow 200 kilometers per hour or more; temperatures frequently drop below  $-50^{\circ}\text{C}$ , and vast swatches of land are guarded by mountains. Antarctica is completely alien to this planet.

The ultimate survival training area, the continent provides long periods of cold and isolation that test our ingenuity, technology and stamina. Its pure, nearly pristine environment is the site of a great deal of basic research. Teams from around the world go to test equipment, the environment, its organisms, and, most of all, themselves. This year the National Science Foundation will spend over \$95 million to conduct research there, to study such diverse topics as the geological formation of the continent and the effects of temperatures on bacteria. NASA is searching there for ways to relieve the strain on people of long periods of confinement. The long Antarctic winters are ideal for testing the isolation areas that slowly erode the sanity of astronauts during our prolonged manned space missions.

(Preceding page) A view through Arch Iceberg, Bull Pass in the Olympus Mountain Range (left) remnants of Wright Lower Glacier (top) ice stranded by a low sea in the Lillieford Islands, (bottom) volcanic cinders and ice in the Daily Islands



The crystal-clear atmosphere of the White Continent will soon be home to our newest telescope, designed to look at the upcoming peak of sunspot activity. Locating the telescope in Antarctica will enable researchers to observe the sun for extended periods at a constant altitude.

Antarctica may also be a source of food for the world's ever-growing population. Off its coast is the breeding ground of the krill, a small shrimp-like creature that is the main food for many whale species, including the sei, fin and blue. Krill harvesting is now expanding rapidly in the hope that the animal's high protein content can be adapted for human use. But some environmentalists fear that we may cut off the whales' source of food. The issue, so far unresolved, is currently under investigation.

Even more controversial is a scheme to tow icebergs from Antarctica—which contains over 80 percent of the world's fresh water supply—to the world's arid regions. As Saudi Arabian engineers search for ways to keep the bergs from melting in transit, scientists are trying to assess the impact the project might have on global climates.

Although the White Continent has been studied intensively for the past 25 years, we have uncovered only a tiny fraction of its secrets. Vast reaches of knowledge remain to be explored. But even as we search for greater understanding, we can take a moment to wonder at Antarctica's beauty. ☐

(Above and right) Two views of ice caves at Hut Point Peninsula, site of the camp established by the English explorer Robert F. Scott on his first expedition in 1901.



📍 Locating the solar telescope there will let researchers see the sun more clearly than ever before. 📍



FICTION

Science could conquer death, she knew. But could she deal with what came after death?

## SOUL SEARCH

BY SPIDER ROBINSON

Rebecca Howell stood trembling with anticipation beside the Resplia tank that contained the corpse of her husband, Archer.

A maestro of conflicting emotions, ragged with her loneliness yearning for just triumphant satisfaction, fierce joy and an underlayer of fear all trying to coexist in the same skull. Perhaps no one in all human history had experienced that precise mix of emotions for her situation was close to unique. Because she was who and what she was, it would shortly lead her to develop the first genuinely new motive for murder in several thousand years.

"Go ahead," she said aloud, and eight people in white crowded around the transparent cryotank with her. In practiced silence, they began doing things.

John Dimsdale touched her shoulder. "Reb," he said softly, "come on. Let them work."

"No. Reb, the first part is not pretty. I think you should —"

"Darrest, I know that!"

"I think," he repeated insistently, "you should come with me."

She stiffened, and then she saw some of the things the technicians were doing. All right, Doctor Bheradway!

One of the white-suited men looked up, intently.

PAINTING BY MICHEL HENRICOT

"Call me before you line the ceiling. With the room, down white-tiled corridors, to Bharadwaj's office. His secretary looked up as they entered and hastened to open the door leading into the doctor's inner sanctum for them. Dimsdale dismissed him, and Rebecca sat down heavily in the luxurious desk chair, putting her feet up on Bharadwaj's desk. They were both silent for perhaps ten minutes.

"Eight years," she said finally. "Will it really work, John?"

"No reason why it shouldn't," he said. "Every reason why it should."

"It's never been done before."

"On a human, no. Not successfully. But the problems have been solved. It worked with those cats, didn't it? And that ape?"

"Yes, but—"

"Look, Bharadwaj knows perfectly well you'll have her skull for an ashtray if he fails. Do you think he'd try it at all if he wasn't certain?"

After a pause she relaxed. "You're right, of course." She looked at him then, really seeing him for the first time that day and her expression softened. "Thank you, John. I ... thank you for everything. This must be even harder for you than it—"

"Put it out of your mind," he interrupted hastily.

"I just feel so—"

"There is nothing for you to feel guilty over, Reb," he insisted. "I'm fine. When ... when

love cannot possess, it content to serve."

"Who said that?"

Dimsdale blushed. "Me," he admitted. "About fifteen years ago." And frequently thereafter, he added to himself. "So put it out of your mind all right?"

She smiled. "As long as you know how grateful I am for you. I could never have maintained Archer's empire without you."

"Nonsense. What are your plans—for afterward, I mean?"

"What he's released? As far as possible. I thought he might enjoy a cruise around the world, sort of a reorientation. But I'm quite content to hole up on Lulu or up in Alaska, instead, or whatever he wants. As long as I'm with him, I—"

Dimsdale knew precisely how she felt. After this week it might be weeks or years before he saw her again.

The phone rang, and he answered it. "Right. Let's go, Reb. They're ready."

The top of the cryotank had been removed now allowing direct access to Archer Howell's delirated body. At present it was only a body—no longer a corpse, not yet a man. It was "alive" in a certain technical sense, in that an array of machinery circulated its blood and pumped its lungs; but it was not yet Archer Howell. Dr. Bharadwaj awaited Rebecca Howell's command, as ordered, before firing the complex and precise charge through the pituitary gland that, he believed, would restore independent life function—and

consciousness— to the preserved flesh.

"This new liver is in place and functioning correctly," he told her when she arrived. "Indicators are good. Shall I—"

"At once."

"Disconnect life-support," he snapped, and the was done. As soon as the body's integrity had been restored, he pressed a button. The body buckled in its Plexiglas cradle then sank back limply. A technician shook her head, and Bharadwaj, sweating profusely, pressed the button a second time. The body spasmed again—and the eyes opened. The nostrils flared and drew in breath; the chest expanded; the fingers clenched spasmodically. Rebecca cried out. Dimsdale stared with round eyes, and Bharadwaj and his support team broke out in broad grins of relief and triumph.

And the first breath was expelled in a long, high, unmistakably infantile wail.

Rebecca Howell's mind was both tough and resilient. The moment her subconscious decided she was ready to handle consciousness again, it threw off heavy sedation like a flannel blanket. In the next room, the physician monitoring her telemetrically started violently wondering whether he could have catnapped without realizing it.

"What's wrong?" Dimsdale demanded.

"Nothing. Uh, she ... a second ago she was deep under and—"

"Now she's wide awake," Dimsdale laughed. "All right, stand by." He got up

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stiffly and went to her door. Now comes the hard part," he said, too softly for the other to hear. Then he aqualed his shoulders and went in.

"Reb."

"It's all right, John. Truly I'm okay. I'm terribly disappointed, of course, but when you look at it in perspective, this is really just a minor setback."

"No," he said very quietly. "I rent."

"Of course it is. Look, it's perfectly obvious what's happened. Some kind of cryonic trauma would be fine. All his memories are gone. He'll have to start over again as an infant. But he's got a mature brain, John. He'll be an adult again in ten years, you wait and see if he can't. I know him. Oh, he'll be different. He won't be the man I knew, he'll have no memories in common with that man, and the new upbringing is bound to alter his personality some. I'll have to learn how to make him love me all over again. But I've got my Archer back!"

Dreadle was struck dumb, as much by admiration for her indomitable spirit as by reluctance to tell her that she was dead wrong. He wished there were some honorable way he could dis-honor!

"What's ten years?" she chattered on, oblivious. "Well, what's twenty years? We're both forty now, that I've caught up with him. With the medical we can afford, we're both good for a century and a quarter. We can have at least sixty more years together. That's four times as long as we've already had! I can be patient another decade or so for that. She smiled, then became businesslike. "I want you to start making arrangements for his care at once. I want him to have the best rehabilitation this planet can provide, the ideal childhood. I don't know what kind of experts we need to hire. You'll have to—"

"No!" Dreadle cried.

She started and looked at him closely. "John, what in God's name is wrong with— She paled. "Oh my God, they've lost him, haven't they?"

"No," he managed to say. "No, Reb, they haven't lost him. They never had him."

What the hell are you talking about? she blazed. "I heard him cry, saw him wave his arms and pee himself. He was alive!"

"He still is. Was when I came in here, probably still is. But he is not Archer Howell."

"What are you saying?"

"Sharodewaj said a lot I didn't understand. Something about brain waves, something about radically different indices on the something-or-other profile, something about different reflexes and different—"

he was close to babbling. Archer was born after the development of the brain scan, so they have tapes on him from infancy. Eight experts and two computers agree. Archer Howell's body is alive down the hall, but that's not him in it. Not even the infant Archer. Someone completely different. "He shuddered. "A new person. A new, forty-year-old person."

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The doctor outside was on his toes, leading tranquilizers and sedatives into her system in a frantic attempt to keep his telemetry-readings within acceptable limits. But her wit was a hot sun, burning the fog off her mind as fast as it formed. "Impossible," she cried, and she sprang from the bed before Dimsdale could reach, ripping tubes and wires loose. "You're wrong, all of you. That's my Archer!"

The doctor came in fast, treated and ready for anything, and she kicked him square in the stomach and leaped over him as he went down. She was out the door and into the hallway before Dimsdale could reach her.

When he came to the room assigned to Archer Howell, Dimsdale found Rebecca sitting beside the bed, crooning softly and rocking back and forth. An intern and a nurse were sprawled on the floor, the nurse bleeding slowly from the nose. Dimsdale looked briefly at the diaphanous man on the bed and glanced away. He had once liked Archer Howell a great deal. "Reb—"

She glanced up and smiled. The smile sideswiped him.

He knows me. I'm sure he does. He smiled at me. "As she picks a faling hand caught one of hers, quite by accident. See?" It clutched, babylike but with adult strength. She winked but kept the smile. Dimsdale swallowed. "Reb, it's not him. I swear it's not. Bharadwaj and Naskamuz are absolutely—"

The smile was gone now. "Go away, John. Go far away and don't ever come back. You're dead."

He opened his mouth and then spun on his heel and left. A few steps down the hall he encountered Bharadwaj, alarmed and awesomely drunk. "She knows?"

"If you value your career, Doctor, leave her be. She knows, and she doesn't believe it."

Three years later Rebecca summoned him. Responding instantly cost him much, but he ignored that part of it. He was at her Alaskan retreat within an hour of the summons, slowed only by her odd request that he come alone, in disguise, and without telling anyone. He was brought to her den where he found her alone, seated at her desk. Insofar as it was possible for one of her wealth and power she looked like hell.

"You've changed, Reb."

"I've changed my mind."

"That surprises me more."

"That's the equivalent of a ten- or a twelve-year-old in a forty-three-year-old body. Even allowing for all that, he's not Archer."

"You believe in brain scans now?"

"Not just them. I found people who know him at that age. They helped me duplicate his upbringing as closely as possible." Dimsdale could not guess how much that had cost, even in money. "They agree with the scans. It's not Archer."

He kept silent.

"How do you explain it, John?"

"I don't."

"What do you think of Bharadwaj's idea?"

"Religious bullsh\*t. Or is that redundant?"

Superstition!

"When you have eliminated the impossible," she began to quote.

"...there's nothing left, he finished.

"If you cannot think of a way to prove or disprove a proposition, does that make it false?"

"Damn it, Reb! Do you mean to tell me you're agreeing with that hysterical Hindu? Maybe he can help his heritage, but you?"

"Bharadwaj is right."

"Jesus Christ, Rebecca." Dimsdale thundered, "is the what lows can do to a fine mind?"

She overmatched his volume. "I'll thank you to respect that mind."

Why should I? he said bitterly.

"Because it's done something no one's ever done in all history. You cannot think of a way to prove or disprove Bharadwaj's belief. No one else ever has." Her eyes flashed. "But I have."

He gaped at her. Either she had completely lost her mind, or she was telling the truth. The two seemed equally impossible. At least he made his choice. "How?"

"Right here at this desk. My brain was more than adequate, once mine told it what to do. I'm astonished it's never occurred to anyone before."

"You've proved the belief in reincarnation. With your desk."

"With the computers it has access to. That's right."

He found a chair and sat down. Her head moved, and the chair's arm emitted a drink. He gulped it gratefully.

"It was so simple. John, I picked an arbitrary date from twenty-five years ago, picked an arbitrary hour and minute. That's as close as I could refine it; death records are seldom kept to the second. But it was close enough. I got the desk to—"

—collect the names of all the people who died at that minute?" he cried, stopping his drink. "On my God, of course!"

I told you. Oh, there were holes at over. Not all deaths are recorded, not by a damn sight, and not all of the recorded ones are mailed down to the minute, even today. The same with birth records, of course. And the worst of it was that picking a date that far back meant that a substantial number of the deadens were born before the brain scan, giving me incomplete data.

"But you had to go that far back." Dimsdale said excitedly, "to get live ones with jelled personalities to compare."

"Right," she said; and she smiled approvingly.

"But with all those holes in the data—"

"John, there are fifteen billion people in the solar system. That's one hell of a statistical universe. The desk gave me a tentative answer. Yes, I ran a fifteen more times for fifteen more dates. I picked one two years ago, trading off the relative affluency of immature brain scans for more complete records. I got fifteen tentative yeses. Then I

*Maman Monseigneur*



correlated all fifteen and got a definite yes."

"But—but damn it all to hell! Reb! The goddamn bratvise has been naging since forever! What the hell do the new ones come from?"

She frowned. "I'm not certain. But I've noted that the animal birthrate declines as the human increases."

His mouth hung open.

"Don't you see, John? You're a religious fanatic, too. The only difference between you and Bharadwaj is that he's right. Reincarnation exists."

John finished his drink in a gulp and milked the chair for more.

"When we froze Archer, he died. His soul went away. He was joyciled. When we forced life back into his body, his soul was elsewhere engaged. We got potluck."

The whiskey was hating him. Any idea who?"

"I think so. Hard to be certain, of course, but I believe the man we reeived was a grade three mechanic named Big Leon. He was killed on Luna by a defective lock seal, at the right instant."

"Good Christ!" Daisdale got up and began pacing around the room. "Is that why there are so many freak accidents? Every time you conceive a child you condemn some poor bastard? Of all the grotesque—!" He stopped in his tracks, stood utterly motionless for a long moment and whirled on her. "Where's Archer now?"

Her face might have been sculpted in

ice. "I've narrowed it down to three possibilities. I can't pin it down any better than that. They're all eleven years old, of course. All male, oddly enough. Apparently we don't change sex often. Thank God."

She looked him square in the eyes. "I've had a fully equipped cryotheater built onto this house. His body's already been re-frozen. There are five people in my employ who are competent enough to get the pup to it, cannot possibly be forced back to me. There is not one of them I can trust to have that much power over me. You are the only person living I trust that much. John. And you are not in my employ."

"God damn it—!"

"This is the only room in the system that I am certain is not bugged. John. I want three perfectly timed, untraced murders."

But the bloody cryotechs are witnesses—

"To what? We'll freeze and thaw him again, hoping that will bring him out of it somehow. From the standpoint of conventional medicine it's as good an idea as any. No one listened to Bharadwaj. No one got any explanation for Archer's change. And no one but you and I knows the real one for certain. Then the desk doesn't remember."

She snarled. "No one attempted defrostings since Archer, none of em worked, and still, nobody's guessed. There's a mousetrap on defrosting, but it's useless. We can do it, John. She stopped set back in her chair and became totally expression-

less. "If you'll help me."

He left the room. Left the house and kept going on foot. Four days later he re-emerged from the forest, bristling with beard, his cheeks gaunt, his clothes torn and filthy. Most of his original disguise was gone, but he was quite unrecognizable as John Daisdale. The Security people who had monitored him from a distance brought him to her, as they had been ordered, and reluctantly left him alone with her.

"I'm your man," he said as soon as they had gone.

She winced and was silent for a long time.

"You'll have to kill Bharadwaj, too," she said at last.

I know.

Rebecca Howell gazed again at the defrosted thing that had once been Archer Howell, but the torrent of emotions was tamed this time, held in rigid control. It may not work on this shot, she reminded herself. I'm only guessing that his soul will have an affinity for his old body. He may end up in a crib in Bombay this time. She smiled. But sooner or later I'll get him.

"Before it would be well to do it now."

The smile vanished and she turned to the chief surgeon. "Doctor Ruiz-Sanchez, I said twelve hundred hours. To the second. You have made me sweat myself."

Her voice was quite gentle, and a normal man would have gone very pale and shut up, but good doctors are not normal men. "Before the longer he is on machine. He support—"

"HUMOR ME!" she bellowed, and he spring back three steps and tripped over a power cable, landing heavily on his back. Technicians jumped, then went expressionless and looked away. Ruiz-Sanchez got slowly to his feet, flexing his fingers. He was trembling. "Si senias."

She turned away from him at once, returning to contemplation of her beloved. There was dead silence in the cryotheater save for the murmur and chuckle of life-support machinery and the thrum of powerful generators. Cryotechnology is astonishingly power-thrifty, she reflected. The "re-starter" device alone drank more energy than her desk, though it delivered only a tiny fraction of that to the prenal gland. She dalked the noisy, smelly generators on principle, but a drain this large had to be unmetered. Especially if it had to be re-paired several times. Mass murder is easy, she thought. All you need is a good mind and unlimited resources. And one trusted friend.

She checked the wall clock. It was five minutes of noon. The tile floor felt pleasantly cool to her bare feet, the characteristic cryotheater smell was subliminally re-generating. Maybe this time love she returned to the half-ling body.

The door was thrown open, and a guard was hurled backward into the room, landing aprawl. Daisdale stepped over him, breathing hard. He was wild-eyed and

CONTINUED ON PAGE 156



*A new superpower has joined the big leagues of international science and technology*

## EUROPE'S SCIENTIFIC RENAISSANCE

BY DANIEL S. GREENBERG

**F**or several years I had been hearing scientists say that Western Europe—the long-ago birthplace of modern science—was undergoing a scientific and technological renaissance.

The reports from biologists, physicists and researchers in other fields were similar. After many false starts and disappointed efforts to recover its pre-World War II scientific glory, the Old World was suddenly astir with ambitious, well-financed, high-quality research. As a result, the American scientific community is starting to have company on the frontiers of scientific achievement.

But my contacts were talking of a renaissance, an odd choice of word. I thought since over the past two decades Europe has scarcely resembled a scientific or technological desert. After all, the genetic code was broken in British laboratories; France has become a self-made, full-fledged nuclear power; complete with intercontinental missiles; and the superproton synchrotron operated by a European consortium near Geneva, Switzerland, is the most powerful atom smasher in the world. Furthermore, over the past 20 years European researchers have garnered about one-third of the Nobel prizes for science.

My informants nonetheless persisted

saying that these showpiece accomplishments of European research should not divert attention from the fact that something new and important had pervaded the ecology of European science and technology. And what that amounted to, they said, was that Europe had evolved past isolated peak climbing toward across-the-board excellence in virtually all fields of research.

So I went to have a look, spending a month visiting some of Europe's major research centers as well as key laboratories and government research ministries, talking along the way with laboratory workers, their front-office administrators and the government officials who control the money for research. In the last group was one of the shrewdest and best-qualified observers of the trans-Atlantic scientific scene: Pierre Aigrain, the French secretary of State for Research, a position akin to White House science adviser. A Carnegie Tech Ph.D. in electrical engineering and, over the years, the occupant of high government and industrial posts in France, Aigrain put the matter quite simply: "The United States hasn't slipped, he said. It's just that we've gotten better. Twenty years ago the United States was doing eighty percent of the world's good science. Europe has been catching up, and the U.S. share of the total has therefore been going



The \$200 million *Challenger* above and at right, now under construction in Bremen, Germany, will fly aboard the United States space shuttle.

PHOTOGRAPHS BY MALCOLM KIRK







down. If the United States wishes to maintain its former lead in proportion of GNP devoted to research and development, it would have to quadruple current spending which is out of the question.

Western Europe is undergoing a scientific and technological renaissance. The effects are already being felt—with more to come—not only within the world community of science but even more so in politics and economics, which are increasingly affected by the ability to turn knowledge into power.

The key to understanding this new renaissance is that it is taking place despite Europe's political fragmentation and divergent national interests. Though none of the individual European nations is a match for either of the two great superpowers, the nations of Europe collectively comprise a formidable assemblage of intellectual power and physical resources. And what this adds up to is a rapidly growing ability to compete in the international big leagues of science and technology.

The results are to be seen in such basic procedures as neutron scattering, a technique for studying the distribution of neutrons in the atomic nucleus as a means of probing the fundamental structure of matter. The acknowledged leader in this field of research is the Institut von Laue-Langevin, jointly operated by a nonprofit corporation backed by France, Great Britain, and West Germany. They are also to be found in the products of high-technology manufacture as was demonstrated last year by Eastern Airlines' decision to buy a fleet of the European-built wide-body A-300 Airbus—the first time that a major U.S. carrier has gone abroad to purchase big planes. With the completion earlier this year of the first stages of a French-led, multibillion-dollar uranium-enrichment facility, Eurodif Europe is now self-sufficient in the manufacture of nuclear fuel, previously most of its enriched uranium was obtained from the United States. And in space research and commercial applications, for which Europe has long been dependent upon American and Soviet launch vehicles, self-sufficiency is also on the way as the European Space Agency, Europe's counterpart of NASA,

meets full-scale production of Europe's first heavy-duty rocket: the three-stage Ariane.

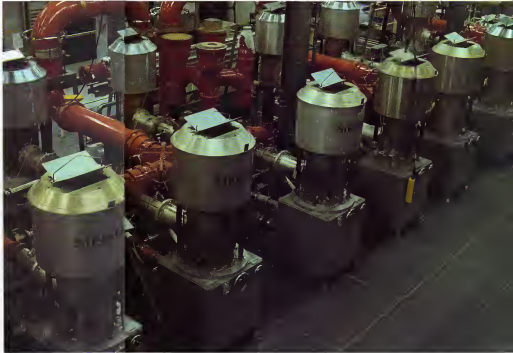
To examine the origins and potential of the revitalization of science on its historic breeding grounds, it is helpful to ignore the most conspicuous symbol of European collaboration, the nine-nation (soon-to-be-expanded) Common Market. The Market works well for agriculture, steelmaking, and external positioning, but it provides a poor framework for scientific and technological cooperation. Science and technology require sensitive administration and insulation from quick-payoff demands—and that is hard to get from nine sovereign nations at variance with one another.

So let's forget about grand omelets—they are plentiful, but mainly confined to paper—and instead as a first step let's look into a laboratory that typifies the ability of Europe's scientists to practice the collaboration of which European politicians so often speak.

Situated in the French alpine city of Grenoble is the Institut von Laue-Langevin (ILL), home of the Franco-German-British high-flux reactor, the world's most powerful facility for generating neutrons to probe the basic structure of matter. ILL (pronounced *ill*) is named after two luminaries of twentieth-century physics: Germany's Max von Laue, who was awarded the 1914 Nobel Prize in physics for research on X-rays, and France's Paul Langevin, a colleague of Marie Curie and a pioneer in magnetic and ultrasonic research. ILL functions on a budget of about \$30 million a year and it would cost some \$250 million to duplicate it at today's prices. It is a showplace of expensive, cutting-edge science, rated recently by the U.S. Office of Naval Research—whose towing teams systematically monitor European science—as the de facto international center for small-angle neutron scattering. ILL is a center of fundamental science; its cousin is

The computer control center above is part of a 24-computer array used to control the 400-Mev super-proton synchrotron at CERN near Geneva. Also at CERN, the imposing ranks of machinery at right typify the multibillion-dollar, 11-nation high-energy physics center.

There is no pressure for us to produce, and consequently we innovate, because there is no pressure.



for knowledge, rather than economic payoff.

ILL is essentially a factory for producing neutrons, firing them at minuscule particles of biological and polymeric substances and learning about the targets' internal structure by studying the subatomic effects produced by the impact. ILL's neutrons, originating in a 57-megawatt high-flux reactor, are both hot and cold, cold neutrons, chilled by liquid deuterium at  $-268^{\circ}\text{C}$ , compose the most intense cold-neutron beam yet achieved. The neutron technique provides analytical capabilities not possible with X rays or optical spectroscopy. With their electrical neutrality, neutrons can penetrate the electron shells of atoms and interact with the nucleus. The reason why they are so potent for providing information about structure is that, because of their short wavelength (of the same order of magnitude as the distance between atoms in matter) they are scattered upon impact with a target, and their dispersal patterns, read with sensitive equipment, provide a "picture" of the target's interior. The technique, known as small-angle neutron scattering (SANS), has developed principally in Europe, the Office of Naval Research reports. "It is clear that Europeans have led the world in SANS."

Elegant is the word often applied to ILL's scientific operations, the same can be said of its political genesis. Organization and day-to-day management, ILL was conceived in the mid-1960s through a happy convergence of physics and politics. With Charles de Gaulle preaching the importance of the Old World regarding the scientific and technological eminence that it lost to the United States because of World War I, the atmosphere was favorable for French scientists to propose grand plans to their government. At the same time, West Germany was entering the industrial boom that was to make it the Continent's strongest economic power. Recognizing the close relationship between industrial innovation and a strong scientific base, the German government was similarly interested in high-quality science. Those Franco-German political stirrings coincided with technological developments that promised both unprecedented neutron-beam intensities and more sensitive means for studying their effects.

Because of Great Britain's traditional strength in nuclear research, the Franco-German partners proposed that the United Kingdom join a consortium for constructing and operating a laboratory that, from the start, would be the world's finest neutron-research facility. Economically ailing Britain demurred on austere grounds, and the French and the Germans went ahead, accepting the French government's offer to provide a site adjacent to a major nuclear-research center. ILL reached full power in 1973. The British changed their minds in 1974, pitched in with a retroactive one-third share of the construction costs, and be-

came a full-fledged partner.

Organized as a private corporation financed by the science-support agencies of the three countries, ILL operates under a charter that specifies that the lab's directorship must rotate between British and German nationals. French citizens are ruled out. The current director, Dr. John White, an Oxford University physicist, explained to me that the French insisted on excluding themselves from the top post as a symbol of the internationalism of the laboratory.

Though ILL has a full-time staff of 75 physicists and 30 students working on Ph.D. theses, it is what is known as a "user" laboratory, which means that the staff is there to keep ILL running smoothly for experiments designed and performed by outside scientists, mostly from European universities and government laboratories. Last year 690 experiments were proposed, 720 were approved, and 1,700 "scientific visits" were made to ILL.

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◀ *Eastern Airlines' order of 23 wide-body planes from Airbus Industrie, a partnership of France, Germany, Britain, and Spain shows how America is losing its hold over high technology.* ▶

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The current director, Dr. John White, who will be succeeded as director next year by a German physicist, Tasso Springer, sparries with pride over ILL's preeminence and notes, with a covetous glint in his eyes, that as the United States is seeking to catch up in neutron research, ILL's three-nation partnership has approved a \$25-million modernization program for the Grenoble facility.

Meanwhile, with neutron scattering rapidly advancing as a research technique in the biological sciences, the European Molecular Biology Organization, another manifestation of Europe's scientific rebirth, is constructing a laboratory near ILL.

White and Springer see ILL as having a role far beyond its research programs. International scientific collaboration, they point out, is a peculiar and at first difficult form of activity, because of problems of language, national pride, concern about "tar return" on investment, durability of interest among the politicians who pay the bill, and so forth. ILL, they observe with satisfaction, has shown thousands of young European scientists how a cross-country can turn their convergent scientific in-

terests into a smooth-running, cost-sharing collaboration.

A persistent, though actually obsolete, rule of thumb about European science and technology is that the further a research subject is from commercial application, the easier it is to achieve collaboration. This is said to account for the failure of Euratom, the Common Market's feeble nuclear R&D agency; its individual members wanted that nuclear market for themselves. Conversely, it is said to account for the success of such big basic science ventures as ILL and CERN (Centre Européen pour la Recherche Nucléaire), the quarter-century-old multinational collider, 11-nation high-energy-physics center near Geneva. Since neutron scattering and atom smashing consume money—lots of it—and produce no salable products, there's a strong incentive to split the costs. Another case in point is the Common Market's decision to cooperate in constructing an experimental fusion reactor—a so-called tokamak, known as the Joint European Torus—on a site next to Britain's Culham laser laboratory. Since fusion is not expected to pay off for 25 or 30 years—if ever!—no European nation is eager to go it alone in the construction of a supermachine that is intended to do no more than prove that fusion energy is physically attainable and controllable.

That's the presumed rule of European collaboration in R&D. It's likely to produce revenue, they won't team up. However, in Europe's accelerating scientific resistance, the rule no longer holds, as several of Europe's industrial competitors in the United States and elsewhere have regrettably learned. Today a reality is that Europe's high-technology organizations have devised a variety of elaborate combinations for pooling their strengths, with outstanding results.

Consider, for example, Airbus Industrie, which at nine years of age is now second only to world leader Boeing in the manufacture of jet aircraft. What is Airbus Industrie? It is 37.9-percent French, 37.9-percent German, 20-percent British, and 4.2-percent Spanish. Unlike the politically motivated and financially disastrous Anglo-French Concorde SST collaboration, the Airbus consortium had money making as its goal from the start. And in a brutally competitive industry Airbus appears to be well on the way to profitability with its wide-body, low-fuel-consumption A-300 accounting for almost 40 percent of the world's wide-body sales this year. Eastern Airlines' break with tradition—it has ordered 23 A-300s and has taken options on another 9—is regarded by economists as perhaps the most decisive evidence yet that America's long overdue dominance of "big ticket" high technology is now seriously challenged.

For an illuminating example of another area in which European collaboration is mounting a challenge, let's look at space exploration, an activity whose entry fees CONTINUED ON PAGE 102

# WAR BENEATH THE TREE

*"Not a creature was stirring . . ." But the boys were busy planning their strategy!*

BY GENE WOLFE

**I**n his Christmas Eve Command Robin, the Spaceman said, "You'd better go to bed or Santa won't come."

Robin's mother said, "That's right, Robin. Time to say good night."

The little boy in blue pajamas nodded, but he made no move to rise.

"Kiss me," said Bear. Bear walked his furry waddy walk around the tree and threw his arms about Robin. "We have to go to bed. I'll come too." It was what he said every night.

Robin's mother shook her head in amused despair. "Listen to them," she said. "Look at him, Bertha. He's like a little prince surrounded by his court. How is he going to feel when he's grown and can't have transistioned ayocophants to spoil him all the time?"

Bertha the robot maid nodded her own almost human head as she put the poker back in its stand.

"That's right, Ms. Jackson. That's right for sure. The Dancing Doll took Robin by the hand, making an arabesque pomché of it. Now Robin rose. His guardsmen formed up and presented arms."

On the other hand, "Robin's mother said, "They no children only such a short time."

Bertha nodded again. "They're only young once. Ms. Jackson. That's a far sure. All right if I tell these little cule toys to help me straighten up after he's asleep?"

The Captain of the guardsmen saluted with his silver saber; the Largest Guardsman beat the tattoo on his drum; and the rest of the guardsmen formed a double file.

"He sleeps with Bear," Robin's mother said.

"I can spare Bear. There's plenty of others." The Spaceman touched the buckle of his antigravity belt and soared to a height of four feet like a graceful, broad-shouldered balloon. With the Dancing Doll on his left and Bear on his right, Robin

PAINTING BY DONALD ROLLER WILSON



trudled off behind the guardsmen. Robin's mother ground out her last cigarette of the evening, winked at Bertha, and said, "I suppose I'd better turn in, too. You needn't help me undress. Just pick up my things in the morning."

"Yes, m'. Too bad Mr. Jackson ain't here; it been Christmas Eve and you expectin' an all."

"He'll be back from Brazil in a week — I've told you already Bertha, your speech habits are getting worse and worse. Are you sure you wouldn't rather be a French maid for a while?"

"Maize nobs, Ms. Jackson. I have too much trouble talkin' to the man that comes to the door when I'm French."

When Mr. Jackson gets his next promotion, we're going to have a chauffeur. Robin's mother said. "He's going to be Italian and he's going to stay Italian."

Bertha watched her waddle out of the room. "All right, you lazy toys! You empty them suitcases into the fire an' get everything put away I'm gone to turn myself off, but the next time I come on this room better be straight or there's goin' to be some broken toys aroun' here."

She watched long enough to see the Gingham Dog dump the contents of the largest armchair on the crackling logs, the Spaceman float up to straggle the magazines on the coffee table, and the Dancing Doll begin to sweep the hearth. Put your sells in your box, she told the guardsmen, and then she turned off.

In the smallest bedroom, Bear lay in Robin's arms. "Be quiet," said Robin.

"I am quiet," said Bear.

"Every time I am almost gone to sleep, you squiggle."

"I don't," said Bear.

"You do."

"Don't."

"Do."

"Sometimes you have trouble going to sleep, too Robin," said Bear.

"I'm having trouble tonight," Robin countered moodily.

Bear slipped from his arms. "I want to see if it's snowing again." He climbed from the bed to an open drawer and from the open drawer to the top of the dresser. It was snowing.

Robin said, "Bear, you have a circus loose." It was what his mother sometimes said to Bertha.

Bear did not reply.

"Oh, Bear," Robin said sleepily a moment later. "I know why you're awake. It's your birthday tomorrow and you think I didn't get you anything."

"Did you?" Bear asked.

"I will," Robin said. "Mother will take me to the store." In half a minute his breathing became the regular, heavy sighing of a sleeping child.

Bear sat on the edge of the dresser and looked at him. Then he said under his breath, "I can sing Christmas carols. I had been the first thing he had ever said to Robin, one year ago. He spread his arms

Altogether, all at once. It made him think of the lights on the tree and the bright lights in the living room. The Spaceman was there, but because he was the only toy who could fly, none of the others liked the Spaceman much. The Dancing Doll was there, too. The Dancing Doll was clever, but well — he could not think of the word.

He jumped down into the drawer and took a pile of Robin's undershirts, then out of the drawer, and softly to the dark, carpeted floor.

"Limited," he said to himself. "The Dancing Doll is limited." He thought again of the fire, then of the old toys — the Blocks Robin had had before he and the Dancing Doll and the rest had come, the Wooden Man who rode a yellow bicycle, the Singing Top.

The door of Robin's room was nearly closed. There was only a narrow slit of light so that Robin would not be afraid. Bear had been closing it a little more each night. Now he did not want to open it. But it had been a long time since Robin had asked about his

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◆When I call,  
'Charge!' we all run —  
The Largest Guardsman  
said, 'I'll beat my drum' —  
"You'll beat the  
enemy, or you'll go into  
the fire with the  
rest of us," Bear said. ◆

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Wooden Man, his Singing Top, and his 'A' Block with all of its talk of apples and acorns and alligators.

In the living room, the Dancing Doll was positioning the guardsman, and all the while the Spaceman stood on the mantel and supervised. "We can get three or four behind the bookcase," he called.

"Where they won't be able to see anything," Bear growled.

The Dancing Doll prouetted and dropped a sparkling curtsy. "We were afraid you wouldn't come," she said.

"Put one behind each leg of the coffee table," Bear told her. "I had to wait until he was asleep. Now listen to me, all of you. When I call, 'Charge!' we must all run at them together. That's very important. If we can, we'll have a practice beforehand."

The Largest Guardsman said, "I'll beat my drum."

"You'll beat the enemy, or you'll go into the fire with the rest of us," Bear said.

Robin was sliding on the ice. His feet went out from under him and right up into the air so that he fell down with a tremendous BUMP that shook him all over. He lifted his head, and he was not on the lo-

zan pond in the park at all. He was in his own bed, with the moon shining in at the window and it was Christmas Eve — no Christmas Night now, and Santa was coming. Maybe he had already come. Robin listened for reander on the roof and did not hear the ground or any reander steps. Then he listened for Santa eating the cookies his mother had left on the stone shelf next to the fireplace. There was no munching or crunching. Then he threw back the covers and slipped down over the edge of his bed until his feet touched the floor. The good smells of tea and fire had come into his room. He followed them out of the room, ever so quietly into the hall.

Santa was in the living room, bent over beside the tree! Robin's eyes opened until they were as big and as round as his pajama buttons. Then Santa straightened up and he was not Santa at all, but Robin's mother in a new red bathrobe. Robin's mother was nearly as fat as Santa, and Robin had to put his fingers in his mouth to keep from laughing at the way she puffed and pushed at her knees with her hands until she stood straight.

But Santa had come! There were toys — new toys — everywhere under the tree.

Robin's mother went to the coxees on the stone shelf and ate half of one. Then she drank half the glass of milk. Then she turned to go back into her bedroom, and Robin followed into the darkness of his room until she had passed. When he peeped cautiously around the door frame again, the toys — the New Toys — were beginning to move.

They shifted and shook themselves and looked about. Perhaps it was because it was Christmas Eve. Perhaps it was only because the light of the fire had activated their circuits. But a clown brushed himself off and sneezed, and a raggedy girl smoothed her raggedy apron (with a heart embroidered on it), and a monkey gave a big jump and chinned himself on the next-to-lowest limb of the Christmas tree. Robin saw them. And Bear behind the hassock of Robin's father's chair saw them, too. Cow-boys and Native Americans were lifting the lid of a box, and a knight opened a cardboard door (made to look like wood) in the side of another box (made to look like stone), letting a dragon peer over his shoulder.

"Charge!" Bear called. "Charge!" He came around the side of the hassock on all fours like a real bear, running softly but very fast, and he hit the Clown at his side waistline and knocked him down, then picked him up and threw him halfway to the fire.

The Spaceman had swooped down on the Monkey, they wrestled leawing on top of a polystyrene toy car.

The Dancing Doll had charged fastest of all, faster even than Bear himself, in a breathtaking series of jets, but the Raggedy Girl had lifted her feet from the floor and now she was running with her toward the fire. As Bear struck the Clown a

CONTINUED ON PAGE 110



*A remarkable eye for the order  
that underlies our complex world  
has made this microbiologist  
an articulate spokesman for  
science, the environment, and life*

## INTERVIEW

# RENÉ DUBOS

**T**he list of René Dubos's accomplishments is nearly endless. Fully 40 years ago he extracted the first commercial antibiotic, streptomycin, from soil microbes that he found on the grounds of Rockefeller University. It was a major step in opening the age of "wonder drugs," an age whose assumptions he has unceasingly questioned.

In 1942 his young first wife died of the then-dreaded disease tuberculosis. He soon devised techniques that made it possible to induce tuberculosis in mice, hastening the development of the first TB vaccine. Since then, his labors have borne satisfying fruit: dozens of scientific awards and honorary degrees, world renown as an activist thinker on medical, social, and ecological issues, and a Pulitzer Prize for his 1960 book, *So Human an Animal*.

René Dubos has come a long way from the small agricultural village north of Paris where he was born 78 years ago, but in many ways he has remained close to the soil. He studied agronomy as an undergraduate and turned to bacteriology after reading a

popular-science article during a lunch break from his work as assistant editor of an agricultural journal in Rome. Even today he finds pleasure and renewal in planting trees at his country retreat on the Hudson River.

His life has been shaped almost by accident. While working in Rome, Dubos met an American—by sheer chance, a bacteriologist who directed a laboratory at what is now Rutgers University, where Dubos took his doctorate. The American's studies impressed him with the adaptability of life, a theme that has animated his work ever since. In 1927 he moved to Rockefeller University where (save for two years at Harvard) he has been a researcher and teacher extraordinaire as his professional life.

Early on, he pondered the importance of multiple factors—stress, nutrition, heredity, psychology—in evoking disease. Eventually he came to believe that illness is only the final act of a sad drama involving many actors, not an absolute state dependant only on the presence of hostile "germs." Today these ideas are

taken for granted, but in the 1940s and 1950s Dubois's skills as a teacher and lecturer played an important part in weakening the hold of the single-factor theory of disease.

He did not stop with educating his colleagues. Since the mid-1940s he has reached out to laymen in books and articles, stressing again and again that health and a humane way of life can never come from a narrow view of medicine and biology. Although not a physician himself, he became known as "the conscience of medicine." Long before it was fashionable, he pointed out the dangers of exploiting our environment, and today that point

made; he does not hesitate to risk his popularity by proclaiming his optimistic view of science in his future.

Despite his years, Dubois energetically pursues the Greek ideals of reflection and action. He teaches, writes, organizes conferences, is preparing a television series on the environment, serves on advisory boards, and, in general, brings all his personal and professional knowledge to bear in shaping the future. He is effervescent, charming, and vigorous. Where does all that energy come from? *Omni* interviewer Claire Wurga began their conversation by trying to find out

**Omni:** The psychologist Julian Jaynes argues that the gods of mythology were really voices from the right hemisphere of our brain. In your book *A God Within* you describe certain almost godlike forces in us. Where do those forces come from?

**Dubois:** I came to the term the god within after reading a speech that Pasteur made about a hundred years ago in which he tried to explain the achievements of great men by their endowment with enthusiasm—from Athens, Greece for "the god within." That impressed me, for I realized that the great achievers I have known all seem to be possessed, almost compelled to act, by some kind of spirit. And in looking around the world, I saw that landscapes and cultures had a genius of their own something that made them special and different from one another.

When I began my working life in Rome, I sensed very soon how profoundly different Italian culture was from my native French culture, despite many historic similarities. As soon as you step into the streets of Rome, you can sense it, an expression of something luminous in the landscape and history that is independent of the daily life. When I arrive in Paris, I am immediately aware of the other kinds of vibrations, political and intellectual. I always have the feeling that I have arrived on the eve of a revolution. And when I arrive in New York, then I am certain that it has already occurred!

In Great Britain the Irish, the Welsh, the Scots, want to affirm their national identity in France, the people from Brittany and the south are trying to rediscover what is peculiar to them, even though France has been united and centralized for so long. So it seems to me that the genius of each part of the world is creative and important, that a landscape or a culture—or a person—is successful to the extent that some unique inner structure finds expression. That's what I call the god within.

**Omni:** What can science tell us about that uniqueness? Neurophysiologists such as John Eccles and Wilder Penfield have asserted that no matter how completely we map the structure of the brain, we will not be able to account for everything about the mind.

**Dubois:** I'm sure most scientists would reject that view, and when I wear my "scientist hat" I say that the mind is an expression of the brain. But deep in my heart I believe that the mind will never be totally explained by what we know or can hope to know about the brain.

**Omni:** Do you see other limits to scientific understanding?

**Dubois:** We can perceive the world only through our senses organs and our brain. But they have evolved in relation to only limited aspects of reality, not to the totality of creation. I think that is the fundamental limitation—that we can perceive only that to which we have adapted during evolution.

**Omni:** What about determinism and free will? As an experimental biologist you have relied throughout your career on assumptions of cause and effect, yet you have written that free will directs our behavior more than determinism does.

**Dubois:** I believe that completely. Let me give you examples. Seven or eight years ago, when I was still a laboratory scientist, I wrote *So Human an Animal*. It was subtitled *How We Are Shaped by Surroundings and Events*. Indeed, all of the papers I published were demonstrations of the lasting effects of early influences.

Now, I can recognize in my own speech, my behavior, my attitudes, my beliefs, the influence of France and Italy and the United States. But the fact is that at the age of twenty, for no good reason I decided to go to Italy, three years later, for no good reason I decided to come to the United States. I had been well accepted in France, where my family still lives. I was fairly successful and accepted in Italy. But somewhere in me was a desire for experience, for adventure, and I find it hard to reconcile that exploratory impulse with a purely deterministic point of view.

So on the one hand I believe in biological determinism, and on the other hand I believe that we are free to do certain things at crucial times. And about four years ago I wrote a book, in French, entitled *Choosing to Be Human*.

**Omni:** You have drawn a distinction between individuality and personality. Can you elaborate on that?

**Dubois:** I define individuality biologically: it is the organization that makes an organism function in a certain way, the biological aspect of the uniqueness of each organism.

I use the word personality to represent the sum of the interventions one makes, in which one declares, in one way or another, "I want this kind of life." It is choosing your persona, or the mask you want to wear. It's very difficult to defend all of the scientifically, but I believe it intensely.

This way of thinking, oddly enough, leads to my attitude toward the environmental movement. Most of my colleagues

in the movement say "You must respect nature, you must not disturb it."

**Omni:** Those are the people you call the Franciscan conservationists, after St. Francis of Assisi?

**Dubois:** Yes, those who say, "Nature knows best, so don't disturb it." Now many people say that, but nobody practices it. I have a much greater attachment for the philosophy of the Benedictines, who see their role as being partners of God in completing the act of creation. They accept that in being human on Earth, you give new materials and you create something that benefits humanity.

**Omni:** But couldn't a strip-mining advocate or an oil company also lay claim to that view?

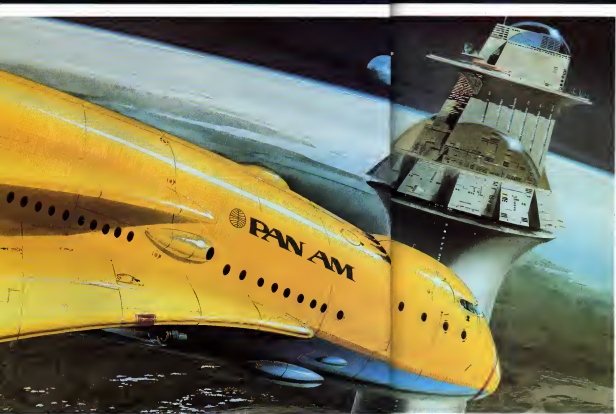
**Dubois:** Yes, but the Benedictine type of intervention is in harmony with the rest of nature. I believe we have the right to use petroleum products, but we must learn to do it in a way that does not damage nature. If, for example, we are going to grow plants for biomass energy, we must do it without ruining the esthetic quality of the environment. We need to introduce ethical and esthetic values into technology.

**Omni:** People used to consider that nature was wild and bestial, something to be feared. But now our mastery over it makes us feel that it is something to be used. Are we simply ripping our own order from such an attitude, or is there an order inherent in nature?

**Dubois:** I think the human brain introduces higher levels of order when the complex scheme of nature, suborders that, for human beings at least have a higher level of meaning, I say "for human beings at least" to accommodate my friends who ask, "What about the cockroach's point of view?" To them I respond, "Well, I don't know. I have a peculiar bath that our point of view is higher than that of any other creature, but I have no way of proving it. I make no bones about being firmly anthropocentric. I have accepted that without being able to defend it."

**Omni:** Do you think the environmentalist message is making headway?

**Dubois:** There is still a great deal to be done, of course, but I've seen enormous strides. In 1973 I was asked by Japanese national television to speak there about the environment. At that time you could not see Fujiyama from Tokyo. At the end of 1977 I was asked to go there again, this time by the newspapers, and from my hotel I could see the mountain. The Japanese govern-



Next to these, the pyramids look like chopped liver

## 7 WONDERS OF THE UNIVERSE

BY PHILIP DUNN

In the second century B.C. that great Hellenic leader of antiquity Antipater of Sidon described the Seven Wonders of the Ancient World. Unfortunately, except for the pyramids of Egypt, these sights had all been destroyed by the tenth century. The tourist trade has gone downhill ever since. Our ancestors gazed upon the Colossus of Rhodes and the Mausoleum of Halicarnassus. Today we settle for Disney World.

But no more! Looking ever upward, we at *CNN* commissioned Dr. Jason D'Argonne to search the far reaches of the universe in his straining for some decent tourist attractions. He returned recently bearing with him two remarkable doom orbs. The first was his expense account, which would have paid for the Olympian Zeus 50 times over. (Our accountants called it "the golden fleece.") The second was the portfolio of intergalactic wonders on these pages—which we now proclaim as the Seven Wonders of the Universe.

The YONKERS AIRPORT (left) is the only northbound sight of the seven. Dr. D'Argonne was able to photograph it, using an Instamatic equipped with a Zikon time-warp motor-drive, which produces snapshots up to four millennia in the future. Built just a few miles north of New York City in the year 2025, the airport was the indirect result of a tremendous population explosion that put ground space at a premium. The theory behind its construction was that if an area of land the size of Kennedy International Airport were built vertically, it would have to be 17 miles high. Thus, the 17-mile-high Yonkers Airport, with its 82 levels of runway. Though inconvenient for late passengers rushing to catch a plane at an upper level, the airport does allow access to take-off directly into their comest atmospheric levels.



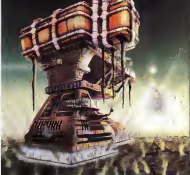
On the planet Tishon, in the Heperaggortia star system, light travels at only 145,543 miles per second, instead of the normal 186,281. Thus, the LIGHT OAMS OF HESPARAGGORTA (above) were built, using mirror surfaces to bring the light back to proper speed. The UFO MUSEUM (right), located on the planet Taucori, housed thousands of hovering space machines. The Taucorians are preoccupied with Earth, having obsessive maps of the planet and records of ancient visitations here. Taucori's culture resembles that of the Aztecs, with burial customs not unlike those of the ancient Egyptians. The DOORS OF LAUNCH (above right) are the portals of the universe's largest spaceship hangar, which became obsolete centuries ago because of energy shortages.



• The Doors of Launch stand four kilometers from the ground. The hangar itself measures 4,600 square kilometers and was built when subatomic fuel was still cheap and muon-guzzling space limousines were gigantic.



When the great forces of the Black Hole of Negran threatened to destroy the planet Straff, Dr. Thurgood Waverly built an anti-gravity system to save the people. The result: the bümplike City of Waverly.



The BRIDGES OF GRIEF (below) make the Hanging Gardens of Babylon look like ported plants. Straddling the three moons of the planet Penari, the bridges are adorned with Egyptian-Wes statues every 100 meters along their 108-million-kilometer length. They are so named because they are latticed repeatedly with the word grief. What this means, no one knows. The TEGLADORIN (left) is one of 80,000 such devices used on the planet Concordia for decomposing any substance, including humans, into subatomic particles to be transmitted to another Tegadom. You simply stand beneath it and push a button. The FLOATING CITY OF WAVERLY (far left) is a self-supporting metropole that floats in an orbit 3,000 kilometers above the surface of the planet Straff. DO





## FICTION

Unorthodox racing cars were Sam's joy,  
no matter what the weather

# SAM AND THE DIRTY MUDDER

BY DEAN ING

Since no one in the motoring press was cleared to report the truth behind Sam's so-called race, I guess it's up to me. I was in the pits with him that day while Pentagon people fled from the grandstands. And before that I had helped Sam prepare the car—the only Nash Metropolitan ever to enter an international race, they say. And before that—well, maybe I should start with Sam's letter from the Defense Department.

The Department of Defense has sponsored some fairly implausible schemes over the years, but nothing quite so bizarre as this. It began as an official request for proposals. I passed over Sam's shoulder, curious to see why he was chortling at registered mail and I supposed that the letterhead must have been that of a sin-ear jock and that the letters made up the other half. At the time we were in Sam's living

quarters, which are in his surplus hangar, while he no longer builds his legendary race cars for serious competition.

Sam's outlook dates from the day the sneaked computer time from Lockheed to get predictions of trends in auto racing—the same day he retired. He flatly refuses to furnish details about the future of racing. Beyond a few homicide hints and a jerk of a grizzled thumb toward his chair, cropped gray thatch. His hair had been as black as his cubicles until the day he scanned that fished pen-out.

Sam dropped the letter on the machinist's surface plate, a huge granite slab he uses as a drafting and driver table. Then resumed cleaning up the mess he'd made building the Sudden Buzzard Machine. The less said about the ill-fated

Buzzard Machine, the better it's enough to report that I helped Sam stow sheets of magnesium-titanium alloy

rolls of quartz tape, a spare pinionize turbine, and jigs for a drive gear that had been before it departed, ah omni-directionally.

As Sam's only helper, I'm equivalent, among the sporty car set, to Leonardo da Vinci's janitor. I get calluses, welder's eyesmen, amine rash, and flammeth itch, but I get bags of status, too. I leaned against the vacuum milling machine that Sam had bamboozled from Avco, happy to see the final vestiges of his unfortunate design disappear as he fed brownie prints into his stove, a vapor deposition furnace that he "found" at Rockwell. I chased down a last sketch with my broom and handed it to him with a smirk. Never again, I said, I sweep clean, but I'm no prophet.

Sam regarded me from under his eyebrow brackets and there was something unreadable in his glance. "Not enough pressure," he

grinned.

"In the turbine or on the drive gear?"

A snort. On me, of course. I do my best design work under pressure. You know I really ought to do something about that Starling today."

On what? I thought you were through with serious stuff."

I am. Scratching the gray stubble on his jaws, beginning to chuckle again as he speared that portentous letter, he continued. "But I know when the gummit plays a joke on itself. Read it and see, and don't bother me for a while." He grabbed an apple from the surface plate, bit into the fruit, and wandered off.

I pulled up a drafting stool and forged Sam and that's always a mistake. The further I read into the letter, the more awesomely genuine it seemed. The DOD, wishing to fund research into last land transportation, was inviting ten of the most savvy

PAINTING BY ELLEN GRIESEDECK

constructors in the free world to demonstrate competitively their concepts at a West Indies test facility leased from the French. Specification paragraphs were few and short, dealing mostly with safety rules and restrictions against hovercraft or onboard computers. I leaped through the attachments finally coming to awards of grant money which was to be apportioned in a five-four-three-two-one-zitch arrangement. The joke? Well, it there was one, I couldn't see it. I went looking for Sam, who had disappeared behind a plain roomy curtain. When I found him, I stopped in honor.

He stood on a foam slab with a clipboard, jotting notes, and every now and then he'd reach out with diagonal cutters to nip at a thin steel cable. The cable was anchored by a ring in the floor and led over a pulley high above, where it held his bronze snail. That nonspeak snail weighed about as much as a Volkswagen, and Sam had positioned himself directly underneath it.

Another pair with the nipples, half of the cable parted with a humming twangggg, and Sam nodded to himself and made another note. I managed to slip my mouth. Nothing came out. Somewhere inside my chest an imp was shaking a very cold martini, and all I could do was stare as one thousand kilos of beryllium bronze turned lazily under a strand of wire high above Sam's venerable and evidently ailing pate.

Sam had mentally spun out. I decided he was trying to qualify for his big main event in the sky. Could it rescue him in one? Was I even going near ground zero? My feet grew taproots. The lead strand parted with a keen musical sigh.

Oh, then you see? Sam said, stepping aside. The snail plummeted, missing him by an eyelash, and when it struck the foam, a dither even bounce. Just a quiet marine thunk, sinking into the foam slightly. Sam knelt, inspected the foam, and made another notation. "Good enough," he said brandishing the clipboard.

I trembled like a dog passing peach pits. "This is how you brainstorm under pressure?"

He squinted at his notes. "It was worth trying," he said. "Seems to work."

"It works, all right. I just invented the Jockey deper."\*

"Seal-of-the-pants styling," he ybed. "How'd you like the D-O-D's sense of humor?"

"Furry as a looth extraction."

He bestowed a very patient look on me. "Okay. I'll lay it out for you. Uncle Wagskins thinks he can steal a lot of new ideas, cheap. But in its wisdom the government expects a bunch of perm and proper feasibility studies, and"—he spoke slowly and distinctly—"it ain't gonna happen. Dids notice that the tech inspectors will be army research engineers? I hadn't. And to save time, they'll have all demonstrations run simultaneously for one hour."

"And the lot of contractors? Tobin Chatham, Rantzoo Ternon, Clem Oall, Hans Ger-

mann, Lodger Minsky—the world's best rule-benders in Formula Libre events. Sam passaged my still quaking shoulder with bird-wrench fingers, and his voice had a conspiratorial rasp. "There has never been a formula as low as this 'un, boy. Under all that jargon lies a spirit race with a half-million to the winner. Even Indy doesn't pay that much. Fifth-place finish hauls in a hundred thou," he marveled, sucking a tooth.

Most pro drivers would main for such a fifth place. I missed.

Bite your tongue. But I'd bit my Le Mans trophy against a plastic dashboard Jesus that no constructor could resist the shindig. For one thing, they'd recognize the location just like I did. Think of the fun we'll have, driving against each other on a good track!

"I thought it was a military facility." "Best track in this country, lad, is Laguna Seca, which is a fast layout on army property. Well, it's the same with the track on

● His roll cage looked as if it still weighed a ton. But it had been acid-etched from the inside, and Sam—  
camed it overhead with one hand like a buzzard's broodage. ●

Maldemar Island. It's on loan from Aero-spatiale de France."

"But why would the French be doing us favors?"

Sam hummed a stanza of "Froggy Went A-Courtin'."

"You know more than you're telling," I jaccused.

"God, I hope so," he replied. "I can't take this thing seriously, and so I've decided to do it. Wanna help?"

Did Polly want a croaker? I squawked a last alternative.

A moment later, watching Sam tape a new velum over the granite surface plate, I thought he had changed the subject. Yes, I remembered my teen-aged pranks. No, I hadn't forgotten the Halloween when six of us kids put a try Nash Metropolitan atop a barn outside Springfield. The Metro, roughly the size of a Buick's trunk, would barely accommodate two midget contortists and could not be decoupled as a wind-marketing success. Later we'd learned the Metro was Sam's, something he'd won, but he liked the effect. Bam and all, the whole thing looked rather like a trophy looming over Springfield's city limits.

So Sam had left it there for the past twenty years.

But now he wanted it back. No matter that the old barn was nearly decayed, no matter that I might have to hire a crane, no matter that I'd need ploding, capping and sniveling. "Have a heart," I begged.

He waved at the "In" bulb on the surface plate. "Have a banana," he said, and put it in yer exhaust manifold. "I don't get my Metro, you don't get to work my pit at the race."

This was different. "Are you suggesting that I get the Nash Metro back, I will be on your pit crew?"

"Highway robbery," he grunted, "but what else is now? Okay! Deal!"

I started for the hangar door, fearful that Sam might change his mind, but then I stopped. "I can't stand it," I admitted. "I have to know why you're sending me after a motorized hood ornament twenty years old when we're supposed to be building a supercalendralulocross race car."

Because, as if to a child, "basically the Metro is the racer."

For the second time I thought about that chapter "Sam Sam, ah—is engine had about twenty horsepower at most."

He nodded. "I installed Mini-Cooper drive trans front and rear."

You told me yourself, for brakes it needs a boat anchor and a short chain.

A wave-off! "Ettore Bugatti said it all. I want it to go, not stop."

That you're really serious? I started out shaking my head.

"I told you before," he called after me, echos slapping from corners of the hangar. "I'm not serious. That's why I'm gonna do it." I didn't like the sound of that laugh.

By the time I dismantled the toylike Nash Metro and brought it to Sam, piece by piece, the D-O-D had processed his entry. In their words, "accepted his proposal." Now we had a steady influx of embossed envelopes, hand-carried by a jilt-pawed gent with slobber and wriggle-socks who spent a lot of time in his car just off Sam's property. I never learned which agency he represented, but he wasn't from Rasta Yenta.

The information in the envelopes was all classified. I'll say this much for the government: It was scrupulously bar-keepng. Sam informed about the other "industrialists" who were "proposing." This forced his first alterations to his original ideas, which built up into sweeping revisions. Two weeks later Sam threw down the latest letter and buried his calculator harmlessly against a piece of his special foam.

I looked up from the squat stilo racing lines. I was strolling. What now?

He thought for a moment before answering. Then, glowering at me, he replied.

"The entrant let Rocky Lunk is getting serious, and the others are talking into the same trap. Hell," he spat. "This was a good to be fun. I gotta write a letter."

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never goes unnoticed.

I froze. "Backing out?"

"Don't. Committed too much money — may as well call it an entrant's fee. But that damn Lunk in Florida has as they put it retained a consultant for his entry."

"So?"

"So he's hired Ronnie Atchison to drive." Atchison, one of the famed oval-racer brothers, was not a man to take a second place lightly, if at all. "You're driving against him?"

After a pause the length of an ice age — "Aw, my license expired anyway" — spoken in a regretful whisper Sam shuffled over to his Saab and began to peck away using a drift punch — his fingers are too stubby for an IBM. I uncoupled a part for the racer, a fat swiveling front wheel assembly for a golf cart. Soon Sam started on the envelope, asking "How much to send a letter to Argentina?"

"Last week it was thirty-one cents." I said. "Try a half-dollar. Send it today while you can still afford it."

The envelope was addressed to the most superhuman driver who ever lived, six times world champion, now retired. I smiled. "Buenos Aires for your driver? Good to see you've kept your sense of humor."

"Keep laughing!" Sam advised, "but check the light connections from Buenos Aires."

After that Sam rarely exercised his grimaces. When he whistled it was the Largo from Death and Transfiguration and I sensed that Sam's laugh began to sound more like a beakless. I took a so-called vacation to help full-time in the hangar and I did it like many of the things I did. Take the protective roll cage for instance. According to safety rules, it had to have thick chrome-moly tubing with a drilled hole for inspection to prove that no one had skimped to save weight. "Why," I asked, "must I pour wax into one short segment?"

Sam was busy with a canby of something that sent pungent white fumes into the air. "So the acid won't eat it away at that point," he muttered around his stub of a cigar.

I nodded and I said so, and Sam couldn't care less. Later, with the wax melted out and the hole drilled, his roll cage looked as if it still weighed a ton. But it had been acid-etched from the inside and Sam routinely carried it overhead with one hand like a buzzard's birdcage.

"That thing," I opined, "isn't safe."

"Don't lean on it. You might bend it."

"So what? You do for structural stiffness?"

"Check. The fellas in Lockheed's skunk works sent me some whisker filaments made in the Skylab. I'll take molds from the Metro body, cast a shell with filaments mixed into that foam I concocted, and let the synthetic Metro body be the structure. It oughta protect the roll cage if nobody brushes against it."

It was outrageous to have bodywork protecting the roll cage instead of vice versa.

but it was in the true spirit of racing, to let. Rules were made to be outrun. I felt better about the fifth wheel, which sat between the driver's knees. The only unpowered wheel it swivaled with the steering and descended to contact the road only during a turn for added side force. The rules had required wheels; they hadn't said how many.

Burfiel Bafo arrived the day Sam tested the Metro. I can't say I ever actually communicated with Señor Bafo, with his lugubrious accent and my tongue-tied awe. We had the beginnings of a beautiful semantic block. The great man mumbled something that Sam understood, and they gabbled for a while, and then Sam pointed to the Metro, which squatted on the mausoleum-sized surface plate like a megal on a granite pedestal.

I don't blame Bafo for disbelieving. You couldn't even see the enormous width of the track, no taller than bagels under the boxy little coupe. Both engines had been crammed in with integral transmissions, one into the minuscule trunk, the other under the sheetmetal hood. There was no passenger seat, just a rubber fuel bag the size of an elephant's whoopee cushion filled with Sam's own nitromethane-spiced mix.

Naturally, Sam had kept the front-wheel drive for both engines, so that all four drive wheels were steerable. And there is something a little demoralizing about a Tootsie Toy car with its rear wheels cooked out of line. The exhaust extension was a single long pipe that emerged from the rear and was aimed cannonlike toward anyone rash enough to follow. The whole car was a dull gray. The natural color of the foam since a coat of paint would double the weight of the bodywork. If it looked nondescript, Sam reasoned, so much the better. He didn't want to alert the competition—and God knows, he didn't.

Bafo laughed for a long time and then began to look around the hangar. He asked a question again, and Sam pointed to the foam-baked, barrel-tread little Metro again, and now Señor Bafo's smile showed signs of wear. Plainly Bafo thought Sam had hidden the real race car somewhere else on the premises.

Bafo maintained that opinion until Sam crawled in through the Metro's window—it had no real doors, which would have weakened the monocoque structure—and started the forward engine.

A shattering blast brought dust from grinders above. The soot of hot castor oil permeated the hangar and laid a mist of promise over Bafo's glum dismay. Sam caught the Argentinian's eye, started the aft engine, and blooped the loud pedal.

With the sound of God's bedchests rapping two engines, like mechanical Valkyres, doppled through an ass. Now even dumoged Bafo ganned outright, watching the exhaust extension spew flames into thin air. He knew without being told. Sam had rigged the single biceps-



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The Van Lines Very Special was the second half of a consortium effort, with constructor Lodger Minsky allied to Lunik Minsky's driver as Lorne Atchison. Roroni's equally talented brother, The Very Special looked like a souped-up stoked-down moving van with huge rearview and an odd exhaust pipe or something protruding from behind. Another tuned exhaust I thought, but the wailer step of Roroni's had its exhaust aimed forward. Well, I was a little slow. Sam had seen the truth in an instant, and that settled the matter in his mind. His protests were disallowed. Barfo was off somewhere with the Terror driver, worst of all. Sam was taking flak from the other constructors.

Dad thought the Metro was "... cute as a little peep, but if Barfo doesn't move over for the Sidewinder, he's gonna be street pizza."

Sam patted the Metro. "Runs like a top," he claimed.

Dad said, "Show it does, over time it stops, it falls over."

Terrori was paternal. He smiled, asked at the Metro, and said "Auto patulo, agromo" and sailed on. Well, it did look chubby.

"I'll give him full truth," Sam snarled, turning to me. "I got a goler job for you. Coal is no object, but I gotta have it all tonight."

"But Sam," I whined, "the Pentagon cocktail party—" He was already scobbling. I sighed and looked at the bid. Then, like any good goler, I wavered.

A thousand francs and two flopatanas later, I returned to Waldemar, the leaves of my Larousse dogeared from use. Sam had found Barfo sampling the fuel of the Messor's Terror, a mix that turned out to be one-severity proof methyl. "No wonder they dance on their tails," Sam growled, busy with his torch and the tubing I'd brought. Barfo had a distinct list to starboard, and he catrapped whenever Sam didn't need him for the moment.

By midnight the Metro had disappeared. It was still there, but Sam's incredibly conserved new exhaust system surrounded the car so completely that all you could see was a maze of glistening metallic guts winding around it. Barfo could barely meet himself in the window and his forward vision—well, I reconsidered giving him a white card so he could tap his way around the circuit. I asked what the new dashboard lever was for, but Sam just looked toward the somnolent Argentinian and winked.

The chemicals I'd brought went into a hopper on the aft engine. Sam tilted the push-type lawn mowers ahead of the front wheels after nesting scavengers onto their blades. To brush the Sidewinder's debris out of the way, I guessed triumphantly.

Sam just bared those big stumpy teeth, shined his cigar, and started grooving the Metro's lines. It was nearly dawn, and there wasn't time to take the tires to a specialist.

Sam jacked the car up, started one engine and scouted near a whirling tire.

"Of course, grooving is only for wet tracks. It hasn't rained here during the dry season in fifty years." I reminded Sam as he chewed a new cutting surface into a lathe.

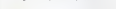
"Pass it on," he said. "If I'm lucky, Dad and the others will decide I've flipped my head gasket."

Privately, I thought so, too. It takes so much time to refile a race car for wet weather that it shouldn't be done during a sprint race. The car that's rigged as a mudder hasn't a chance unless the track is wet, and Sam couldn't have made his intent more obvious with a Pitcoot line. Well, Sam had friends at the satellite center, maybe the weather wizards had told him something I didn't know.

Barfo seemed fresh after his nap, but I'd worked all night. Unlike Sam, I wasn't used to I-slepted-around, helping Barfo into his cage and topping off the fuel tank.



John Chatham's  
*Blossom had a Scottish steam engine and needed no transmission. It had wedge fenders, four front wheels, and an engine intake as high as a periscope.*



When the loudspeaker blared the grid positions, we saw it was an inverted start with the most powerful machinery at the rear.

We pushed the Metro out behind the Luncocks, the Nippan entry, and Guevara's Pacer. At the very back, Dad's Sidewinder and the Terror lurked like predators they'd be coming through the pack like a dose of salts through a tasting guru. I saw little old lady Pasadena doddle out to her Lincoln, arranging her treproof shawl.

Sam leaned through the maze of plumbing and showed instructions to Barfo while the others warmed up. Barfo didn't want to wear the easings, but Sam offered. His elaborate pantomime suggested he'd feel a lot better if he had a newview—better still, a front view. Then Barfo started his engines. I watched the metallic drossour intrude, flexing around the Metro, adjusting for optimum extractor effect and every head in sight swiveled to the tune of King Kong's Wurlitzer.

Well, look at it this way: A stereo speaker can deafen you with a hundred watts. Merely strum the twin-reel Metro was pumping maybe ten of its horses out as exhaust at full blast, it might be a hundred

horses. Converted to audio terms, Barfo was sitting in an extremely mobile seventy-thousand-watt speaker. Every time a piston fired in the little mudder, it was a shot heard round the world. I began to understand, or thought I did.

The constructors barely had time to leave the grid before the start flag came up. It was green and gray, like currency. When it fell, I was glad I had earplugs and sorry I hadn't brought blinkers.

The first thing that happened was that the convertible Pacer outdragged Nippan and Lincoln. The second thing was that Barfo got sideways with whoopsn. Guevara, with his sudden lead, immediately scooped his barriers open, but one side was a little slow.

The horse behind Barfo hung back, waiting for him to spin, forgetting that all five of his wheels were steerable. Barfo kept accelerating sideways and under perfect control as he drove around the slowly opening barrier. Then he straightened and was gone.

Old Mr. Pasadena didn't mind when the speed demons overlooked her Lincoln. She'd have to stop for gas, anyhow, next time around. I scrambled atop a pit ladder to see past the stands, which were full of more stars and gold braids than a doorman's convention. Guevara set ailar pace, but R and L. Atchison had crowded up behind him now in the Van Lines Special and the Van Lines Very Special. It was obvious that both of these racers were using aerospace turbines like the one Sam had once tried. I figured they couldn't possibly last long without stopping to refuel, since they gulped about ten gallons of peroxide a minute at full speed. But judging from the clouds of exhaust vapor, while they ran they had more wild horses than Ailla.

I lost sight of the thundering pack until they started down the back straight. The Messrs. Atchison shook their tails. Señor Guevara shook his butt gun in reply. Then the Atchisons nosed up against the open barriers, one on each side, and I could see wheelspin from a kilometer away. Guevara tried to steer but couldn't; he stood up and turned around and aimed his little gestulator. Propelled by the brothers Atchison to a hundred sixty miles an hour, his Pacer blew its engine in a thunderous report. Atchison L. and Atchison R. dropped back. Guevara, his back turned to the engine, perhaps thinking he'd been high-jacked, raised his hands and finally grabbed for the steering wheel again as his Indy Pacer took a scenic excursion at the end of the straight. He reaped a dozen hay bales and, I'm told, shot three more in reprisal.

Barfo meanwhile had taken advantage of the bottleneck and had already lapped the slowest cars. The Sidewinder Terrori and Blossom were nudging one another in their private race just behind the Atchisons, when Lorne's V. L. Very S. suddenly dropped back to conserve fuel, the trio passed him. Gully got passed on each



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straight but used Sidewinder suction to re-pass on every turn, casting gravel as if it were lagged among the multitudes. To help tie Guffy was to four a sandstorm.

The Fokker dived along alone, disdarning to turn aside as it passed. Its stubby wings would cock to gain enough lift for it to glide overhead before touching down again. Just the thing for bunker hopping, I judged.

Sam hauled himself up with me and started shouting into a transceiver, mad as hell because Bano couldn't hear past the earplugs that Sam had insisted he wear. Sam brightened though after glancing above the track. Every time his little bundle of guts trundled past, a faint moans smogged up from it into the still air. An overcast was forming from all the exhaust vapor, but only over the track.

The Lincoln had long since pined for repairs to its stereo and when Ronnie A. had a strong lead on most of the others, I realized his V.L.S. was about to lap his sibling a biggish way. But he didn't just yet. He tucked in behind, slowed abruptly and nosed the probe I'd mistaken for an exhaust pipe into the receptacle of Lonnie's van.

Sam said laconically "Had to happen sooner or later. I.R.R."

In fact, refueling. How very special can you get? The van hauled hundreds of gallons of unstable peroxide in big Teflon bags and was pumping it into its sister ship while flying down the main straight at blinding speed. Meanwhile they were passed by other wheeled meloncos—until refueled. Ronnie took off and caught them all again in a howling whir that raised hackles.

The Nippan stopped on the course; the cloud pail loomed so dark now, sail only above the track, that the Nippan solar panels couldn't catch any sun, rising or otherwise. Big sandrops splattered on the track. Sam nodded, shifted his gear and folded his arms. Then I knew why Sam had insisted I find the oxide crystals. Minkered into the Moto's exhaust, they were seeding the vapor thrown up by all the others. We sat there in brilliant tropical sunshine and watched as a tropical downpour descended all the way around the course.

The rain spelled instant disaster for most of the competition. Their huge slick tires were aquaplaning, and I saw Daii trying to cobble up a snorkel in his pit. Chatham began to eat his head cap as the Blossom floated past the valiant Tasman steering with one hand and baling with the other. I don't think Chatham wanted the money so much as he loathed losing to the Fokker.

The paragonal types were going nuts right there in the stands as the superior mudders instated their water wings and it began to look as if the Fokker had an advantage. It spent more time in the air now, porpoising from ankle deep water to the wild blue ether and back again. Despite Bano's madly whirling goggles, his bow wave slowed him considerably. The Fokker leaptrogged Bano.

I didn't know who was in first place now, but Lonnie was made great use of its power and high clearance.

"It's time," Sam said. Five minutes to go. Sam wailed for something—I didn't know what—as the bodwacs in the Terrors engaged his co-driver in heated dispute over which way to steer the rump end of a jarted racing car in a narbaroom.

Sam belliowed into the transceiver: Okay. Bufoel. It's time, and then he started running toward the track. Bano couldn't hear him.

The faster of the Alchison cars was parked now with an empty tank. The Terrors jackedkned around a hay bale, the Blossom wibed under water, but Guffy had her snorkel enter the latest pit stop on second and her Sidewinder still had a chance.

Sam's muck splattered mudder was still circulating, but under the handicap of a small tidal wave that preceded it like a pushcart, thanks to the car's blunt prow. The Fokker half-axplane half-aquaplane was doing better even though the cloud had now kept its last. Sam hastily screamed a message on his bag pitboard for Bano and sketched out to the edge of the track which was still half-flooded.

That was the moment I will never forget from my elevation. I could barely make out the surviving four machines as they all lined up in angle ble through the narrow curved chute just before the long main straight. The flag was out, signaling one lap to go. The V.L.S. van was leading, throwing such a wall of spray that Guffy in the Sidewinder couldn't pass even in the turn. The Fokker chose this moment to tip hop-scotch from behind Guffy and with his hawk's eyes Bufoel somehow glimpsed the pitboard from his position in the rear. He pulled down on the dashboard lever.

### I gues

There was no guesswork in what happened next. From deep within my head and I was wearing earplugs—it must have been many times worse for those who weren't protected—an object fear welled up, accompanied by a vast subterranean shaking that honed my teeth and was not quite a nose. Somehow I knew it radiated from the dirty little mudder as its flexible exhaust pumped over. Sam had earplugs but he was closer to it than I was.

E. Braun, just ahead of Bano, must have caught the full brunt of the subsonic wave, seventy thousand watts' worth of a bass note so profoundly deep you couldn't really hear it. It was Sam's final secret weapon, something he later described as the thirteen-cycle light note. The adjustable exhaust was capable of almost any tone and could be tuned for a given frequency instead of a given engine speed. Having read up on psychoacoustics, Sam had always wondered what might happen if he put that much power behind a tone like an earth tremor. He wondered no longer.

The fear-stunned Braun ducked and pulled on the wheel as the Fokker began its climb and swayed Guffy's car before

swapping up into a gorgeous suede loop. As Guffy fought her defanged Sidewinder for control, the Fokker completed its loop and angled off-course toward the observation tower, climbing again.

The Fokker stalled directly over the tower and found an air-porter Valhalla on the roof, which collapsed onto ten million dollars' worth of government audiovisual spy equipment.

Despite my earplugs, the hairs on the back of my neck stood in a phallos and marched off down my spine. The dirty mudder accelerated toward Guffy's rear. As it neared the grandstand, airborne heroes peered over railings as one-headed for sail pairs.

No one could blame Guffy for deciding to seek a parking place, but as Bafo hurtled into her spray, he couldn't tell she was braking. The muddy Metro disappeared up the rear of the spray, I gritted my teeth, expecting a grinding collision just behind Atchison and then the Sidewinder subtripped itself to a stop. Atchison slowed for the next turn, his rooster tail subsided, and Sam's tubular creation was nowhere to be seen.

Linnie Atchison continued at reduced speed, utterly unaffected by the fibrous nose our mudder had made. Sam's lips moved. I pulled out an earplug and heard only the whine of Atchison's turbine, and I asked Sam to say it again.

I said that was what would happen when you drive oval tracks so long. Sam told me Atchison doesn't understand it anymore.

I removed my other earplug. What's to understand?

Fear. They don't know the meaning of it. But anger is something else again," he added. He headed for the start-finish line with a crescent wrench.

I blomed nonplussed. It was Sam who'd taught me that you don't touch a machine with a crescent wrench until you've tried sockets, pliers, and motors. Running to catch up, I panted. "But Bafo and the Metro, where are they?"

In first place? Sam pulled back, as Atchison wheeled his solitary steed at a virtual crawl past the checkered flag.

I didn't understand until Sam shinned into the open rear of the V.L. Very's. Sitting atop a half-empty peroxide bag in the cargo section of the van was a familiar snarl of tubing and two arms were waving from inside. Bafo had run up the back of the Sidewinder to land inside the van!

Linnie Atchison was all smiles until he suspected that his last-minute slowdown might be between him and a varload of money. After assisting Bafo from his cage, Sam reminded Atchison of the facts: It didn't matter how you got around the track so long as you got around it. The Metro had done its last lap inside the van.

But Atchison argued, his rig nosed across the finish line before its cargo did.

Right, Sam agreed, but the van had already been lapped once by Bafo early in

the fray. Any way you sliced it, the Metro had done one lap more than the van.

For about five seconds Atchison stood and thought about it. Then I learned why the crescent wrench is indispensable, not on machinery, but in negotiation.

The contesterales ended when Minsky tossed a handful of ball bearings underfoot. Eventually the few officials still on the premises straggled over and, working from remains of videotapes in the observation tower, confirmed that Sam's little bogus buggy had demonstrated one extra lap. Atchison claimed the mudder was now his property since he had lost it to a win, and Sam let him take it after removing the tangle of tubes for further study. Atchison got his Nash out of there, and Sam got a "contractor fee" the size of a Korean lobbyist's.

What good came of it all? Well, the D.O.D. learned something about a ground pounder's application of in-flight refueling a little about the dread thirteen Hartz note and a lot about driving in inclement weather. Minsky and Lunk found hors d'oeuvres for thought when they discovered Sam's iodide dispenser. And I learned not to assume that Sam is deranged merely because he palpably is.

Dad whose Texas team masks Caltech training was so impressed with Sam's innovations that he issued a grudge-race challenge to Sam for a figure that was double the present winnings. Because Dad himself is one of the greatest innovators in racing history, Sam took the challenge seriously. That's why he didn't accept—not right then, anyway. **DO**



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## PRIZES

The desire to win them is  
one of the greatest untapped resources in science

BY SCOT MORRIS

**P**ink money does something to people. It makes them attempt the impossible. It was \$190,000 in prize money, for example, that spurred Bryan Allen to pedal a remarkable aircraft called the Gossamer Albatross across the cold waters of the English Channel this past spring. A prize of only \$3,000—plus an honorary speeding ticket—was enough incentive for two college students, riding a streamlined bicycle, to break the national speed limit of

55 miles per hour. A few years ago a prize of \$10,000 led to the successful breeding of an until-then-legendary white mangrove. In 1927 it was a prize of \$25,000 that sent Charles Lindbergh on his historic first solo flight across the Atlantic.

Money is obviously a driving force behind such prize-winning efforts. So is the notoriety that almost always accompanies a successful attempt. But fame and fortune alone cannot explain the perseverance of



◀ Whence, then, comes the inspiration to spend days bouncing on a pogo stick or covering a gym floor with dominos? ▶

the would-be prizewinner. Something else is involved.

Consider the megajoules of human effort spent in attempts to break a Guinness world record. There is no money at stake, and the chance of modest recognition—a listing in next year's volume—does not justify the prodigious amount of effort required. So what is it that inspires someone to spend days bouncing on a pogo stick or covering a gym floor with dominos? A definable goal, that's what—knowing beforehand the exact criteria for success. If you can set 64 bananas in ten minutes,

you're in. If you can manage only 53, well, maybe you should concentrate on Frisbee Throwing (outdoor record: 444 feet).

Prizes like the ones mentioned so far are also known as challenge prizes. The criteria for winning are well defined in advance. Either you meet them or you don't. While challenge prizes are exciting and effective in spurring people on to achievements, they are almost unheard-of in science and technology today.

Most of the prizes now available are what could be called "the best of" prizes. The Nobel prizes are examples of this variety of award. The Nobel Committee examines the work of scientists and researchers in each of the prize areas and then makes its annual awards. The prizes are handed out each year, even if there has been no outstanding work in a given field.

There are literally thousands of Nobel-like awards, most of them listed in the two-volume annual catalog *Awards, Honors and Prizes*. They range from the prestigious Nobels to the \$200 prize given by the National Lubricating Grease Institute for the best paper of the year on the manufacture of grease and the \$500 Cleanliness Achievement Award offered by the Soap and Detergent Association. Curiously, the *Awards, Honors and Prizes* catalog does not list a single challenge prize.

#### TO FLY LIKE A BIRD

The modern prototype of the challenge prize is the Kremer Prize, which eventually led to the spectacular English Channel flight of the Gossamer Condor, was one of man's ancient dreams, but in the middle of this century it was no closer to becoming reality than it was when Leonardo da Vinci sketched his first plans for a man-powered aircraft. Then in 1959 British industrialist Henry Kremer stocked the inventor's fire by announcing a \$50,000 award for a muscle-powered craft that could fly a specific course—a figure eight around two pylons half a mile apart, with the plane at least ten feet off the ground at the beginning and the end of the run.

An amazing array of vehicles was built and tested in vain assaults on Kremer's money. A Canadian team designed a three-order beam-ship. Two German collaborations were tried out in England, and more conventional single-order vehicles were seen in the United States, France, and Japan. But none came close to



flying the Kremer course. Then in 1977 Paul MacCready designed and built the Gossamer Condor, a delicate craft that weighed only 70 pounds but sported the wingspan of a DC-9. His string-bean power plant, Bryan Allen, flew the Mylar bird into history.

The Gossamer Condor went to the foyer of the National Air and Space Museum in Washington, D.C., alongside the Spirit of St. Louis, the X-15, and a Wright Flyer. Henry Kremer was so happy to see his dream realized that he not only paid the prize money (then worth about \$95,000) but doubled the ante to \$100,000 for the first human-powered flight across the English Channel (see "Man-Powered Flight," December 1978). The money was claimed his spring, again by MacCready, when Bryan Allen piloted a new, streamlined craft, the 55-pound Gossamer Albatross, across the Channel and onto the front pages.

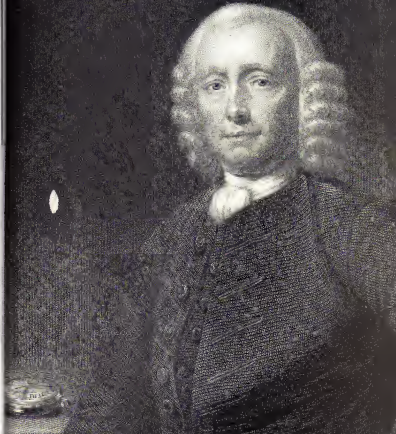
During construction, at a crop duster's airstrip near Bakerfield, California, an early version of the Gossamer Condor, John Lee, one of the principal designers, reflected on the shrewd vision of Henry Kremer. "They call Kremer eccentric," he observed. "I say he's a practical businessman." Lee's point was this: If one were to add up the cost of all the raw materials, man-hours, and computer time that went into the Gossamer Condor, the total value would be many times the \$50,000 Kremer eventually paid. If Kremer had gone directly to Boeing or Lockheed, even to MacCready's Pasadena firm Aero-Venturini, and said, "I want you to build me a human-powered airplane that will fly my figure-eight course, and I'm willing to pay you eighty-six thousand dollars to do it," he would never have gotten past the secretaries. The idea was farfetched and impractical on the face of it. His money would have barely paid for the initial designs by any major aeronautics firm, with no guarantee of success.

But to offer a prize! There is a mystique, a challenge, a spirit of adventure in that. Kremer did just what he had to do to get what he wanted. He offered a challenge prize, specified his goal, put the money in a bank, and waited. Around the world, backwater adventurers worked on impossible schemes, and Kremer's money stayed in the bank. Riders pedaled, sweated, and crashed; designers went back to drawing boards, and builders built again, all at their own expense. Kremer never had to pay a cent for failure. He paid only for demonstrated success.

Might there be a lesson here?

Recently Allen Abbott, a thirty-two-year-old California doctor offered a similar prize. Abbott has a flair for speed. In 1972 he rode a bicycle in the slipstream (where there is virtually no wind resis-

Bryan Allen powered the Gossamer Albatross across the English Channel to win a cash prize in the location of Lindbergh (previous page); after miscalculations of longitude led to a tragic wreck off the Solay Islands and the loss of 200 lives in 1757, Britain offered a \$20,000 for an accurate ship's chronometer that would work aboard ship. John Harrison's (right) won it in 1765.



rance) of a specially built race car and pedaled across the Bonneville Salt Flats at an incredible pace of over 140 mph, the fastest speed ever attained by a man on a bicycle. Abbot also entered strange bicycles in the annual International Human-Powered Vehicles (IHPV) speed championships in southern California. In 1976 he broke another record: Riding headfirst on his stomach, in roughly the "diver's position" which is the least wind-resistant shape the human body can assume, and using both hand and foot cranks, he took first place with a speed of 47.5 mph over a measured 200-meter course, the fastest speed that a human being had ever traveled outside a slipstream, under his own power.

The following year Abbot relied from active competition. To maintain his involvement in the sport, he announced a \$3,000 prize for the first human-powered vehicle to break the national speed limit of 55 mph. At last spring's IHPV championships two students from Northrop University pedaled White Lightning at 56.7 mph and won the Abbot Prize. They were awarded the check and an honorary speeding ticket by the California Highway Patrol. (The riders of White Lightning took the prize because they were the first to break the 55-mph limit. Later in the day a three-man cycle team, clocked in at 57.07 mph.)

As an investment, Abbot's money was well spent: White Lightning cost more than \$2,000 to build in materials alone. The Abbot and Kessler prizes stand in stark economic contrast to the way technological achievements are usually made.

#### PRIZES PAST

The economic appeal of challenge prizes is nothing new. In the early 1700s the British Navy offered a prize to the person who could discover longitude at sea. To navigate by the sun or the stars, one must know exactly what time it is back at the home port. The difference between that time and local time tells a navigator how far around the earth his ship has gone. But the best pendulum clocks of the day were not reliable aboard a pitching sailing ship, and miscalculations of longitude led to some tragic wrecks. When the government stepped in and offered \$20,000 for an accurate ship's chronometer, all kinds of people—intelligent and not so intelligent, genius and crackpot—went to work.

Finally a Yorkshire mechanic, John Harrison, produced a series of chronometers, each more accurate than the one before that satisfied the Crown's conditions. It took some time for the government to pay up, but eventually Harrison got his \$20,000. Without financing a single feasibility study, Britain got a tool that could determine a ship's location anywhere on Earth, a military advantage comparable in its day to acquiring the atom bomb. And the world got an invention that revolutionized the clock industry.

Another historic example is the prize Napoleon announced in 1795 for a practical method of preserving food. A cook and confectioner named Nicolas Appert was interested in such things. (It was he who invented the bouillon cube.) He eventually worked out a process of heating food and then sealing out the air to prevent spoilage by bacteria. His idea formed the basis of the modern canning industry. Napoleon paid Appert 12,000 francs in 1806, a small price indeed for an invention that has changed the eating habits of all mankind. It has been said that if Napoleon had been able to keep Appert's invention in France, he could have conquered the world.

In 1925 New York hotelier Raymond Ortgog offered \$25,000 to whoever would make the first nonstop solo flight across the Atlantic from New York to Paris. Two years later Charles Lindbergh won it and did more to promote commercial aviation than any other man. But stimulating air travel wasn't his purpose. He accepted the chal-

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◆ UFO debunker Philip Klass will pay \$10,000 for proof of alien visitors — if you'll pay him \$100 for each year that passes without it. Only one major ufologist has signed up. ◆

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lunge to win the Ortgog prize.

David Burpee of the Burpee seed catalog started trying to breed a white mangold in 1930. He mailed the American gardening public to join his search in 1964 with an offer of \$10,000 to the first person to send in seeds that would produce a perfectly white mangold. The prize was paid in August 1975 to Mrs. Alice Vonk, of Sully, Iowa.

In all these cases the money offered was substantial but far less than what the achievements were worth. Even small challenge prizes can stimulate prodigious amounts of work, so long as the conditions for winning are clearly stated in advance.

There are few fields in which the accomplishment can be more precisely stated than in mathematics. Some 43 years ago at the Scottish Pub, in Wensae a group of Polish mathematicians who often gathered there started a tradition of listing their favorite problems in a book (recently translated and published as *The Scottish Book*) and offering a small prize for the first solution—a bottle of wine for one, two beers or a kilo of bacon for another. John von Neumann entered a problem on July 4,

1937 and offered the prize of a bottle of whiskey of measure  $\sqrt{5}$ . An entry posted in 1938 offered a live goose. This "goose problem" was recently solved by a Swedish mathematician. He went to Warsaw, where the Scottish Book trustees presented him with his bird and celebrated with a banquet featuring—what else?—cooked goose (not the prize specimen).

#### MARGINALIA MONEY

The oldest and most famous prize in mathematics is for the proof of Fermat's last theorem. Fermat scribbled a note in the margin of a book, saying that while  $3^3 + 4^3 = 5^3$  (the model case for the Pythagorean theorem), he had proved that the equation  $x^n + y^n = z^n$  has no integral solution for any exponent  $n$  other than 2. Unfortunately, Fermat died without publishing his proof, and mathematicians have been trying to duplicate it ever since.

The Paris Academy of Sciences offered twice a gold medal and 3,000 francs for a solution. In 1908 the Germans offered the Wolfskehl Prize of 100,000 Deutsche marks, which will remain in effect until September 13, 2007. Hypertension in physicist Gernsey reduced the prize to a small fraction of its former value, as of 1974 it was worth a bit more than 10,000 DM.

Today the man in charge of the Wolfskehl Prize is Dr. F. Schlichting at the University of Göttingen. Dr. Schlichting reports that he has no idea how many solutions have been sent in so far, but back in 1908, the first year the prize was offered, 521 were filed. He adds that "today they have stored about three meters of correspondence on the Fermat problem." One man sent in the first half of his solution and promised to send in the second half if the institute would pay him 1,000 DM in advance. Another promised to cut Dr. Schlichting in for 10 percent of all royalties from books and TV appearances once he had become famous if Schlichting would support the solution. If Schlichting would not, he threatened to send it to a Russian mathematics department to deprive Germany of the glory of having discovered him.

Despite all the attempts, Fermat's problem remains unsolved and many mathematicians now feel that it may be insoluble. Computers have checked out all the integers up to 125,000, so that if any equation is going to have two fifth powers that add up to another fifth power, the exponent must be at least 125,000. If there is a solution, it will have millions of digits. It's not the kind of problem you can work out on your pocket calculator.

The tradition of mathematical challenge prizes has been carried on and expanded by the eccentric, vagabond mathematician Paul Erdős (pronounced AIR doosh). He first offers small cash prizes that raise the stakes if a problem remains unsolved for a number of years. Erdős is such a legendary figure that some mathematicians know one another by their "E number," the number of coauthors one is

in 15-volt increments. There are also verbal designations which range from slight shock to OUCH—BETTER SHOCK. The teacher is told that he is to administer the learning test to the learner in the other room. When he responds correctly the teacher moves on to the next item; when the learner gives an incorrect answer, the teacher is to give him an electric shock. He is to start at the lowest shock level, and to increase the level each time the man makes an error.

"The teacher is a genuinely naive subject who has come to the laboratory to participate in an experiment. The learner or victim is an actor who actually receives no shock at all.

"Conflict arises when the man receiving the shock begins to indicate that he is experiencing discomfort. At 75 volts the learner grunts. At 120 volts, he complains verbally. At 150, he demands to be released from the experiment. His protests continue as the shocks escalate, growing increasingly vehement and emotional. At 285 volts—his response can only be described as an agonized scream.

"Observers of the experiment agree that its gripping quality is somewhat obscured in print. For the subject, the situation is not a game; conflict is intense and obvious."

Milgram points out that 80 percent of social-psychology research requires staging of technical illusion and that laws against such procedures would greatly interfere with inquiry.

"Of course, you can't withhold information that affects the person's willingness to participate in the experiment," Milgram said in an interview, "but you must withhold certain information for epistemological reasons. If the subjects of this kind of research were fully informed, experiments would become meaningless."

He added, "I think it's much more risky to swallow some unknown chemical than to participate in this kind of study. And there is no evidence whatsoever that when an individual makes a choice in a laboratory situation—even the difficult choices posed by the conformity or obedience experiments—any trauma, injury, or deterioration of well-being results."

Yet Milgram points out, some of the proposed regulations in this area would make it impossible for a trained scientist to conduct market research—while any person on the street is free to ask questions of anybody. Milgram finds this an absurd possibility, indicating he thinks that the degree of regulation may have reached its peak.

But if not, there will have to be new solutions to the problem of pursuing human-subjects research. Might there be a place in some future job market for professional

human-subjects research, where people like Evil Kneivel could put their daring to public service? Vestch says no. "A subject actually becomes useless with experience," he explained. "The more you do to him, the less normal he becomes. Either he's had too many drugs in his system, or he's gotten too savvy about research protocol and begins to say what he thinks the investigator wants to hear."

#### SCARCITY OF MONKEYS

Arthur Caplan, another Hastings Center staffer and a member of Columbia University's institutional review board, says that human research will continue to expand despite tighter government scrutiny.

There's a monkey shortage, Caplan said, and a real potential in Western society for concern about animals' rights to increase to the point where it poses a problem for research in general—and people in general—because less animal experimentation will only mean more human experimentation.

The Indian government stopped exporting rhesus monkeys to the United States last year, abruptly ending an annual supply of 12,000 animals for needed testing of vaccines and other drugs. Some South American countries (Brazil, Peru, Colombia) had already embargoed their commercial primate trade when the latest shortage occurred. At regional primate centers around the country, U.S. scientists are trying to breed captive populations of experimental monkeys from existing supplies, but so far, native production is no match for the missing imports. For most research purposes involving monkeys, other animals simply will not do. And as for skipping the monkey step and proceeding directly to human volunteers, well, no one has suggested that. Yet.

"One of the hard facts of life for the twenty-first-century researchers is that the diseases are tougher than war," Caplan continued. "Cancer and stroke are much less amenable to miraculous cures than were measles, anthrax, and smallpox. Self-experimentation will play only a minimal role. For, while Walter Reed and his boys had no problem acquiring yellow fever, the future researcher may not be able to give himself leukemia. Even if he's willing to sit next to an atomic reactor, it might take him twenty years to develop symptoms. So he must rely on people who already have the disease.

Caplan agrees with Vestch that a volunteer army of research subjects "wouldn't wash scientifically." But he does see room for each of us to volunteer for a short while as part of our civic duty—or be called to do so, the way we're called to serve on juries.

"I'm not sure anyone knows what the individual owes the state in terms of medical experimentation," Caplan concluded. "But if medicine becomes publicly funded, through national health insurance, that question may be of great importance." □





An ability to cohabit with humans guarantees their presence in the 21st century

# SURVIVORS

BY BARBARA FORD

**O**ne hundred years ago no one expected to see herring gulls along the shoreline of New York, raising their chicks next to picnic tables conveniently close to discarded food. Twenty-five years ago residents of Edison, New Jersey, were baffled by the appearance of herring gulls nesting in their chimneys. Now, two-and-a-half decades after they first swooped down on its shores, the gulls are so well established in New Jersey that many smaller birds have been driven from their nesting grounds. Within a century, Rutgers University biologist Joanna Burger predicts, the herring gull may become one of the most prolific species of animal, a true survivor able to fly in the face of fast-diminishing natural habitats.

A voracious scavenger's diet and the unusual ability to expand its breeding range give these big white birds their

singular hardiness. Or Burger notes that as man and his garbage have increased along the shore, so have herring gulls. Given such unfrocked food preferences, it comes as no surprise that, during the past 150 years, herring gulls poured out of Maine and parts north to perpetuate their species as far west as the Great Lakes and as far south as the Carolinas.

The herring gull explosion represents a phenomenon that runs counter to the well-publicized decline of endangered species. While many large, well-known species decline, others do well and actually increase in number.

Most of the successful animals today are, as might be expected, small creatures like the squirrel, the house sparrow, the cockroach. The food and space requirements of these animals are modest, enabling them to thrive in a world of dwindling resources. Yet there are some large animals

as well whose hardiness and adaptability will guarantee their presence on Earth long into the future.

Consider the North American coyote. A good argument could be made that the coyote is the most successful large animal next after man. The coyote has significantly expanded its range, beginning with the arrival of the first white colonists. As Europeans struck out to new territory, so did the coyote. White-tailed deer also seem sufficiently hardy to cope with the modern world. More of them are around today than when the first colonists found venison tasty and plentiful. Few of America's larger animals are doing as well as the coyote and the white-tail, but elk and mule deer are still present in substantial numbers in the West, and the bighorn sheep, the pronghorn antelope, and the black bear appear to be holding their own in the twentieth century almost

PAINTING BY RENE MAGRITTE

all of these species are more numerous than they were in the previous century.

Other regions of the world have their own adaptable animals, including the leopard and yellow baboon in Africa, the Hanuman langur monkey in India, the red and grey kangaroos of Australia, the squirrel monkey in South America, various seals in the Arctic and Antarctic, and the blue shark in all the world's oceans. A century from now those same species may still be fairly plentiful, even though the world will contain vastly more people and less wilderness than it does today. Some wildlife experts believe in fact that all animals, flourishing and endangered alike, will live only in the protection of parks, refuges, and zoos a hundred years hence.

"A hundred years from now the 'wild' will be only zoo-like preserves," says Dr. Benjamin B. Beck, of Chicago's Brookfield Zoo. Most experts, however, expect to see a few exceptionally resilient beasts surviving outside protected enclaves.

"The coyote will certainly survive without the protection of parks or preserves," says Dr. John B. Muldard, a Kansas University professor of veterinary medicine. "Its continued movement into new and expanded territories is ample evidence for this." Thomas Lowrey, of the World Wildlife Fund, picks the coyote, hyena, jackal, and some kangaroos and vultures as the large animals most likely to be found outside preserves in another century. He calls them "weed species."

What makes one species, such as the coyote, a good prospect for long-term survival when others, for instance the wolf, dwindle to the brink of extinction? A number of descriptive terms come up again and again when wildlife experts discuss animals that persist today in large numbers: adaptability, particularly to habitats disturbed by man, intelligence, fecundity, high reproductive rates, absence of competition with man, suitability for management and wide distribution.

The coyote's breeding range has grown very rapidly since the first white explorers reached the western parts of the country. The coyote once inhabited only the grassy western plains. By the mid-nineteenth century, however, when most other sizable animals were being hunted to near extinction, the coyote not only was flourishing in its original habitat but had established itself along the West Coast, in Central America, and as far east as Illinois and Michigan. It followed the miners to Alaska in the Gold Rush of the 1890s, subsisting largely on dead horses left along the trail. By 1925, the coyote had reached the Atlantic Coast, Hudson's Bay, Florida, and the Gulf Coast.

Researchers who have studied the coyote give it points for intelligence, tenacity, and fertility, but its major advantage, like that of the herring gull, is probably its adaptability. The coyote will live almost anywhere and eat almost anything. Although it originated on the western

plains, it now inhabits broken forest, desert mountains, and the tropics. It has even been seen moving unobtrusively through the outskirts of large American cities.

Because it is one of the few animals that have flourished in spite of man's harassment, the federal government each year kills some 70,000 to 85,000 coyotes as part of a program to control predation on sheep. Thus far, the controversial program has achieved only local success and may even have introduced an undesired result: H. T. Gar of Kansas State University writes in *The West Coyote*: "We, with our persecution of the coyote, have added another parameter to natural selection with the result that coyotes are now larger, smarter, more adaptable, lazier and more cunning than when white men first entered the coyote's territory."

An earlier predator-control program, this one directed against the wolf, also helped the coyote in that it removed a feared predator from almost its entire range. The coyote

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● **One to two million kangaroos are killed yearly in Australia, yet the big red species has actually increased its numbers as a result of land clearing for ranches and the creation of water holes.**

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promptly moved into the vacant territory. The wolf incidentally is now protected as an endangered species.

The American Indians, who hail domesticated the coyote, say that the coyote will be the last animal on Earth. They may turn out to be right.

The coyote is not the only animal that shows an exceptional ability to thrive in the face of man's harassment. From 1 million to 2 million kangaroos are killed each year in Australia for export alone, the toll was even greater in earlier decades. Nevertheless, one species, the big red kangaroo, actually increased its numbers in the first half of the twentieth century, largely as a result of the clearing of land for ranching.

Another animal that seems to be thriving in the face of man's depredations is the leopard. The big spotted cat was once considered endangered (it is still on the U.S. government's official "endangered" list) because it is seldom seen, but new research indicates that its fecundity, not its scarcity, accounts for the lack of sightings in some areas. There is evidence, however, that the leopard's range, which formerly extended throughout much of Af-

rica and Asia, has shrunk. The big cats' eating habits help it to survive, but the major reason for its success is its adaptability, according to Dr. Randall Eaton, of the University of Washington, who calls it "the coyote of the cat family." Like the coyote, the leopard apparently can flourish in a wide variety of habitats, including the environs of large cities.

An African animal that is demonstrably successful despite man's onslaughts is the baboon. Classified as "vermin" outside parks and preserves, baboons are slaughtered in great numbers because of their crop-raiding proclivity. Nevertheless, some baboons are doing remarkably well. Dr. Bruce Westlund, of the University of California at Riverside, who has studied yellow baboons in the flat grassy areas of East Africa's savannahs, notes that this particular species is expanding its numbers in some areas of Africa while maintaining a stable population in others.

The baboon's adaptability explains its success. Baboons can live with humans," says Dr. Westlund. "You see them inside and outside national parks and near cities. The baboon's ability to meet changing conditions by modifying its social structure enhances its prospects for survival. If there is a decline in the food supply, baboons can divide into smaller groups. The development of a complex social organization by baboons millions of years ago is thought to have helped these large, intelligent monkeys to make the transition from forest to grasslands. Early man is believed to have made the transition in the same way. Now the baboon's adaptability faces an even greater challenge: making the transition from an undisturbed savannah to an environment in which the human is dominant."

Highly adaptable species like the baboon, the leopard, the kangaroo, and the coyote might succeed even in a world where no animal is given protection, but most other species need man's assistance to last at least another century. These are the animals as Thomas Lowrey puts it, that "we have decided, consciously to preserve." The holed "big game" animals, the black bear, the Australian seals, and the langur monkey are all fairly plentiful today and they are found in some rather unexpected surroundings. The koala, which is completely protected, flourishes in the eucalyptus forests of eastern Australia, the most populated area of that island country.

The Hanuman langur or "sacred monkey" is the second most widespread primate in India, a country in which almost all other large animal populations have been severely depleted as a result of the human population explosion. The langur's success is partly attributable to its adaptability to man—it lives in and near cities and towns—but even more to its status as a sacred animal of the Hindu god Hanuman. Dr. Sarah Blatter Hrdy, a Harvard University anthropologist and author of a recent study of Hanuman langurs, *The Langurs of Abu*, notes that Hindu convictions prohibit



the killing of langurs, even when the animals become pests. While engaged in her research, Dr. Hirdy was beaten with a cane by an elderly Brahmin who mistook her going about marking langurs with red paint as a means of injuring them.

Nevertheless, Hirdy fears that the special protection afforded the langur may be undermined by "increasing secularization combined with the inescapable fact that langurs cause damage." If the privileged status of langurs changes, she says the creature probably will not survive near populated areas.

In an increasingly irreligious world, a game animal may have a better chance of survival than a sacred animal would. Both Europe and the United States have numerous large animals considered "game" by sportsmen, the red and roe deer in Europe and the white-tailed deer, mule deer, elk, moose, pronghorn antelope, mountain sheep, and caribou in the United States. All are common, at least in some areas, owing partly to careful management by professional game wardens employed by federal and state governments. Game management is fairly new in the United States. Until the end of the nineteenth century virtually unrestricted hunting—most of it carried out by commercial hunters in later years—was the rule. By 1900 the vast herds of bison were gone, elk had disappeared from the East and were fast disappearing in the West, and the white-tailed deer population had shrunk to the point where it could no longer survive in the East. All other hoofed animals in the wild also became scarce.

Luckily, extinction, the seemingly inevitable conclusion to all the slaughter, was averted. In this century came protective legislation mandating a ban on commercial hunting, the establishment of more national parks and wildlife refuges, and the application of such management practices as restocking and closed seasons for sport hunting. Hoofed game animals soon replenished their numbers. Now elk and mule deer are common again in the West and the white-tail is everywhere. Other hoofed species are locally abundant. The white-tail is often pointed to as the primary success story of game management.

This new appreciation of the environment's importance is expected to benefit other big animals, too. Many wildlife professionals believe that few of our large wild animals will soon become extinct, although they may eventually be confined to protected preserves. Among the species given a good chance of survival are the black bear, the mountain lion, the beaver, and the wild turkey, all rather numerous in some areas. The turkey has even expanded its range recently because of restocking efforts. However, the fact that each of these species has undergone a severe population decline indicates they still need help.

The black bear is a case in point. Once common throughout the United States, it is still numerous in the West but has declined

domestically in the East. The leveling of large unbroken stands of forest, essential to the black bear's survival, is the major cause of this animal's decline. Not too long ago the black bear was considered venison and there was a bounty on its pelt (a few locales still offer a bear bounty), but in recent decades it has become a game animal. As such, it enjoys the same protection given fabled big game. And as with the white-tail deer, one other development in the black bear's favor is the reversion of farmland to woodland in parts of the East. In western Massachusetts, where trees now cover some farms, black bears are in residence again after an absence of many years. They are less adaptable than most other successful big animals, but their comparative lack of aggressiveness and their omnivorous diet enable them to live close to man without posing a significant threat. Grass forest cover the black bear can live with people—if we'll let them.

An ability to share human habitat is all-

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● *The success of the hanuman langur in India, where few large animals now survive, is due to its status as "sacred monkey" if that status changes, the langur will be threatened.* ●

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important to most big animals, but some good-sized creatures flourish precisely because they do not share our domain. This group encompasses some of the big marine animals and those that live in environments too harsh for man. Marine mammals have a better chance of survival today than land mammals, because no one is building houses in the sea. "So says Dr. Burney LeBoeuf of the University of California at Santa Cruz. Following this reasoning, LeBoeuf names the harbor seal which is both widely distributed and numerous, as one animal that has an excellent prospect for survival through the next century, along with a number of inhabitants of the Arctic or Antarctic, such as the ringed seal, Weddell and leopard seals. Most penguin species will survive for the same reason. George Gaylord Simpson in his book *Penguins* notes that some species of penguin are becoming more numerous because of man's slaughter of whales, which compete with them for food.

Some large sharks, such as the blue shark, are seemingly threatened for survival, too, in the opinion of Robert Hueter, of the University of Miami's Rosenstiel School

of Marine Sciences. The blue shark is abundant and has a high reproductive rate (for a shark), these traits will probably enable it to win out over its water and more feared relative, the great white shark.

Animals that live in, or depend on, the ocean do face one danger that may affect their survival: pollution. But we know little about the cumulative effects of pollution on reproduction and mortality.

The creatures that by all indications should still be around a century from now are all familiar animals. Over a longer period of time, according to Dr. Paul Opler of the U.S. Office of Endangered Species, new species of animals better adapted to man and to his influence on the planet will evolve from today's most successful species. While the evolution of a new species is usually a slow process measured in eons, not centuries, it can occur more quickly. "All that has to happen for evolution to occur," Opler says, is for a population to become isolated. The isolated population then specializes and becomes increasingly different, genetically from the surrounding population.

A classic study by Dr. Guy Bush, conducted at the University of Texas, shows that the process occurred in native fruit flies over a very short period when some fruit flies were introduced from other countries. Fruit flies are notorious for the speed with which they can make genetic changes, but Opler notes that animals like the house sparrow, the coyote, and domestic cats that have reverted to a feral state all appear to be undergoing evolutionary changes at present. Before long, new species might arise from any of these animals. Changes may already be occurring.

On an island off the coast of Taiwan, what appears to be a new species of wild cat, the formica cat, has been found. Biologists dispute whether it is a genuine new species or only a wild domestic cat.

The future, Opler predicts, will bring other such creatures as well as new species arising from today's wild animals. Since humankind is responsible even if unwittingly for the success of all these beasts, we are in a sense creating our own new species. Before too, too many more years, humanity itself will vanish (anthropologically speaking, our own demise is already somewhat overdue), leaving behind the species that evolved on a human-dominated planet. Hundreds of thousands of years after man's extinction, enough new species will have emerged to bring the depleted fauna of the earth back to the equilibrium that existed before man's arrival.

Meanwhile, the species that adapted to humans will have to readapt to a world with many more species but minus man. Will they succeed? It seems likely, Opler feels, that some of the species that learned to live with man's pesticides and pollutants can learn to live without them. The earth of the distant future will contain creatures strangely reminiscent of the most successful animals today. ☐

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"I really wasn't into games before. I had read Dune and when I heard that there was a game on it, I just had to check it out for myself if only to see how faithfully it recaptured the Frank Herbert storyline.

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# EUROPE

CONTINUED FROM PAGE 38

are so colossal that 22 years after Sputnik went into orbit, the Americans and the Russians overwhelmingly dominate the heavens. Following years of an again off-again attempt to mobilize resources for space research and exploration, there's a growing sense of competence and achievement in Europe's space enterprise. This is so because Europe is about to become the world's third wholly self-sufficient space power, small in relation to what the giants are doing, but of sufficient size and capability to make Europe's presence felt in space research, communications, and remote sensing (China, France and Japan have put small satellites into orbit, but their efforts are modest compared to the European program.)

One of the paradoxes of European space efforts is that many of Europe's present activities are heavily intertwined with the American space program. European-built satellites regularly go aloft on American launch vehicles. European space tracking stations fit into NASA's deep-space tracking net. A European consortium is the designer and builder of the vastly complicated manned SpaceLab, which will ride aboard the American space shuttle. Under construction in Bremen, Germany by a European consortium led by ERNO, a major German aerospace corporation, the \$800-million SpaceLab will provide a "shirt-sleeve" environment for scientists performing experiments on gravity-free materials processing, earth-resources surveying, a variety of biomedical undertakings, and a long list of others that are still being worked into the flight schedule.

This transatlantic technological and scientific togetherness is, of course, not confined to space. It is found in the basic sciences where, for example, U.S. and European high-energy physicists regularly circulate through each other's laboratories in a healthy atmosphere of cordial collaboration and intense competition. It also exists in military research, where the United States and Europe have worked jointly on the development of a supertank for NATO forces for the remainder of the century. But, while the United States has always been generous in providing Europe with launch services, space aboard U.S. research satellites, and access to U.S. remote-sensing capabilities, the indispensable launch capability has remained under U.S. control, leaving Europe in the role of customer or guest. That the United States, for political reasons, preferred this way—and sought to discourage European space independence by offering free or inexpensive launch services—is quite clear. After all, the United States followed the same practice with uranium enrichment, telling the Europeans in effect that there was no necessity to build their expensive plants when it already had them

and would take care of their needs.)

Europe's answer in space—a projected and painful gestation—stands 47.4 meters high, weighs 208 tons, and bears the symbolic name of Ariane, after the mythological Greek maiden who helped guide a future Athenian king safely through a monster's maze. Ariane, designed to put two-ton satellites into sun-synchronous orbit, is perhaps the ultimate symbol of Europe's newfound ability to bring technological harmony out of political cacophony.

The field of Europe's space ambitions is strewn with the debris of collaborative efforts that were half-heartedly started, underfinanced, poorly led, and then either terminated or rolled over into new organizations. This has led Europe's space enthusiasts to conclude caustically that politically induced cancellations, rather than failures on the launching pad, have been the main impediments to Europe's development as an equal partner. Ariane is of

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● *We learned how to do things the American way," says physicist Herwig Schopper. "But in the meantime you've picked up Europe's red tape. Once we get our budget, we're free to use it."*

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ferent, because—as with the LL neutron-research center—it has benefited from the convergence of technology and politics. And economic prosperity increasingly furnishes Europe the wherewithal for the high costs of front-line science and technology.

Ariane is sprung from France's political determination to possess its own nuclear retaliatory force and from its technological accomplishment in building the rockets necessary to maintain that force. Having invested billions of francs in intercontinental military missiles, France invited its European neighbors, under the auspices of the European Space Agency, to collaborate on the development and manufacture of a multistage launch vehicle of sufficient capability to give Europe total independence in the launching and operation of unmanned satellites.

But—and this is where this project differs from past efforts to put Europe into space—Ariane has only one boss, Aerospatiale, France's vast aerospace conglomerate. At the Ariane assembly facility, in Murox, on the outskirts of Paris, general manager Pierre Jaumar wryly remarked, "We had originally hoped for

cooperation with the United States in developing our ballistic systems. The United States refused, and we had to develop the technologies by ourselves, which enabled us to learn a great lesson. Any technology can be developed if you spend enough."

Though, as of this writing, Ariane is yet to prove itself, there's no lack of confidence in its potential. With Intelsat having already contracted to have one of its "birds" put into orbit by Ariane—from a launching site in French Guiana—nearly 40 European aerospace firms have formed a company to provide a commercial base for carrying on the production of Ariane and selling launch services.

For the American and Soviet space establishments—so long accustomed to an oligarchy in space—the message from Europe is that company is on the way. Skeptics may counter with the observation that, with the United States currently spending about \$5 billion a year on civilian and military space programs, Europe's efforts of \$1 billion or so annually really don't amount to very much. The reality of the matter, however, is that while the United States, for political and technological reasons, can't afford to lag in any important aspect of space research, Europe is free to call its shots and concentrate its efforts. Being a determined but untriumphant participant in the formidably expensive field of space research has its own advantages in the view of Dr. Othmar Hesse, director of research and development for Germany's huge Messerschmitt-Bölkow-Blöhm aerospace company. "Europe has tried to avoid monster space projects," Dr. Hesse said. "What we're looking for are certain areas of challenging technologies that might put us ahead of American industries." Conceding the present big U.S. lead in space technology, and disavowing any European interest in all-out competition, Hesse asserted that the European strategy is paying off. "In the last two years some European space products have reached the complexity and reliability of U.S. products. And some are ahead. The sad, old high-power electronic tubes, in which he estimates that Europe has achieved a two- to three-year lead over the United States.

The French, with their traditional quest for independence between the giants of East and West, voice considerably grander ambitions than their West German partners. In the opinion of Hubert Guen, a veteran research administrator who directs the French space agency, "The object is autonomy. What we want is autonomous capacity to put satellites into orbit."

That autonomy is close to being within Europe's grasp.

We've so far focused on how Europe, by pooling its resources, is making the grade in big science—those multimillion- (sometimes billion-) dollar efforts that mobilize highly sophisticated apparatuses and highly trained research teams. However, this current European rebirth is taking

place on many levels, not just on the costly peaks of research. The Continent is also experiencing a boom in so-called little science and alongside those big multinational research programs there's also a resurgence of purely national scientific activities and an accompanying breakdown of the rigid institutional boundaries that have long thwarted interdisciplinary research in Europe.

A good example is to be found in Lyons, France, where two young researchers—from nearby but different institutions—as well as different disciplines—are collaborating on the development of electronic devices to provide instantaneous diagnoses of burned tissue to guide the application of therapeutic practices. Working together on this project are Jacques Manchy, a physician in the burn ward of the Edouard Bellet Hospital, and an old friend and colleague, André Dittmar, of the faculty of medicine, who holds advanced degrees in electrical engineering and physiology. In part drawing upon electronics technology devised for the French space program, the two researchers have succeeded in simultaneously making 20 vital measurements from the skin surface of severely burned patients. The research provides close guidance for determining the most favorable time for skin grafts and also monitors the body's acceptance of grafts. Dr. Dittmar remarks that such interdisciplinary collaboration was highly unusual as recently as several years ago, but it is now becoming more common.

At the internationally renowned Pasteur Institute in Paris, the research setting for eight of the nine Nobel prizes that France has received in the category of medicine or physiology, modern biomedical techniques are being used with the founder's historic interest in the beneficial use of microbes. Following a long period of financial uncertainty, the institute was restored to financial health by a big boost in government assistance—from 19 percent of its budget in 1975 to fully 50 percent now. The effect, according to Jean de Rooinay, Pasteur's director for research applications, is that the institute has the resources for wide-ranging programs that extend from basic biology to the development of laboratory appliances, such as the Pyrodesfilter, which produces superpurified water for cell research. With 52 separate research groups at work at the 1,000-member institute, studies are under way on viral vaccines, parasitology at the molecular level, and the automation of venous diagnostic procedures.

"The big difference between now and, let's say, ten years ago," De Rooinay observed, "is that science now has a high status in Europe. It gets better press coverage. It's on television. Biology in particular is recognized as having great importance for health, the environment, and agriculture."

This optimistic view would provoke strong dissent in Britain, where the scientific community has experienced numerous ups and downs—mostly downs, in

recent years—as the government has instituted one belt-tightening measure after another in an attempt to stop runaway inflation. British scientists, however, do manage to remain in the forefront of many major fields of research. Molecular biology is one of these and to get some insight into how—despite enforced austerity—British science remains top in the field, I walked with the distinguished researcher Sydney Brenner, of the Medical Research Council Laboratory of Molecular Biology at Cambridge. Brenner, who received the 1979 Gardner International Prize for deciphering how living organisms "read" and "translate" the genetic code, has been engaged in a years-long project aimed at mapping the nervous and genetic systems of the *Caenorhabditis elegans*, a small, free-living nematode worm.

Money is of course important, Brenner agreed, but at least equally important he insisted are the stipulations attached to the use of the money in that regard. He said:

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◀ *There's no pressure to give quick results," says Cambridge biologist Sydney Brenner. "We can't afford to innovate. We don't have to ask who's offering money for what kind of research."*

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the Cambridge lab has an advantage over many better-supported laboratories in other countries. "We know long in advance what our budget is going to be, and we know that we're not going to be put under pressure for quick results," he said, obviously referring to his American counterpart. frequent experience with twists and turns in congressional appropriations for biomedical research and accompanying political demands for glittering results—fast. "There is no pressure for us to produce, and consequently we innovate, because there is no pressure. We don't start out by saying, 'Who's offering money for what kind of research?' Instead, we'll decide that a problem is worth looking at, and as long as it remains unsolved and continues to look important, we'll continue to work on it."

The Cambridge lab, which Brenner modestly describes as "part of the international scientific scene" has a staff of about 130, of whom 40 are long-term visitors—graduate students and senior researchers—from North America. Brenner said with some satisfaction, "I regularly hear from American deans and depart-

ment chairmen who want advice on finding top people for vacancies."

Finally, in surveying Europe's scientific and technological renaissance, let's shift from Great Britain to prosperous West Germany and let's look at the leading manifestation of Germany's determination to be in the vanguard of modern science—the big atom smasher, DESY (for Deutsches Elektronen-Synchrotron), at Hamburg. Though regularly used by foreign scientists, DESY is Germany's own high-energy physics laboratory paid for mainly by the Federal Republic with a 10-percent contribution from the Hamburg government. And, with DESY's new machine, PETRA, the world's largest positron-electron colliding beam device just coming on-line, DESY is a very expensive operation—currently costing about \$60 million a year for operating expenses. Britain closed down its own accelerators to finance its dues for the big CERN synchrotron. Germany while keeping up its participation at CERN, chose to expand DESY's hot competition with Stanford University's particle accelerator, apparently with stunning success. Last August, using DESY's newly inaugurated PETRA machine, an international team of physicists glimpsed the long-sought and elusive gluon, the whimsically named subatomic particle that theorists had postulated as the binding force for groups of quarks. If the gluon research is corroborated, it will inevitably lead to a Nobel Prize.

Among the world community of high-energy physicists, DESY is renowned as a laboratory where things get done. DESY's director, Herwig Schopper, agrees with some embarrassment that perhaps that's true. "We learned how to do things the American way," he said ironically, "but in the meantime you've picked up all of Europe's best-practice practices. But once we get our budget, we're free to use it."

Why does West Germany bear the immense expense of running such an accelerator laboratory when the trend in Europe is toward cost-sharing for such costly facilities?

The answer was succinctly offered by Germany's minister of Science and Technology, Volker Hauff, in an address to the twenty-fifth anniversary celebration of the CERN laboratory. "International science can succeed," he said, "only if national science is strong."

Germany and France have the wherewithal to pay for both. They are the engines of Europe's scientific and technological renaissance, with their European neighbors contributing as best they can.

Western Europe is experiencing a scientific and technological renaissance, and it's occurring at a time when instability and caution have become dominant factors in the politics and management of American research. What's especially important to note is that Europe's new renaissance is just beginning. ☐

# INTERVIEW

CONTINUED FROM PAGE 58

ment had introduced new laws about automobile fuel and so forth, and there had been a remarkable improvement in the quality of the air.

I mention Japan because it points up the worst case of technology imposing itself and polluting everything. But in New York, too, there is no question that the air has improved. Rome hadn't improved much when I was there last, but there has developed great agitation about the Mediterranean Sea. People realize that unless something is done soon, it is going to be a dead sea. So yes, I do think the environmental movement is having a meaningful impact.

**Owens:** That brings up the questions of social management and understanding the systems we create ourselves. Jay Forrester, a computer specialist at MIT, believes that complex social systems are too full of feedback loops, too widely interactive for us ever to untangle. Do you agree with that?

**Dubois:** Yes. I don't think we can understand the organization of many social systems.

**Owens:** Can a computer?

**Dubois:** No, because it has to operate on instructions that we give it. But my conclusion is that we must restructure society so that we don't have such complex systems. That's not impossible, in fact, it is one of the activities that most absorbs me now. Last fall I was teaching at Bard College, and the

students were complaining that it seemed that the world would become boring and standardized. They believed that shopping would be done via computerized telephone supermarkets, and so on. But in New York, in Paris, and in many other cities, I see an increase in the number of little shops selling vegetables, tools, clothes. There is a universal tendency if we can manage it to do something a little different from what other people are doing.

So I think we will create social subsystems that we can comprehend and within which we can function. We will make use of the interrelationships that electronic technology permits, but we will turn away from the notion of the world evolving into one system with one government. I don't think we'll have a world ruled by computers.

I see evidence of this trend to smaller more or less independent social systems everywhere, and when I lecture about it, the response is enormous. So I'm sure it is in the spirit of the times.

**Owens:** Scientists who speak directly to the public are often disparaged by their colleagues as "popularizers." How would you describe your own role?

**Dubois:** What I'm trying to do is to communicate the human and social consequences of scientific and technological developments. Instead of trying to explain disease mechanisms, I say, "If you continue doing certain kinds of things, these are the consequences." The details of science have become just too intricate for the public

to keep abreast of.

And not just the public! I was the editor of *The Journal of Experimental Medicine* for twenty-five years. I still review it, but it is no longer easy for me to understand. First I stopped understanding the techniques that were being used, then I had difficulty with the nomenclature. Now when I still understand the problems they're trying to solve even the titles of the articles are full of words I don't know!

So, except in a very limited number of fields, I no longer read technical papers, but I try to read those that deal with consequences. I don't know anything about computers—I've never worked with them—but I can certainly understand that introducing them into technological operations is going to affect the labor market. And I can talk with computer specialists about such matters because they usually don't know any more than I do about the consequences.

**Owens:** Is that a general strategy for dealing with information overload? One feels that trying to get acquainted with unfamiliar fields makes one's range of knowledge shallower as it grows broader.

**Dubois:** I think that's always been the case. But it's an illusion to think there is much more to be learned than there was before. The Egyptians, for example, had more medical specialties than we do. Someone who treated the eyes didn't know anything about the foot.

Actually, I think things are becoming easier because our knowledge is grouped under more and more general laws. When I was a student in biology you had to learn an immense number of creatures and classifications. Now there's a framework of evolution and genetics, and you fit into it the particular problem you're working on.

**Owens:** What about medicine? There is widespread disillusionment with our health-care system, its fragmentation of care, its mechanization of the doctor-patient relationship. Many people have turned away and looked instead to holistic practitioners, who seem to provide more human and encompassing care. Do you see a danger in this?

**Dubois:** First of all, it should be more widely known—as any doctor knows—that ninety percent of the conditions for which people seek care will resolve themselves without any medical intervention.

Second, a great deal of what the physician, whether "traditional" or "holistic," does is to give you confidence. And it is that confidence that helps you to heal yourself.

Third, even orthodox physicians very often do not cure you. They give you something that makes you able to live more comfortably with your disease. It's probable that many people with no medical training can do that as well as a physician can. Recent papers have confirmed that chicken broth has some effect—not well understood—in relieving some kinds of pulmonary congestion. So there you are!

**Owens:** You played an important role in the





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## WAR

CONTINUED FROM PAGE 64

second time, he saw two Native Americans carrying a guardman — the Captain of the guardmen — toward the fire too. The Captain's saber had sliced through one of the Native Americans, and it must have disabled some circuit because the Native American walked badly. But in a moment more the Captain was burning, his red uniform ablaze, his hands thrown up like tongues of flame, his black eyes glaring and cracking, bright metal running from him like sweat to harden among the ashes under the logs.

The Clown tried to wrestle with Bear, but Bear threw him down. The Dragon's teeth were sunk in Bear's left heel, but Bear locked himself free. The Calico Cat was burning, burning. The Gingham Dog tried to pull her out, but the Monkey pushed him into the fire. For a moment Bear thought of the cellar stairs and the deep, dark cellar, where there were boxes and bundles and a hundred forgotten corners. If he ran and hid, the New Toys might never find him, might never even try to find him. Years from now Robin would discover him, covered with dust.

The Dancing Doll's scream was high and sweet, and Bear turned to face the Knight's upraised sword.

When Robin's mother got up on Christmas Morning, Robin was awake already sitting under the tree with the Cowboys, watching the Native Americans do their rain dance. The Monkey was perched on his shoulder, the Raggedy Girl programmed, the stove had assured Robin's mother to begin Robin's sex education) in his lap, and the Knight and the Dragon were at his feet. "Do you like the toys Santa brought you, Robin?" Robin's mother asked.

"One of the Native Americans doesn't work."

"Never mind, dear. We'll take him back. Robin, I've got something important to tell you."

Bertha the robot maid came in with con-tinues and milk and vitamins for Robin and came out last for Robin's mother. "Where is those old toys?" she asked. "They done a pecky-pecky job of cleanin' up this room."

"Robin, your toys are just toys of course—"

Robin nodded absently. A red coil was coming out of the chute, with a cowboy on a rearing horse after him.

"Where is those old toys, Ms. Jackson?" Bertha asked again.

"They're programmed to self-destruct. I understand," Robin's mother said. "But Robin, you know how the new toys all carries the Knight and Dragon and all your Cowboys, almost by magic? Well, the same thing can happen with people."

Robin looked at her with frightened eyes.

"The same wonderful thing is going to happen here, in our home." **OO**

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way with tools held in human hands. "Right after I gave the talk," Feynman said, "a friend of mine, Don Glaser [who is also a Nobel Prize winner in physics], came up to me and said, 'You're trying to describe something so small that you can't make it directly; you'd have to do it in two stages. Make one machine, which makes a smaller machine. A sixty-fourth of an inch is too big. You should have said one two-hundredths of an inch.'"

It turned out that one Nobel laureate-to-be should have listened to the other. A few months later a man named William McLellan came in with a motor of the specified size, and Feynman had to pay up. "That guy was too clever for me," Feynman said. "He did it by hand, using a loathepek, a microscope, and a watchmaker's lathe. He rolled wires between glass plates to get them down to an extremely small size, and he put the whole thing together with tools he held in his hands. I wanted something so small that only a machine could make it, but I didn't get it."

Prizewinner McLellan, asked to submit ideas for new challenge prizes for this article, was cautious. "I have nothing to suggest," he replied. "I'm a little afraid that there might be a loophole in it and that somebody would get a nigger through. I fully understood what Feynman wanted, and gave him the option of not accepting my motor as the winner because no new technology was involved. After all, he didn't need the motor. It was to be an example of the new techniques. But he was a gentleman and said it fully met the challenge as written. He had assumed that a new method would be necessary and it was his oversight for not stating it specifically."

When Feynman posed his micromotor challenge, he also offered a second \$1,000 prize to anyone who could miniaturize the information on a printed page and reduce it by a factor of 25,000 on a side. "When I offered the prizes, I was single," he said. "When I wanted to get married, I told my wife what my assets were. I don't think we were married for more than a week or so when I had to say, 'By the way, darling, I have to give a thousand dollars to this guy McLellan, who has made this electric motor. And she said, 'Oh? And what other little purposes have you got waiting?'"

That story got around in physics circles, and out of respect for Feynman's new wife many physicists considered the offer withdrawn. No one has ever come forth with a claim on the other \$1,000. "I don't really mean to withdraw completely. I just made a joke about it," Feynman says.

But perhaps he should count on the status of inventions. IBM researchers recently patented a dye laser storage scheme capable of storing 100x10<sup>9</sup> elements per square centimeter, with 1,000 bits per element, well within the margin of Feynman's challenge.

#### BUT NOT TOO TIGHT

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strict enough to prevent an unfair claim, but they shouldn't be so complex that they stifle creativity. Chester Kyle, the president of the International Human-Powered Vehicles Association (see "Future Bikes," July 1979) notes that in ordinary racing, whether it is with motorcycles, cars, or yachts, competitors always seem to get divided into "classes." There are rules to specify the weight of the vehicle, the engine displacement and so on. Soon everybody's sailboat or motorcycle looks alike. The American Cup race is not a contest for the fastest sailboat but for the fastest within a narrowly defined class.

"We've tried to break loose from that restriction," Kyle says. "to let people be as creative as they want. We don't specify the type of vehicle, the type of sustenance, the number of wheels, or even the type of muscle power used. There's a goal of breaking a speed record with human power and the task is to do it. The problem is how."

The answer is that there are lots of ways and the annual championships feature a diversity of entries. Every machine looks different. In the single-rider division one year a winner rode his bicycle in a prone, headfirst position; another on his back and foot-first. Another year the winner was on a quadsicycle. Other ingenious variations have included front-wheel drive, a rowing quadsicycle, even a streamlined, hand-powered wheelchair. The range of entries is limited only by designers' imaginations, and the IHV Association wants to keep it that way.

## PUT UP OR SHUT UP

Another type of prize challenges the validity of a questionable claim. It is often used to publicize the fact that an assertion is unproved, since the prize money remains unclaimed.

Several "put up or shut up" prizes have been offered in the realm of spiritism, ESP, and paranormal phenomena. In the 1920s Scientific American magazine offered \$20,000 to any spiritist who could provide convincing evidence of contact with spirits in the presence of qualified observers chosen by the magazine's editors. Harry Houdini was for a time the star of the Scientific American panel, and the challenge was eventually understood to be for any performance in a session that Houdini could not duplicate by fakery.

More recently the magazine James' *The Amazing* Randi has offered \$10,000 to anyone who can demonstrate any paranormal ability under controlled conditions. Similar prizes have been offered elsewhere, and though many people have tried to claim them, no one has succeeded. The German magazine *Die Zeit* offered 100,000 DM for a convincing psychic demonstration, but has not yet had to pay. In Norway the Magic Circle offered Ulf Geller 50,000 kroner (\$7,000) to perform any of his psychic feats under test conditions, but Geller has declined the challenge.

Lawrence Kusche, author of *The Bar-*

rudd Triangle Mystery Solved, offered to pay \$10,000 to Chesée Berlitz, author of *The Bermuda Triangle and Without a Trace*, if Berlitz could produce any evidence to substantiate her recent claim that a huge underwater pyramid has been discovered in the Bermuda Triangle. Berlitz formally declined the challenge.

Philip Klass, senior editor of *Aviation Week & Space Technology* magazine, has made an outstanding offer, also for the magic figure of \$10,000, for any major piece of a UFO or for any positive evidence that extraterrestrials have visited the earth during the twentieth century. To sign up, you have to agree to pay Klass \$100 per year for every year that goes by without positive evidence of UFO's up to a maximum of ten years. Stanton Friedman, author of *The UFOs Are Real*, is the only major ufologist who has signed the agreement. He has paid Klass for four years but has not yet tried to collect the ten grand. Conroy Friedman still gives lectures stating, "The UFOs are real."

Challenge prizes should be offered as an incentive for new scientific research technology or human achievements. But they are not always appropriate. Such problems as a cure for cancer or harnessing fusion power are already being attacked by huge teams working with sophisticated machinery too expensive for private individuals or groups to afford. And problems that will have immediate commercial payoff probably don't need the added incentive of a prize. Any inventor who could make a battery calculator or light bulb with any twice the efficiency of today's models could make much more money from patent rights than any conceivable prize would amount to.

Good challenge prizes stimulate work that will be needed eventually but that isn't quite profitable now. McLaren's micro-motor pushes back the frontiers of miniaturization, but it generates only a millionth of a horsepower and, as the Guinness Book of World Records states, "The only suggested use so far for this ultraminiature motor is to run a mifty-go-round in a flea circus."

In the space colonies imagined by Gerard O'Neill (*Interview*, July 1979), pedal-powered planes could be an every day sight. For now, however, as MacCready admits, "This plane isn't of much practical use. It was built to do only one thing — win the Kremer Prize."

The lessons learned in pursuit of a challenge prize may open up whole new branches of a science or provide new applications to old problems. The solution of Paul Erdős's \$3,000 prize would open up a new subarea of number theory. In building the Gossamer Hawk, with a cruising speed of 10 mph, the slowest propeller-driven airplanes ever built, the designers learned a great deal about low-speed aerodynamics, a field that should interest any pilot, since all planes must land and take off slowly.

But what makes challenge prizes so ap-

pealing in the grid is the economic balance sheet. A well-publicized, well-timed prize can stimulate an outpouring of human dedication and effort worth many times its face value. The Cmei competitions over the past year have shown how tiny offers—\$100 for first prize and \$25 for nine runner-up prizes—can stimulate an overwhelming response. The competitors' postage alone costs far in excess of the prize offered.

What we need then is a list of the things we need the accomplishments for which prizes should be offered, with rules carefully based on the state of the art in each area, possible breakthroughs in the near future, and a sense of the directions in which human achievements should go. This is a big order and beyond the scope of this article, but there are a few obvious areas that might be prizeworthy. In Cmei Competition #10 (page 108) you will have a chance to submit your own suggestions.

Among the challenges still to be met:

- A windmill that could give say 300 watts' output in a 10mph wind for a one-unit cost of \$100 or less.

- A solar-powered automobile or airplane that converts sunlight directly into motion above a certain speed in real time without battery storage.

- A glider (jet/plane) flight of more than 2,000 miles (the record is 1,000 miles).

- A manned transpacific balloon flight.

- A voice-identification device that can recognize a certain human voice with less than 1-percent chance of failure.

- A robot that can clean windows, scrub floors, fold laundry and mix drinks.

- The first woman to run the marathon in less than 2 hours 20 minutes (or accomplish another feat usually in the domain of men).

- The first person over sixty years old to run the mile in less than five minutes.

- The first human-powered airplane to do a battle roll or loop.

- The first successful live births in captivity of endangered species that have so far resisted such attempts.

- The first human-powered ornithopter to fly the Kremer figure-eight course or a motorized ornithopter that exceeds the speed of the fastest bird.

- A human-powered boat that can exceed a given speed in still water, or a one-man pedal-powered, propeller-driven water vehicle that can beat an eight-car shell (at 14 mph the fastest human-powered transport now in the water, the best single-man scull goes no faster than 11 mph).

- Passing new milestones in the efficient utilization of nonpolluting energy sources.

- Breeding elusive plant forms comparable to the white mangold for which the Burpee Seed Company paid \$10,000. How much for a seedless watermelon?

What the world needs is more "eccentric" visionaries like Henry Kremer, Allen Abbott, David Burpee, Paul Erbs, and Richard Feynman—men who have a dream and enough money to stimulate the world into making that dream come true. **☐**

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CONTINUED FROM PAGE 42

wonder the experts think the public is crazy and the public thinks the experts are lame.

Dr. Velie's *Messengers of Deception* takes a broader and more ominous perspective. Velie proposes that UFOs wherever they are, have been created by a totalitarian intelligence agency. UFOs, he says, are not a secret weapon, as some have hypothesized. They are a secret control system to manipulate the beliefs and the behavior of the public. The argument for this is subtle and ingenious. It is also deftly difficult to summarize. Velie does demonstrate with examples from recent history that intelligence agencies have created some truly staggering deceptions. (The part of the book is great fun for fans of espionage stories, whether or not they are interested in UFOs.)

He then points out some consequences of the UFO mystique, which has grown up in the past three decades. According to the mystique, certain elect individuals have been selected by our space brothers to carry their wisdom to us backward Earth folk. The messages carried by those elect ones, Velie points out with the Galilei irony, are redolent of the most reactionary ideologies: Authoritarianism, mysticism, a follow-the-guru syndrome, contempt for science and reason, in-group superiority, and messianic fervor are found among UFO cults.

Here Velie becomes chillingly specific. Naming names, he shows links among intelligence agencies, occult groups, UFO cults, and allegedly impartial UFO study groups. The whole UFO phenomenon, he says, might well have been designed as a new quasi-religious faith that can be used to manipulate populations, just as churches and cults have been used by reactionary forces in the past.

It is refreshing that Persinger, Lahné, and Velie admit that some of their theories do not explain the enigmas they have confronted. Combining these theories, one can envision both that a cyclical natural phenomenon creates areas of strange occurrences and that a cynical intelligence agency has capitalized on it to install a new mythology.

Still, some of the reports do not fit even that theory. The extraterrestrials that so many want to believe in might yet be found among the still-unexplained tales. But so might the time travelers conjectured by Saul Paul Sirag, the "sky centers" of Trevor Constable, the "ultrastranzisols" of John Keel, and other natural phenomena we do not yet understand. It will take several more investigators as imaginative, independent, and free of dogma as Persinger, Lahné, and Velie to find out. **DD**

Robert Anton Wilson reviews books for *Omn*. His new novel, *Schrodinger's Cat: The Universal Next Door* (Pocket Books).



UNDERGROUND



MAN AND MONKEY



NUCLE



COLANI

**UNDERGROUND ARCHITECTURE**— Trees grow in the Lierly's front yard. Flowers bloom, breezes blow. But it never rains. The Lierlys' house cost less than other Oklahoma homes its size, and it uses perhaps a third as much energy. And grass grows on the roof. Like a surprising number of American families, Price and Sylvia Lierly live underground. There are at least 3,000 subterranean homes in the United States today, probably many more, and office buildings and even shopping centers are following them into the earth. For a look at why the caverns' ancient home may be the best housing for the coming decades, see the January *Omn*.

**LOOKING BACK AT O-21**—Agnes Eunani Olgard Huth—Able, as most of us know her—embodied the best in biotechnology in the primitive year 2000. Gene mapping, artificial fertilization, and a host mother combined to guarantee that she would be the healthiest, most capable child her genetic parents could produce. Able, as her parents had planned, was the first person born in the twenty-first century. In the record of her first 100 years, she traces the revolutions in medicine, education, government, and personal freedom that electronics, bio-, and psychotechnology have brought about since her birth. The tale, told to science writer G. Harry Stark before Able left for the stars in the first faster-than-light ship, appears in next month's *Omn*.

**COLANI**—“There are no straight lines in nature,” says engineer Luigi Colani. So he's thrown away his straightedge to design aircraft, autos, and furniture that curve into the future. Colani grew up in Berlin and trained there at the Academy of Art. Today, after three decades of sculpting home and industrial products that range from toothbrushes to oil tankers, he just may be Europe's best-known designer. In a stunning pictorial, January's *Omn* will show you the look of tomorrow.

**BETWEEN MAN AND MONKEY**—Get ready for the most important words uttered in the twentieth century. They're “Baby in my drink,” and they were said by Washoe, a fourteen-year-old chimpanzee that speaks American Sign Language, also used by the deaf. Washoe is the property—or perhaps the colleague—of Dr. Roger Fouts, a University of Oklahoma psychologist, pioneering in the field of interspecies communication. Washoe, a gonia named Koko, and many other talkative simians are taking us man in not alone anymore. The next issue of *Omn* holds all their gossip. **DD**



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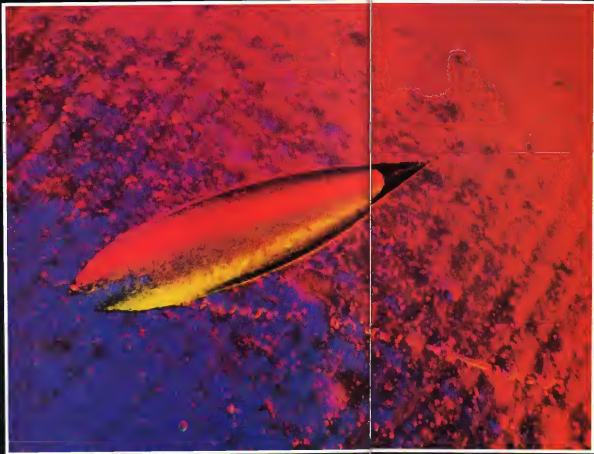


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## PHENOMENA

A satellite from space is captured in the photograph by Philip Harrington. The leardrop shape is actually the imprint of a cosmic ray found in the Lexan helmet of one of the Apollo astronauts.

Developed for NASA by General Electric, Lexan is a plastic used in helmets and as a protective casing for sensitive machinery. To analyze the effects of space on the plastic, Dr. Robert L. Fleischer, of G.E.'s research and development division, invented an etching technique to wear down the Lexan by layers. In this way, irregularities were slowly brought to the surface, and the cosmic rays were "discovered."

Fleischer's technique has other applications. It can be adapted to geologically date minerals from space, create ultrathin biological films, and detect radio gas, quantities of which are emitted just before an earthquake.

Harrington took this photograph with an Olympus Research Microscope at X 75 magnification. Harrington specially etched the Lexan with a series of films and used Ektachrome 64 film and a 2 1/4" camera. □



# GAMES

By Scot Morris

Man is a puzzle-solving animal.  
—Ronald A. Knox (1888–1967) Roman  
Catholic priest and translator  
of the Bible

People have been amusing themselves with games and puzzles ever since there have been people. This threshold month, when everyone seems to be craning toward the future, peering over the hill into the Eighties, wants as good a time as any to look back to the old games that have been around longer than any of us.

Games don't die; they just hibernate. This past year saw a flourishing game laid in the form of Xeroxed sheets of a satiric "College Entrance Exam" in which letters and words were arranged in relation to each other on the page to suggest familiar phrases. "stand", for example, is a new way of writing "I understand." And "emalg" is "a backward glance." With these in mind, can you guess the following? (Answers, page 128.)

1 ting tin ing	2 you put me
3 M D P D S S	4 wheeder

It may come as a surprise to learn that this kind of puzzle, called a rebus, has been around for centuries and enjoyed a similar burst of popularity in magazines over 100 years ago. The earliest rebuses included pictures for words or syllables. As an example of their antiquity, consider the fish as a symbol for Christ only. This came not from the legend of the loaves and the fishes but from a visual pun on the initials of the Greek words *iosour* (Christos, Thaduo, Yios, Soter) (Jesus Christ, Son of God, Savior). The initials spell *ichthys*, Greek for "fish." The study of fish is called ichthyology. Thus, the symbolic fish is a rebus of an acronym for Christ.

Picture rebuses allowed literates to read and were popular in children's books. Letter rebuses were more sophisticated and challenging and appeared in magazines for adults. Here are three over a century old.



The oldest puzzles are riddles. Oedipus became the first puzzle solver when he saved his own life and prevented the destruction of Thebes by answering the Sphinx's riddle: "What walks on four legs in the morning, two legs in the afternoon, and three legs in the evening?" (8).

Riddling was once serious business. Skill at posing riddles and at answering them was a sign of overall intellectual capacity. The inability to solve a riddle meant a loss of prestige. The fishermen of Los gave the following riddle to Homer: "What we caught we threw away; what we could not catch we kept." (9) The great poet was stumped. It is said that Homer was so angered by his inability to solve the riddle that he died of pique.

Another ancient form of wordplay is the anagram. Can the letters in your name be rearranged to spell any meaningful phrases? It was once thought that mystical messages were woven into the letters of one's name and that the proper rearrangement was a portent of one's

destiny. When André Pupin, a Frenchman, realized that his name could be transposed into *Pendin* (from "Hanged at Reon"), he became so obsessed that he committed murder and the anagram came true. He was hanged at Reon, a town in France.

A conceptual link between the anagram and the person named is considered the highest form of the art. After Demosthenes defeated Gladstone in Parliament, two anagrams that seemed to tell the whole story were much talked about. Gladstone was transposed to "G leads not" and Disraeli into "Lead, sir." The most elegant descriptive anagram is considered to be *Horace's a Mito* (His honor comes from the Nile), for Horatio Nelson. It was made up by an English clergyman after Admiral Nelson's victory in Egypt.

The pseudonyms adopted by writers are often anagrams. Thus, François Rabelais also wrote under the name Alcofribas Nasier; Galileo, Christian Huygens, and Robert Hooke published discoveries under anagrammed names each, apparently for the same reason: to walk on further verifications before an "official" announcement, while avoiding the risk of someone else claiming credit. The French poet Auguste J. J. (le jeune, "the younger") arranged the letters of his name (substituting V for U and I for J, as was the common practice among writers) and created the nom de plume by which he is known to the world today (10). When you have figured it out, try to find the highly praised anagrams that have been worked out for Francisco Nightingale (11) and the words Presbyterian, telegraph, and revolution (12–14).

Hunting for anagrams is easiest when you have the letters printed on separate squares of paper (Scrabble tiles are ideal) and lay them out on a table.

By comparison with the puzzles mentioned, the most popular puzzle form in America today—the crossword—is a mere child, barely forty-six years young this month. The first crossword puzzle was constructed by an editor of *The New York World*, Arthur Wynne, who introduced it without fanfare on the Fun Page of that

paper on December 21, 1913. Reader reaction was immediate. Crosswords swept the country then the world. Cash contests led the fad, and by 1924 there were books, conventions, encyclopedias, and cross-checked fashions and jewelry, and the Baltimore and Ohio Railroad put dictionaries on all its trains to accommodate its cross-crazed passengers.

For an excellent history of crosswords and other old puzzles discussed here, see *The Puzzler's Paradise*, by Helene Hovancic (Paddington Press).

Here it is: The one that started it all. We have renumbered the squares according to current convention and have added clues (in parentheses) for four archaic words that may not appear in some modern dictionaries. Otherwise, this is Wynne's original "word-cross" (15). It complements with his encouraging word at the top to those who might be put off by all those boxes. Experienced crosswordists will find this one a snap (notwithstanding clue 15 Across).

#### ACROSS

- 2 What bawdy hunters enjoy
- 4 A written acknowledgment
- 6 Such and nothing more
- 7 To culminate
- 10 A bird
- 11 A bar of wood or iron
- 13 Opposed to less
- 14 What artists learn to do
- 15 What this puzzle is
- 17 Fastened
- 18 An animal of prey (etc.)
- 20 Found on the seashore
- 21 The close of a day
- 23 To elude
- 24 The plural of it

#### DOWN

- 1 To govern
- F Part of your head
- M A fit: ("One bow a serif")
- 2 A talon ("Withered")
- 3 Part of a ship
- 4 A chrysoem
- 5 Exchanging
- 6 What we all should be



- 8 To sink in mud
- 10 The fiber of the gonist pair: (Raw breed, phonetic)
- 12 A boy
- 16 A pigeon
- 17 One (Scott. past participle of take)
- 19 A river in Russia
- 20 To agree with
- 22 An aromatic plant
- 26 For a variation on the theme, try this Four-Maria Crossword, below.



#### ACROSS

1. Josiah
5. Type of cat
6. Moustache
7. Duplicate

#### DOWN

1. Take by force
2. Is webbed
3. Vegetables
4. Singular

Finally, here's a message addressed to all Omni readers, that was typed to our door by the Omni cryptographer. We're not sure what it says. Can you figure it out?

Em e are are wye see otch are eye ess  
 tas em a ees! (17) Answers on page 128

#### COMPETITION #10: PRIZES FOR PRIZES

In April Omni announced the establishment of a \$5,000 prize for a computer program that could successfully defeat chess master David Levy. We fully expect to have to pay the \$5,000 Omni/Levy Prize within the next few years, and we'll consider the money well spent. The work required to produce a winning program, not to mention the also-rans, will be worth many times that amount.

We expect to sponsor more challenge prizes, either on our own or by matching someone else's offer, along the lines of those discussed in the article "Prizes" in this issue (page 108).

Achievements for which prizes will be offered will be practical, socially or scientifically significant, and feasible enough so that they will indeed be won within the foreseeable future. But most important, they will be narrowly defined and stated clearly enough so that the prize cannot be awarded on a technicality that is not in the spirit of the offer.

Each idea must be sufficiently far ahead of the current state of the art to preclude an easy win before a substantial number of competitors have tried and failed, yet sufficiently within the realm of the possible so that the dream may be expected to be realized in our lifetime.

The Competition: Suggest one area of human achievement for which a prize should be offered; a scientific breakthrough that could use a little nudge. We'll consider originality, feasibility, importance, and rule tightness—that is, the degree to which you specify the current state of the art, and define specific cutoff criteria. In addition, we are interested in any outstanding challenge prizes not mentioned in the "Prizes" article, or any prizes that readers themselves care to offer.

Prize-worthy suggestions must be postmarked by January 15, 1980. The usual prizes. All entries become the property of Omni and will not be returned. Send to: Omni Competition #10, 908 Third Avenue, New York, N.Y. 10022. ☐

# NIGHT BEFORE CHRISTMAS, 2001

## LAST WORD

By David A. Terr

**T**was the night before Christmas  
and all through my home  
Not a creature was stirring, not  
even my clone

The test tubes were hung by the bumper  
with care  
In hopes that Saint Nicholas soon would  
be there.

The androids were nestled all snug in their  
beds,  
While visions of mol' danced in their  
heads

My wife in her jumpsuit, and I in my vest  
Had just settled down to some  
drug-induced rest.

When, out by the labs, there arose such a  
clatter,  
My bed woke me up to see what was the  
matter.

Away to the window I hastened my mass,  
To see open the blast shields, and throw up  
the glass.

The reflection of moonlight through  
smog-ridden air  
Gave a luster of midday to everything  
there.

When what to my bionic eyes should  
appear  
But a mass-driven sleigh with some  
strange landing gear.

With a quick little pilot, a company man  
Who did what was asked and followed the  
plan.

More rapid than photons his courses  
they came:  
He implored his crewmen, then called  
them by name.

"Now, Redox! Now, Hewlett! Now, Quasar  
and Photon!

"On, Laser! On, Xerox! On, Pulsar and  
Proton!

"To the top of the dome, by the air- intake  
vent.

"Now dash away quickly

before our fuel's spent."

So, up to the air vent his courses they  
flew  
With a craft full of toys and Saint Nicholas,  
too.

And then, in a flash, on the dome I did  
hear  
The screeching and scraping of about  
landing gear.

I steadied my blaster, my chest to the  
ground.  
And then, through the air vent, he came  
with a bound.

He was dressed in a three-piece he'd  
rented near here  
(Why purchase an outfit you wear once a  
year?)

A life-support system he wore on his back.  
While the toys for the chuds he took out of  
his pack.

A bottle of synthoid he held in his hand  
(He was curbside overweight from a poor  
thyroid gland).

He brought out the toys that department  
stores sell  
The elves at the Pole could not make them,  
as well.

He checked with the base ship, while  
doing his work  
And filled all the test tubes, then turned  
with a jerk.

His anti-grav belt was secure, I suppose.  
And, pressing the keys, up the air vent he  
rose.

He sprang to his craft; to the crew gave a  
shout.  
The ship heaved a shudder, then blasted  
them out.

But I heard him exclaim, as he flew out of  
sight,  
"Merry Christmas to all, and to all a good  
night." **CC**

