COLLECTOR'S EDITION

OMNI

EXPANDED PROJECT OPEN BOOK: HOW TO SEARCH FOR UFOS

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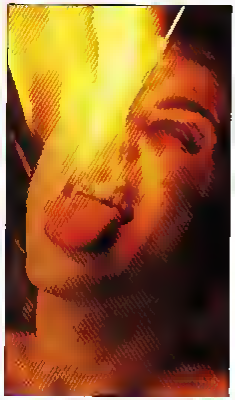

Response to *Omni*'s Project Open Book has been so phenomenal, we've expanded our research into a new investigative section. Cover art by Chris Moore/Bernstein & Andriulli, Inc. (Additional credits, page 86.)

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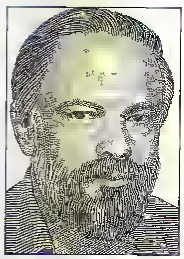
FIRST WORD

SHIFTING REALITIES

"If you find this world bad, you should see some of the others"

By Philip K. Dick

May I tell you how much I appreciate your asking me to share some of my ideas with you. A novelist carries with him constantly what most women carry in large purses: much that is useless, a few absolutely essential items, and then, for good measure, a great number of things that fall in between. But the novelist does not transport them physically because his trove of possessions is mental. Now and then he adds a new and entirely useless idea; now and then he reluctantly cleans out the trash—the obviously worthless ideas—and with a few sentimental tears sheds them. Once in a great while, however, he happens by chance onto a thoroughly stunning idea new to him that he hopes will turn out to be new to everyone else. It is this final category that dignifies his existence. But such truly priceless ideas—perhaps during his entire lifetime he may, at best, acquire only a meager few. But that is enough; he has, through them, justified his existence to himself and to his God.



Known best for his fiction, Philip K. Dick (1928-1982) was also a gifted intellectual capable of sifting through the most complex of philosophical ideas with both rigor and joy.

An odd aspect of these rare, extraordinary ideas that puzzles me is their mystifying cloak of—shall I say—the obvious. By that I mean, once the idea has emerged or appeared or been born—however it is that new ideas pass over into being—the novelist says to himself, "But of course. Why didn't I realize that years ago?" But note the word "realize." It is the key word. He has come across something new that at the same time was there somewhere, all the time. In truth, it simply surfaced. It always *was*. He did not invent it or even find it, in a very real sense. It found *him*. And—and this is a little frightening to contemplate—he has not invented it, but on the contrary, it invented *him*. It is as if the idea created him for its purposes. I think this is why we discover a startling phenomenon of great renown: that quite often in history a great new idea strikes a number of researchers or thinkers at exactly the same time, all of them oblivious to their compeers. "Its time had come," we say about the idea, and so dismiss, as if we had explained it, something I consider quite important: our recognition that in a certain literal sense ideas are alive.

What does this mean, to say that an idea or a thought is literally alive? And that it seizes on men here and there and makes use of them to actualize itself into the stream of human history? Perhaps the pre-Socratic philosophers were correct: the cosmos is one vast entity that thinks. It may in fact do nothing *but* think; in that case either what we call the universe is merely a form of disguise that it takes, or it somehow is the universe—some variation on this pantheistic view, my favorite being that it cunningly mimics the world that we experience daily and we remain none the wiser. This is the view of the oldest religion of India, and to some extent it was the view of Spinoza and Alfred North Whitehead, the concept of an immanent God, God within the universe, not transcendent above it and therefore not part of it. The Sufi saying [by Rumi] 'The workman is invisible within the workshop' applies here, with workshop as universe and workman as God. But this still expresses the theistic notion that the universe is something that God created, whereas I am saying: perhaps God created nothing but merely is. And we spend our lives within him or her or it, wondering constantly where he or she or it can be found.

I enjoyed thinking along these lines for several years. God is as near at hand as the trash in the gutter—God *is* the trash in the gutter, to speak more precisely. But then one day a wicked thought entered my mind—wicked because it undermined my marvelous pantheistic monism of which I was so proud. What if—and here you will see how at least this particular SF writer gets his plots—what if there exists a plurality of universes arranged along a sort of lateral axis, which is to say at right angles to the flow of linear time? I must admit that upon thinking this I found I had conjured up a terrific absurdity: ten thousand bodies of God arranged like so many suits hanging in some enormous closet, with God either wearing them all at once or going selectively back and forth among them, saying to himself, "I think today I'll wear the one in which Germany and Japan won World War II" and then adding, half to himself, "And tomorrow I'll wear that nice one in which Napoleon defeated the British; that's one of my best." ▫▫

Supplementing serious contemplation with charm and humor, this excerpt begins a delightful exegesis of time, space, God, reality and fiction from The Shifting Realities of Philip K. Dick: Selected Literary and Philosophical Writings, *edited and with an introduction by Lawrence Sutin (Pantheon Books).*

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MARCH

COMMUNICATIONS

READERS' WRITES

Living in lava tubes, saving the American inventor, and driving the aliens away with immaturity

Omni Fiction Is to Die For

I had no idea what treasure awaited me in your fiction story, "Dying" by Michael Marshall Smith. I'm an avid SF fan and read almost nothing else. This story was absolutely outstanding. I have never read a story or a novel that dealt with the fate of animals as the central theme in such a powerful way. When I finished the story the only thing I could think of was, Wow. This was one of the best stories you've ever published. Thank you for a first-quality magazine and the opportunity to read such exciting and informative fiction.

Patricia A. Battson
Ehrenberg, AZ

The A-OK for AOL

I just wanted to tell you that your America Online magazine is the best I've found. It's frequently updated, has many different types of services and resources, good graphics, picture and sound files, and interactivity, too. Thank you for a state-of-the-art presentation.

Jay Kornek
Dearborn, MI
aol: Kornek

History (Sort of) Repeats Itself

I very much enjoyed the article about living in lava tubes on the moon. It seems a very practical and logical progression for humanity to assume. Thousands of years ago our ancestors first lived in caves before moving out into the vast new world that awaited them. Isn't it ironic that in the future, in all probability, we may do exactly the same. Our very survival on a bold, new world, and our first steps into the new unknown, may very well depend upon it. Godspeed to the stars.

James I. Kelly
Stone Mountain, GA

More Stars Please

I'd just like to say your magazine is excellent. The "X-Files" article in the December issue was interesting, but I was disappointed there were no interviews with Duchovny and Anderson. The series on UFOs are well researched and interesting. The cosmic Mars conspiracy and Hoagland articles were also eye-openers; Steve Nadis is a very good writer. Keep up the good work.

Nimra Hussain
Dartmouth, Nova Scotia

Inventing a Better America

With reference to Representative Dana Rohrabacher's article, "Inventing America," the Clinton administration's cavalier indifference to American entrepreneurship and ingenuity is intolerable. As we enter the twenty-first century and an increasingly competitive global economy, are we also going to weaken our environmental laws and OSHA regulations as well? Other countries should be meeting our high standards; we shouldn't be sinking to theirs. How can I and other American inventors help Rohrabacher fight to protect U.S. patent laws and regulations, and in turn save the American spirit of ingenuity and tradition of success?

John J. Phelan
Inwood, NY

No Wonder ET Went Home

I agree with the Roswell Declaration and the idea of the government's opening its files on the Roswell incident. I can also see why the government would initiate a cover-up if the incident were a military project gone wrong. If UFOs were in the southwestern desert of the United States in July 1947, why would advanced beings allow anything to be left behind? Surely our military and technology of 1947 would have been no match for beings able to bridge the distances of space. Sadly though, if there were extraterrestrials here in 1947, I would not fault them for staying away if their first contact had been hidden, a testament to our immature species.

Juris Breikss
Highlands Ranch, CO

Got something to say but no time to write? Call **(900) 285-5483.** Your comments will be recorded and may appear in an upcoming issue of *Omni*. The cost for the call is 95 cents per minute. You must be age 18 or older. Touch-tone phones only. Sponsored by Pure Entertainment, 505 South Beverly Drive, Suite 977, Beverly Hills, CA 90212.

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"It's an imaginative, engrossing and visually mesmerizing experience..."

Computer Gaming World—December 1994

"Magic Carpet's graphics probably represent the PC's finest hour. The gameplay in Magic Carpet is bloody marvelous."
Edge Rating: 9 out of 10.

EDGE Magazine—December 1994

"Magic Carpet is a groundbreaking title that combines the best features of a flight sim with the intellectual backbone of an RPG."

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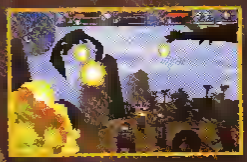
Shred the skies on the world's fastest, most-heavily armed flying carpet. Get ready for non-stop blasting action. Feel the groundrush created by revolutionary fractal graphics in the fastest arcade flight experience ever. See for yourself why critics *AND* gamers are raving about Magic Carpet. Visit your local retailer or call 1-800-245-4525.



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NET-SURF'S UP:
All-in-one packages make it easier to hit the Internet

By Gregg Keizer

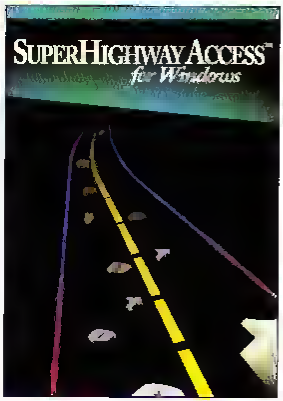
I must have touched a raw nerve in the collective mouth of *Omni* readers last fall when I devoted two consecutive "Electronic Universe" columns to the Internet and what fun it is to go surfin' for both serious science stuff and the kind of paranormal chat that would make the *X-Files* proud. I got a *lot* of mail.

If I'm reading you right, you're convinced the Internet is cool. You're probably even willing to spend the time and money to get connected. But many of you are asking the same question: "Just how do I get on the Internet?"

You need a computer, a modem, and a phone line, hardware you likely have already. Parts of the Internet are available via the commercial online services if that's all you have access to. America Online and CompuServe both let you send/receive Internet E-mail and scour Usenet newsgroups (see the November 1994 "Electronic Universe" for some neat newsgroups to delve into). Delphi offers more, but it relies on a text-based interface that's harder to use and that doesn't show graphics in World Wide Web documents.

Rather than settle for what the online services give you now (they all promise expanded Internet access in 1995), you're better off making a personal connection. Three different paths—each with its own potholes and smooth spots—can take you there.

Whether you have a PC, Mac, or even an Amiga, software is available that makes connecting to the Internet easy. Those running Windows PCs will find the most choices.



The first is The Pipeline (call 212-267-3636 or send E-mail to *info@pipeline.com*), the closest thing going to an instant-access Internet service. This New York City–based provider has created its own set of Internet software tools which it hands out free to anyone who signs up for an account. The software comes in versions for either Windows or the Mac and is icon-based. Click on the "Get Files" icon, for instance, and you can download via ftp (file transfer protocol). "News" takes you to a decent newsgroup reader where you can subscribe to any group with a click. The Pipeline's software is great, but connecting to the service could be a problem for you. Unless you live in the New York area, where you can dial a local number, you have to pay an additional $2.50 per hour ($5 per hour during the day) for access to SprintNet. On top of the $15 to $35 per month charges that The Pipeline itself levies, that can quickly add up to a big bill.

If you're after less expensive Internet access, you'll want to check out two kits which work with virtually any provider. Spry's *Internet in a Box* (call 800-557-9614 or send E-mail to *ibox-info27@spry.com*) is a $149 Windows all-in-one kit that not only includes nearly all the necessary software, but uses a simplified setup that holds your hand all the way. It includes a default Internet provider for a no-sweat connection, but you should find a local provider that's less expensive. Even though setup is a bit tougher that way, it shouldn't take more than an hour or so to complete.

Frontier's $149 *SuperHighway Access* (call 414-241-4555 or send E-mail to *superhighway-@frontiertech.com*) also works with Windows PCs. If you have an account with one of the more than 100 providers supported by its installation scripts (likely, as even the small provider I use was among the listed), you just need to enter three pieces of information. Everything else is done for you. The *SuperHighway* software is even snappier than *Internet in a Box*. You get all the programs you need for E-mail, newsgroup reading, Web browsing, Gopher searching, and file downloading. More impressive, though, is something called *WinTapestry*, which combines the Web and Gopher clients under a single interface. Here you can group Internet resources by subject and stick them in file folders. Its the best tool I've seen to put some organization on the Internet.

Any of these three routes to the Internet will have you dialing up in less time than it takes to read an issue of *Omni*. When you get there, drop me a line at *gkeizer@rain.com* and let me know how it went. ☒

VIRTUAL REALITIES

A SYSOP'S WORK IS NEVER DONE:
Cleaning out cyberclosets is a thankless job

By Tom Dworetzky

I was at Land Oh's, the sleepy oceanfront café and sushi bar south of the sewage processing plant when in walks Flash, the system operator. The sysop slumps down, calls Oh for a double latte, bottled water, and tuna sashimi, pops a vita-celerator, and sighs deeply.

"Want to talk about it?" I ask. "I'm a good ear."

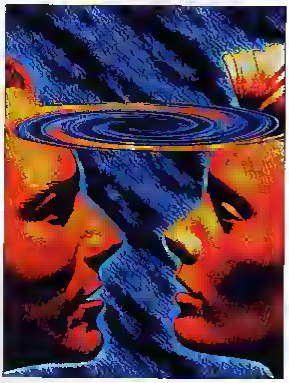
"I know you make scratch from selling tales out of school. Just change my name," she says, "and buy me lunch."

Flash hit this *com* two days ago and clicked forum to forum looking for someone to let her drop code for the night and houseclean. But the forums in the brightly lit, high-priority part of town were flaming, and one after another they told her, "Sorry, we're full. Try next door." In the meantime her list of bug fixes was going out of RAM—the to-do list from hell.

Got to find a place to partake and do some work, or I'm gonna blow my partition, overrun my array boundaries, and crash she'd thought. And a sysop who crashed while out on the net was gone forever, just so much shattered code splattered on a piece of bad memory waiting for the garbage collector to pick up, read-dress, and recycle as available.

She'd worked the town forums and there was nothing for her there. The reveling cyberforms had laughed when she'd explained she had work, not just some need to chat, or Vsex, for God's sake. No, they didn't give a damn. Finally she wandered the Vworld map out of the town. There was one last lone light halfway up the mountain above the valley. Maybe someone there had a few cycles to spare, at least room at the forum for another log on.

The reveling cyberforms had laughed when she'd explained she had work, not just some need to chat, or Vsex, for God's sake.



The two old cyberforms who answered the door looked at her and said nothing to each other. They had met in a virtual forum at the end of the infoexpressway almost 20 years ago. They had dreams of cyberglory. At first many joined the forum. They came to lead the talks and gathered volumes of E-mail that almost overwhelmed them. They would go for runs together for 24 and 36 hours, talking on the forum, speaking with each participant. But over time these interactions had faded, until finally they had only each other to talk to. The net had passed them by. They'd lost the membership in their forum. Mail stopped arriving. In the end they even gave up maintaining their interface.

Today no one talks, but appears in telepathic holographic form projected directly into the minds of others on the forum. But the two old cyberforms lacked the baud and software to keep up with this. And so others drifted away from them.

Now into their intertwined nirvana came this dark shimmering form with a voice made of gravel and bits. Low and mechanical, untailingly polite. Flash identified herself as the sysop and inquired if there was any space on the forum. Offering their meager software and the few priority credits they'd saved, they helped her jack onto the net at full power.

"Too many people want too much of my time," Flash said. "I'm flamed, totally. People are cyberpigs, leaving old backups and threads no one cares about. We're always compressed. That's why I'm here. If we don't make space in this sector ASAP, the whole thing is going down. Let's see what we've got then . . ." And with this, Flash brought up the usage map of the valley. Forums all over town were churning with interaction. Only the little forum in which Flash now rested was dim and low. She started closing down forums, turning swatches of the virtual valley and its inhabitants into available memory. "It's been just the two of you in this forum for how long now? Ten, maybe twenty flops? That's a long time to let you have this space."

"Must we leave each other?" asked the forms.

"You two cut me a break," said Flash, initiating logoff. "If you ever dare to look each other up, here're the addresses of your physical realities."

They hadn't moved, not looking at each other, by the time the sysop finished logoff.

'Not exactly street legal, what you did out there," I said to her.

"Make room, no questions," she replied. "Still, I can't say whether they were who they seemed to each other or not. Everyone's whatever they want on the net."

Shifting in my chair, I spotted Oh coming out the door, heading our way. 'Some favor,' I think. But I didn't tell Flash; she was digging into her sashimi, and she was pooped.

MEDICINE

SHOPTALK IN CYBERSPACE:
Virtual laboratories encourage collaboration and exchange

By Linda Marsa

When the BioMOO biology center opened in Israel's Weizmann Institute of Science it boasted state-of-the-art facilities—sparkling new labs, spacious offices and meeting rooms—and was set in an idyllic wood where colleagues could commune with nature and exchange ideas in private. Yet the center cost nothing to construct and almost all the scientists working there have never set foot in Israel.

This may sound like a perpetually cash-starved administrator's fantasy—acquiring a new lab without dispensing vast sums on bricks and mortar or dealing with the egos of science superstars. But it's not. That's because BioMOO doesn't exist—not in the "real" world, anyway. It's actually a software program running on a Weizmann Institute computer. The BioMOO is the first broad-based attempt to create a "virtual" scientific laboratory on the Internet by harnessing the interactive capabilities of computer games software.

Will BioMOO, the cyberlab set up by Israel's Weizmann Institute, change the nature of research in the twenty-first century?

The MOO (for Multiuser dimension, Object Oriented) software enables researchers separated by vast distances to congregate in cyberspace and actually work together in real time. Since its inception in November 1993, the BioMOO has become a high-tech hangout for more than 750 biologists from three continents and dozens of disciplines who log onto the program to "meet" with colleagues, exchange ideas, jointly write papers, and explore the potential of the virtual world of computer networks.

A recent National Academy of Sciences report says that virtual laboratories like the BioMOO will be among the key technologies that propel scientific discovery into the twenty-first century. And computer wizard Pavel Curtis, who helped devise this technology at Xerox's Palo Alto Research Center (PARC), predicts that virtual laboratories "will permanently alter the way research is conducted." In addition to BioMOO, a virtual astronomy center, Astro VR, is already online, and plans to develop MOOs for ecologists, zoologists, aerospace engineers, and neurosurgeons, and a fully accredited online virtual university, the Globewide Network Academy, are in the works.

Gustavo Glusman, co-founder of the BioMOO and a graduate student at the Weizmann Institute, in true scientific fashion, stumbled upon a MOO one day while surfing the Internet and realized that the technology could be adapted for use in scientific collaborations. In spite of public perception to the contrary, scientists are remarkably social creatures who spend much of their time bouncing ideas off colleagues, gabbing over the phone or going to meetings where they can blab even more, all in hopes of sparking an insight that will move their work forward. The connections made possible by the MOOs add another dimension to this communication. "Logging on is more convenient than traveling to a conference," says Glusman, "and it's more versatile than the telephone."

The next step came from half a world away. David Van Buren, an astrophysicist at Caltech in Pasadena, California, designed the Astro VR, which can beam audio and video as well as text. This MOO-based virtual environment is frequented by a select cadre of a few dozen senior astronomers at key research centers in the United States and Europe. One "room," for example, contains graphics of the Infrared Astronomy Satellite's survey of the heavens while another features the supernova recently discovered by Van Buren's group. "The capacity to transmit images and view the data simultaneously gives us a tool to do real science online," says Dr. Van Buren. "Of course, there is no substitute for actually being with somebody—but this is the next best thing."

Even so, Pavel Curtis and other PARC researchers are busy working on the next generation of MOO—Jupiter. This new program could raise the level of global interaction several notches and truly put the world at users' fingertips by transmitting video and audio recordings live. "It's like going to a conference and having dinner afterward with the five or six scientists in the world who do exactly the same thing you do," says Dr. Curtis. "This will be a way to allow that dialogue around the dinner table to continue."

Now that's really food for thought.

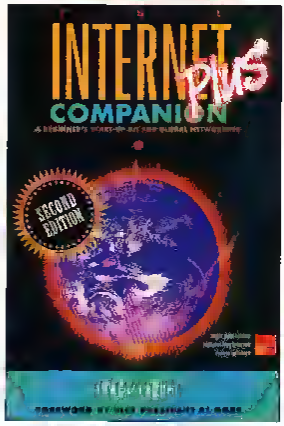
BOOKS

REFERENCING THE NET
A common-sense guide to guidebooks

By Chris Porter

Most of the conventional wisdom about the Internet insists that this computer network, which connects so many individuals and businesses into an online community, grows at the rate of 10 percent per month. Consequently, it seems that the number of books about the Internet has grown just as fast, with everyone wanting to capitalize on the spreading pool of new users. The field is ripe for these books because the Internet comes with no user's manuals, and there are many options available. Knowing what one needs from an Internet book can be the difference between an unwise investment and an integral resource.

In order to surf through cyberspace, one must first have a board, or in this case, a book. Internet reference manuals can be valuable resources if you take the time and choose your manuals wisely.



One special feature of the Internet is that most of the documents that the user might need can be found in various texts online. Furthermore, within most individual functions, a screen-based help section is available to guide the user. Theoretically, an adept user could learn all he or she would ever need to know from the resources on the Internet.

But most of us will not take the time to retrieve and print out all of these helpful documents, so we buy books. Most of the books about the Internet can be placed into one of three rather broad categories: introductory guides, targeted guides, and comprehensive manuals.

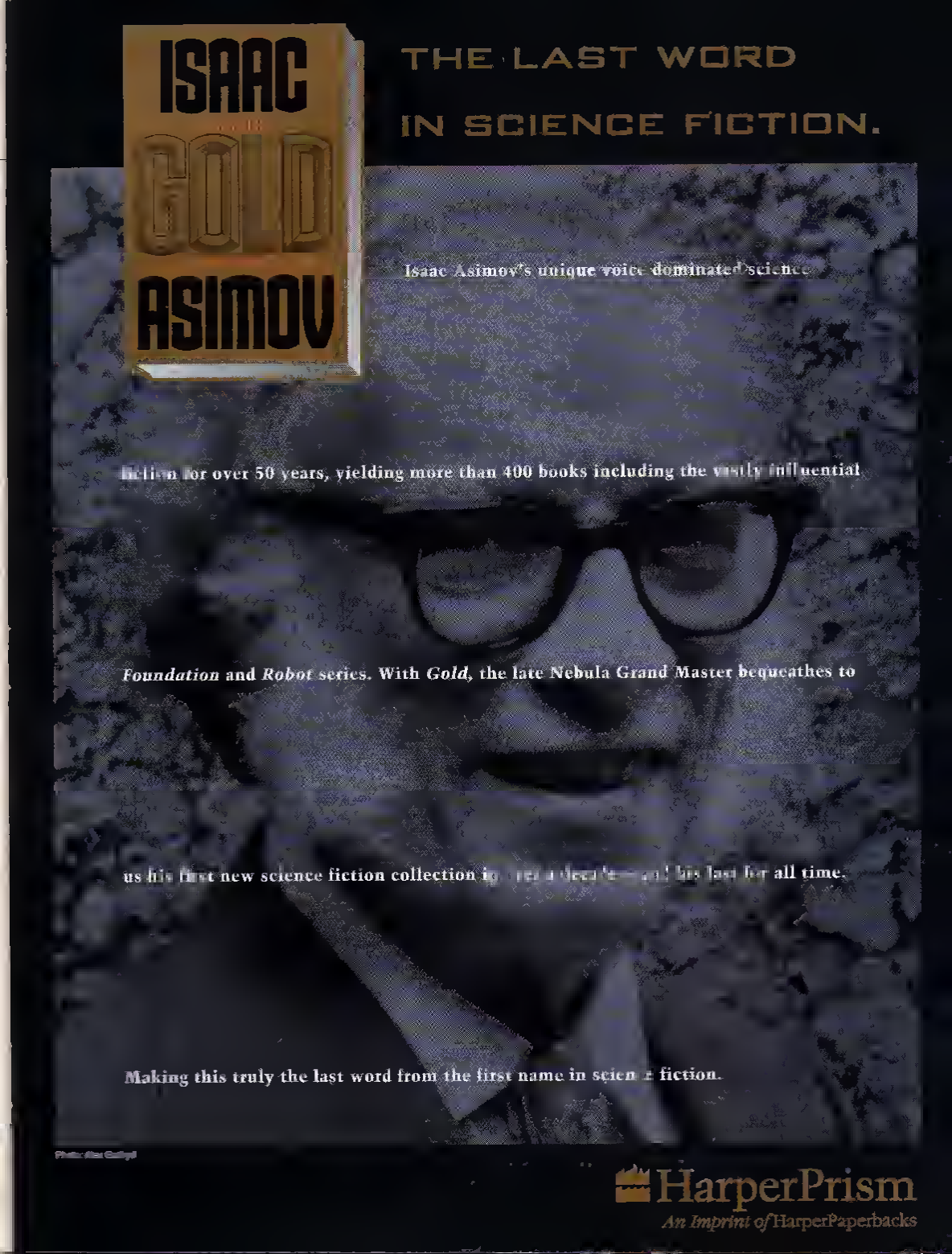
The introductory volumes are designed to whet the user's appetite for the Internet and to provide the basic information the beginner needs to log on. A good one provides a strong foundation upon which a user might begin his or her search for the available resources. Tracy LaQuey's *The Internet Companion: A Beginner's Guide to Global Networking, Second Edition* (Addison-Wesley Publishing, 1994, $12.95) is a good place to start. It assumes no knowledge of how the Internet works, and it teaches not only how to find a service provider and the etiquette of the Internet, but also starts the user on the regular features like how to download files and how to use E-mail. A quality introductory book can be worth its weight in floppy disks, although soon it will begin to collect dust as the user gets more experienced.

For more specialized instructions and extended information on particular aspects of the Internet such as optimum utility of mail programs, accessing extensive resource lists, or even how to join the role-playing games that have proven so popular, see both the *Whole Earth Online Almanac* (Don Rittner, 1993, $32.95) and the *New Riders' Official Internet Yellow Pages* (New Riders Publishing, 1994, $29.95). Both provide extensive, categorized listings of information sources such as newsgroups, file directories, and mailing lists the user can access. New groups are constantly added and old features give way to new versions, so the specific type is less a permanent reference than a snapshot examination of one area.

The third type of book is the comprehensive, all-in-one resource that generally includes sections which answer the needs of the first two categories. These are the books which deserve a permanent place on the bookshelf, because they take into account the advancement of a user. *The Internet Unleashed* (Sams Publishing, 1994, $44.95) is the best example of this type that I've found. There are exhaustive chapters on the history of the Internet and conducting business online, and it even covers advanced projects like creating your own mailing list. Not only does it explain the strengths and weaknesses of different types of mail readers, but it also suggests publicly accessible files that can help readers make the most of their systems. Therein is the value of this type of book. It enables the reader to take more personal control of the network environment.

All three types of books can reward the Internet user. The introductory book gives the reader the confidence to log on and to begin learning about what he or she will want to do on the Internet. Once the user is comfortable with the functions and has determined what he or she wants to do on the network, then the more specific type of book, covering the areas which interest the user, becomes a welcome addition. Finally, the comprehensive book as an encyclopedic resource can help the user well into the future.

So before buying an Internet book, determine your needs, assess your skills, and find the book that best fits those areas. That will help ensure that the resources are valuable not just immediately but in the long run as well.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EARTH

THINK GLOBALLY, ACT GLOBALLY:
Playing the World Game can lead to real solutions

By Steve Nadis

Imagine the leaders of the world convening to strategize about peace instead of war, uniting to battle the common enemies of disease, hunger, pollution, and illiteracy. R. Buckminster Fuller—the architect, philosopher, and visionary—conceived of such a "world peace game" in the 1960s, hoping to conduct the first sessions at the 1967 World's Fair in Montreal. Fuller proposed that the U.S. Pavilion he designed—a giant geodesic dome—be devoted to the solution of global problems and hold a vast computer, a so-called "world brain," crammed with all the necessary data.

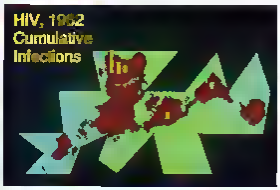
The U.S. Information Agency rejected the idea, considering it inappropriate for a world's fair. Fuller persisted, nevertheless, hosting the first "World Game" workshop in 1969, and the World Game Institute (WGI), founded in 1972, has brought Fuller's dream to fruition since his death in 1983. WGI has conducted about 1,000 workshops or simulations in 48 states and 21 countries. Some 90,000 people have participated, including members of Congress and the United Nations.

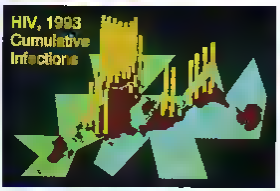
The World Game software boasts a huge collection of crucial worldwide statistics and projections, including those for the spread of HIV infections.

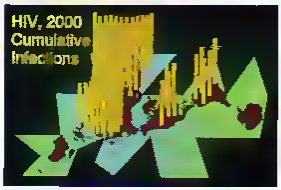
In the World Game, players representing different regions and international agencies barter and negotiate in the hope of resolving conflicts and meeting the needs of their constituents. The simulations are designed to give players an appreciation of the complexities facing world leaders, while demonstrating the need for cooperation among nations. "In some ways, it's like a flight simulator where you can learn how to fly without killing all the passengers each time you make a mistake," explains WGI executive director Medard Gabel.

The "world brain" exists today within a set of software disks. WGI offers two main software packages, *Global Data Manager* and *Global Recall*, plus a number of additional data disks. *Global Data Manager*, according to Gabel, is the "largest database of socioeconomic and environmental indicators for the world," containing more than 15,000 statistics per country on such topics as population, natural resources, and energy reserves.

Global Recall is more user-friendly, presenting data in a highly accessible format. It contains more than 300 maps of continents, regions, and countries and has more than 800 statistical indicators for every country. There are instructional essays on a variety of topics, accompanied by ever-changing statistics called "worldometers"—the number of people who were born or died today, the amount of food and energy consumed, and so forth.







The Solutions Lab is, perhaps, the most innovative part of *Global Recall*, consisting of a set of exercises and questions aimed at helping the user devise a strategy for tackling daunting problems, from homelessness in New York City to hunger in the Sudan. Solutions developed through *Global Recall* can be entered in an international competition called the World Game Tournament. The first round is just winding up, with a panel of experts from the United Nations Environment Program judging the entries. The winner will receive an around-the-world plane ticket, plus a cash prize to begin implementing his or her strategy. In addition, the top 50 solutions submitted will be published and sent to world leaders. Entries for the second round are due by December 1995.

Gabel calls the tournament "an experiment in global democracy." Alice Foreman, a teacher at Absegami High School in New Jersey, considers it an important follow-up to the World Game workshops. "Students get very motivated when they play the game," she says. "The idea here is to carry that motivation through. They don't have to stop working on a problem just because the workshop has ended." And even though the students are young and relatively inexperienced, "they're just as capable of providing solutions as anyone, including the experts, because their views aren't tainted by cynicism," Foreman remarks.

To learn more about the World Game, contact the World Game Institute, 3215 Race St., Philadelphia, Pennsylvania 19104, by phone at (215) 387-0220, or by E-mail at *xtm00002@duvm.ocs.drexel.edu*.

MIND

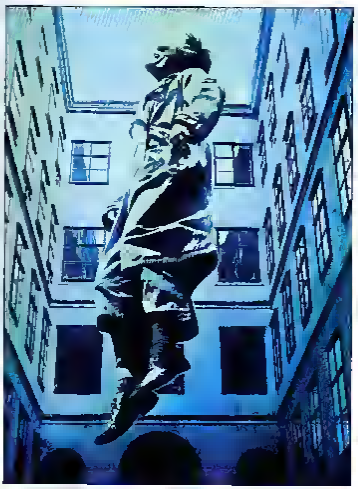
VIRTUAL THERAPY
A little bit of electronic vertigo may cure the acrophobe

By Steve Nadis

At a conference, Ralph Lamson put on a virtual reality (VR) helmet and entered a new world. As a technician guided him through the novel landscape, he found himself on top of a tall building, which happened to be his greatest fear. "I could have taken off the helmet, but I decided to wait and see what happened," he recalls. He ventured to the edge of the building and, looking down, forced himself to cope with the scary sensations. That single experience carried over, helping him conquer his fear of heights. To Lamson, the psychologist and therapist, the next step was obvious. He decided to see if the same technique would work for others.

Phobia sufferers may not need prolonged therapy to overcome conditions like aerophobia. With VR, they can work on their fears directly in a way no talk therapy can match.

He contacted a VR company, Division Incorporated of Redwood City, California, which agreed to design a virtual environment enabling acrophobia sufferers to confront their terrors head-on. In the acro-land scenario, virtual explorers start off in a cafe, go through a doorway and step onto an elevated patio. They walk across a narrow plank that appears to be several stories above the ground, until they reach a suspension bridge spanning a large body of water.



The environment certainly seemed realistic to the 36 patients Lamson recruited at Kaiser Permanente, the San Rafael HMO where he practices. Acrophobes conducted the VR tour standing up and, at times, their legs wobbled. Occasionally they grew dizzy, reaching for something to grasp onto. Yet they plowed bravely ahead. Overall, the experiment—possibly the first clinical study using VR—was a stunning success. After one virtual therapy session, 91 percent of the subjects were able to attain new heights, such as walking across the Golden Gate Bridge. Three months later, 91 percent of the subjects achieved the goal set by Lamson, ascending 15 stories in a glass elevator.

Phobias are persistent, irrational fears that can restrict people's lives for decades, causing them to go to great lengths to avoid the things they fear most. After her first VR session, Marianne Descalzo of San Rafael climbed a stepladder to clean the gutters. Previously, she'd been unable to get beyond the second step. Since then, she's walked around her roof, ridden a ferris wheel, and visited the summit of Mount Tam, the highest peak in the Bay Area. "If everyone did virtual therapy," she predicts, "in about five years no one would be afraid of heights."

Why does it work? Because the virtual environment seems "real and unreal," Lamson thinks. "You would immediately know this is a computer-generated environment, but your sensory reactions seem real just the same. The truth is, ordinary reality is too real for these people. This technology offers a step before reality—a place where they can confront and work through their fears." The approach involves the lowering of the stress response. "You can see it in the heart rate and blood pressure measurements [monitored continuously during the VR excursions]," explains Lamson, who plans to soon offer virtual therapies for claustrophobia and agoraphobia.

Hardie Dunn of Division Incorporated thinks it will be relatively easy to design environments featuring spiders or snakes for people afraid of those creatures. "The hardest part is to figure out all the applications. We've just begun to think about the psychiatric conditions for which this technology might be useful." Meanwhile, VR has Lamson reconsidering the traditional reliance on talk therapy. "It now appears in most cases people won't need prolonged therapy to overcome conditions like acrophobia. With VR, they can work on the fears directly, in a way no talk therapy can match." He challenges the idea that virtual therapy might treat the symptoms rather than the underlying syndrome. "Some theories maintain these folks have deep-seated problems, but our study suggests they can get over their problems pretty quickly. If it takes years to solve these phobias with conventional therapy, that may reflect the ineffectiveness of the therapeutic approach, rather than the severity of the problem."

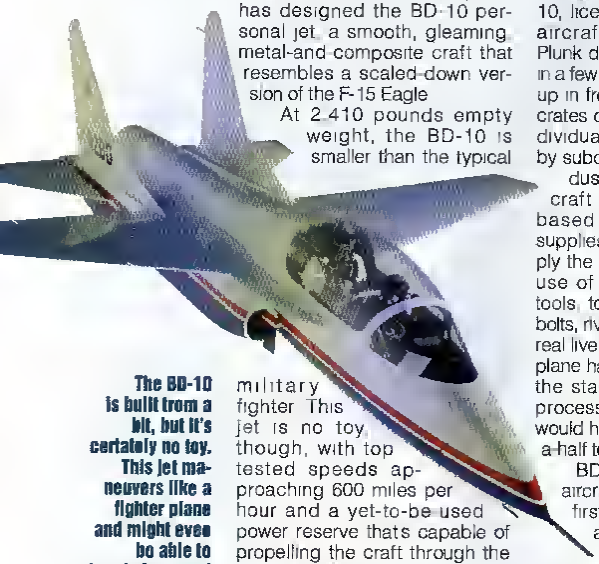
WINGS

SOME ASSEMBLY REQUIRED:
This model plane seats two and is designed for mach 1.4

By Robert Mark

It used to be the only way to get into the cockpit of a supersonic jet was to enlist in the military or get a job flying the Concorde. If Jim Bede is successful, the process will get a bit easier. The aeronautical engineer has designed the BD-10 personal jet, a smooth, gleaming metal-and-composite craft that resembles a scaled-down version of the F-15 Eagle.

At 2,410 pounds empty weight, the BD-10 is smaller than the typical military fighter. This jet is no toy, though, with top tested speeds approaching 600 miles per hour and a yet-to-be-used power reserve that's capable of propelling the craft through the sound barrier toward mach 1.4. Powered by the same engine as the Air Force's T-38 supersonic trainer, the BD-10 cruises at 45,000 feet, yet it can land on runways shorter than 3,000 feet.



The BD-10 is built from a kit, but it's certainly no toy. This jet maneuvers like a fighter plane and might even be able to break the sound barrier.

The only certification necessary to fly a BD-10 is a private pilot's license with an instrument rating. Bede explains, "I wanted to design an airplane as personal transportation that a nonprofessional pilot could fly easily. It contains no complicated systems, yet is exceptionally stable and reliable." The BD-10 is even being scrutinized by a number of foreign governments as a possible trainer. The basic price of the aircraft is about $450,000, complete with engine and radios. This is comparable to the cost of many general-aviation aircraft, and a fraction of the price of the typical military jet trainer.

Before you dig for your checkbook, there is a catch. The BD-10, licensed in the experimental aircraft category, is kit-built. Plunk down your cash, and within a few weeks an 18-wheeler pulls up in front of your house with 30 crates containing some 5,200 individual parts, many produced by subcontractors that supply industry giants like Boeing. Aircraft Chesterfield, Missouri-based Bede Jet Corporation supplies the parts, but you supply the sweat equity, through the use of relatively simple hand tools, to turn this assortment of bolts, rivets and sheet metal into a real live flying machine. "If this airplane had been funneled through the standard FAA certification process," Bede says, "the cost would have been about one-and-a-half to two million dollars."

BD-10 owner Jim Priebe's aircraft, which should be the first owner-built kit to actually fly, is currently undergoing taxi tests near Priebe's Findlay, Ohio, home. After flying the BD-10 prototype from Bede's Chesterfield factory, he said, "It's an easy airplane to fly. There's nothing complicated, nothing tricky about it. It's just incredibly exciting with that panoramic view through the bubble canopy."

The BD-10 is also capable of aerobatics. In fact, Priebe says, "My wife has just ten hours logged as a pilot, and the Bede demonstration pilot was able to talk her through a simple aileron roll. She loved it." Celebrity pilots who've flown the BD-10 prototype include actors John Travolta and Cliff Robertson, as well as comedian Jerry Seinfeld.

Current EPA regulations prohibit civil aircraft from supersonic flights over the United States because of possible noise pollution from the aircraft's shock wave. But Bede believes the noise footprint of the BD-10 is so small at 0.7 pounds-per-square-foot overpressure (a measure of noise pollution; any value under one is technically inaudible), compared to over 2.3 for the Concorde SST, that supersonic cross-country flight might become a reality some day.

Not surprisingly, turf-sensitive aircraft manufacturers are skeptical of some of Jim Bede's claims. And Paul Poberezny, founder and chairman of the board of the Experimental Aircraft Association says of the BD-10, "It's very well designed, but the pilot must learn how to safely operate the aircraft within its capabilities before he or she climbs into the cockpit."

Never a man easily influenced by skeptics, Bede allays the fears of potential builders who might not believe they possess the necessary skill to complete the project alone by promoting a liaison with Minden, Nevada-based Fox 10 Corporation. The company will assist owners in building and testing their BD-10 for $169,750. FAA regulations require the owner to actually be involved in at least 51 percent of the aircraft's construction process to qualify it as an experimental aircraft. Bede reports 15 of the first 18 buyers are opting for Fox 10's help.

But don't plan on assembling a BD-10 as quickly as the model airplanes you may have built as a kid. Priebe, who started constructing his BD-10 in October 1993, believes he'd put approximately 5,000 man-hours into the project before the plane flew in October 1994.

ARTIFICIAL INTELLIGENCE

NEURAL BAT-NETWORKS: Understanding bat sonar

By Steve Nadis

First, a few facts about bats. They are not blind despite rumors to the contrary. They are the only mammals that can fly. (Flying squirrels actually glide.) And vampire bats do not suck blood—they lick it. On behalf of the world's 800 bat species, the folks at the Harvard University Bat Lab would like to set the record straight.

Psychologist Cynthia Moss, head of the lab, has studied the creatures for almost a decade, focusing on their highly evolved system of echolocation, or sonar. Bats obtain detailed views of their surroundings by emitting ultrasonic sounds and analyzing the echoes that come back.

The hard part for Moss and others in the field has been explaining how bats can extract all this information from reflected sound. Some answers may finally come from a computer system designed by Itiel Dror, a psychologist at Miami University in Ohio who did his graduate work at Harvard. Dror developed an artificial neural network that can simulate, and hopefully illuminate, the dazzling perceptual feats of bats. With the help of Moss and Harvard postdoctoral fellow Mark Zagaeski, Dror has put his system through a series of bat exercises, and it has performed amazingly well.

Sensitive bat sonar can identify insects by measuring the rate at which the bugs flap their tiny wings.

The neural network, which consists of 248 processors working in parallel, has been tested on routine bat tasks, using sonar echoes to identify targets in the air and to determine the speed at which an object is moving. To obtain the raw input for these experiments, a loudspeaker first transmitted synthetic bat sounds, which were reflected off a variety of objects from all different angles. The echoes were picked up by a microphone, recorded, and converted to digital form. In the first experiment, the network was presented with a series of echoes and asked to decide whether the target was a pyramid or a cube. In the second case, the network was asked to determine the precise rate at which a propeller was turning, again on the basis of ultrasonic echoes.

Neural networks, unlike conventional computers, are not programmed in advance. They are trained by a process of trial and error during which adjustments are continually made to the links between processors. Training for the first task took 700 sessions, consuming about two weeks of computer time. By the end, the network could distinguish between two shapes with 95 percent accuracy, regardless of the objects' orientation. The network achieved 100 percent accuracy in the second task, but only after thousands of training sessions. Once the network was trained, however, it could make instant determinations regarding shape or rotation speed.

The point was not simply to show that a neural network could perform these tasks, but also to gain clues about how the bat sonar system processes the information contained in the echoes. One theory, for example, holds that the echo alone does not carry enough information to enable bats to recognize targets. According to this cross-correlation model, the bat must somehow compare the signal it sends out with the sound that returns after bouncing off an object. However, when the information was presented to the neural network in this form—a comparison of the outgoing and incoming sound—the network failed to discriminate between the two shapes. It performed well, on the other hand, when the input consisted of a normal echo broken down into frequency channels. "This proves that it's possible to use sonar echoes to identify shapes without cross-correlating—that is, without knowledge of the emitted sound," Dror explains. "I can't say what the bat does, but I can say that information about the shape is contained completely in the echo."

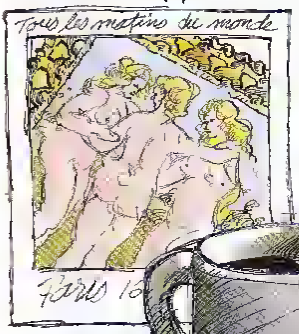
The work, he adds, will proceed on two fronts: using the network to probe the bat's perceptual system, while also performing behavioral studies on bats themselves. "The performance of the bats—what they can or can't do—helps us think about how we might build a neural network. Bats tell us what is possible; they tell us what might be done with sonar."

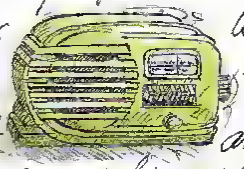
A neural network system could have many practical applications, robotics being an obvious example. Some robots already rely on sonar, but it is mainly used to keep them from bumping into objects. Equipped with neural networks, robots could wander around an environment describing the location, shape, size, and identity of objects.

Such neural networks might be used to guide autonomous vehicles or to do factory quality control. Security surveillance systems capable of distinguishing between a dog and an intruder represent another big opportunity. "This is a new tool, and the possibilities are practically unlimited," Dror says. "The main limits are those of imagination, not of technology."

12 August

Heroic nudes watched with envy from the wall. And as the smell of rich coffee filled the air, it happened. Conceptual improv. Everyone exchanging ideas. Intelligent perspectives. The issue didn't even matter. I wondered, though. Why is conversation like this the exception and not the norm? Are we so mentally saturated with sensational crap that anything with value has to take a number and wait in line? Am I the only one who cares? Another sip of coffee and a look at my old radio made me feel better. And reminded me that there is one place where good dialogue still exists.





SPACE

WHY WAIT FOR NASA?

Jamie Floyd thinks his space station will beat NASA's into orbit

By Mark Fischetti

Jamie Floyd always wanted to be an astronaut. So after finishing medical school four years ago, he went to work for a NASA contractor in cardiovascular science. But when he began to investigate the fiasco NASA and Congress have created over the proposed space station *Freedom* (now renamed *Alpha*), he came up with the idea of a lifetime: putting a private space station into orbit for less.

Floyd knew he'd never get anywhere pitching his space-station idea to U.S. space companies accustomed to fat government contracts, so he began calling Russian firms. They liked the notion. Floyd gathered three partners—a lawyer and two aerospace engineers—to form General Space Corporation in Houston. They then convinced seven engineers from the Apollo days to trade consulting time for equity.

A space station of one's own: General Space Corporation plans to have a space station roughly similar in size to the Russians' *Salyut* (above) in orbit by late 1997.

At age 33, Floyd is not a wild-eyed dreamer. He's a level-headed planner who may just be naive enough not to know what he can't do. He thinks that the several billion dollars that have been spent on a decade of *Alpha* redesigns, and the total estimated cost, are outrageous. "How can they fly this thing for $20 billion when it's basically four cans of air?" he asks.

The Russian aerospace companies Floyd has contacted have formidable experience building, launching, and operating space stations like *Mir*. The Russian government, however, now spends on space a fraction of what the Soviet Union once did. In August 1993, Floyd visited three prime contractors to discuss price quotes. They were "so eager to do business," Floyd says, that he's now making monthly trips to hammer out technical specifications as well as a bottom line.

Floyd recognizes that his plan is a long shot that depends on his ability to keep forcing the Russians' price down. He's asking the contractors—Machinostroenia, Energia, and K.B. Salyut/Kurnechev—for a *Salyut*-class space station, launch capabilities, and a manned mission on a *Soyuz* spacecraft to initiate operations. The station would consist of a single canister 12 feet in diameter and 45 feet long, only one-fifth the volume of the multi-can *Alpha*. But the cost pales in comparison. On Floyd's first trip, he was quoted $360 million to $430 million for everything he needed. Floyd continued to push the contractors, however. "It now looks like we can get a space station into orbit for less than $150 million," he reports.

Now that Floyd has solid estimates, he can solicit customers for manned and unmanned experiments on the station, which could begin orbiting by late 1997. Likely candidates include pharmaceutical companies, materials manufacturers, and life scientists. "We're going to go after beer and soft-drink companies to take ad space, too," Floyd adds. General Space plans to cover its costs with such customer commitments, rather than trying to raise venture capital.

General Space intends to price its services well below NASA's. "They provided two weeks of data from a recent shuttle mission, and it cost about a billion dollars," Floyd points out. "We could do the same for one-tenth the cost."

NASA itself could become a customer; pending legislation would require the agency to buy space services from private companies if it can't do the work more cheaply. Although Floyd ran into "a bureaucratic wall" when he first brought his ideas to NASA, he says senior NASA scientists have told him in private discussions that commercial firms could play a significant role in providing scientific data. Still, it may take legislation to get NASA to knock on General Space's door. "The private guys are looking to make a quick buck," NASA spokesman Mark Hess told *Omni*. Could General Space compete with NASA services? "I doubt it," Hess says.

General Space is not the first company to attempt such an ambitious venture. A decade ago, Space Industries International tried to raise venture capital for a $1 billion space station with NASA as the anchor customer. But "the government wanted to own its own facility," says Joe Allen, president and chief executive officer of the transportation technology company which now produces shuttle hardware packages and satellite services. "I am sure the Russians could build and launch a space station for a reasonable cost today. The question is who would use it if not NASA."

That's the key for Floyd and his company: signing those much-needed customers. Still, he remains undaunted. And what does he see as the chances for the four-man General Space Corporation? "Hey," Floyd quips, "Hewlett-Packard started in a garage."

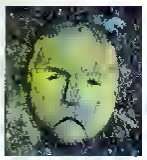
DIGS

NATIVE CULTURE:
A new discovery rewrites the history of Alaska's Alutiiq Eskimos

By George Nobbe

When Russian fur trader Grigori Ivanovich Shelekov first sailed into the Gulf of Alaska in 1784 and landed at Three Saints Bay on Kodiak Island, he was greeted by a skeptical band of Pacific Eskimos called Alutiigs, whom he and his crew considered rootless savages like those they had encountered on earlier voyages to the Aleutians. Shelekov's Russian-American company and its successors had no interest in the cultural history of the Kodiak Archipelago and, in fact, did their best to obliterate it altogether. What they wanted in the New World was the Russian equivalent of England's Hudson Bay Company.

But more than 200 years later, archaeologist Rick Knecht, working nearby on windswept Afognak Island, has unearthed extraordinary evidence that could rewrite the history of the Pacific Eskimos in the archipelago. Artifacts excavated at the ancient Alutiiq settlement of Nunilak, where Knecht began digging three years ago, have convinced the archaeologist that the roots of the current natives extend in an unbroken line reaching as far back as 7,000 years. "Today's Alutiiq are the descendants of the people who once controlled the balance of power in southeastern Alaska, where Kodiak was a cultural crossroad," Knecht says. Archaeologists had previously estimated that the Alutiiq culture was a product of migration of outsiders who settled the area only eight centuries before the Russians arrived.



A dig on Alaska's Afognak Island has revealed surprising details about the culture of the young Alutiiq man (top). Among the objects found at the dig were a spruce root basket (middle) and a mask of cottonwood bark (bottom), both dating to the fifteenth century.

Knecht theorizes that the Nunilak settlement served as a summer village where perhaps as many as 200 natives—once known as Koniags—lived in a complex, well-developed culture with a distinctive social structure that separated rich from poor. He bases his belief on items recovered from a "wet site," so called because underground water apparently once flooded the area, sealing off oxygen that otherwise would have rotted many of the artifacts. They include well-preserved feathers, sea-lion whiskers, animal furs, human hair, carved boxes and basketry, masks, wooden toys, whalebone harpoon points and blades, cosmetic lip and cheek plugs, and gambling implements such as dice. Carbon-14 dating has verified the age of many of the thousands of items recovered from the layers of soil, Knecht says.

He believes that his discoveries shed new light on how the Koniags developed a complex, stratified society based on marine hunting and fishing, contrary to traditional anthropological beliefs that agriculture is a necessary precursor to social complexity. Stored food supplies free a society to develop socially, or so the theory goes. But farming was never necessary in the Kodiak archipelago because plentiful salmon, sea mammals, and a profusion of wild berries provided all the nutritional variety the early settlers required.

"These weren't Stone Age people sitting around eating slugs from under rocks," Knecht says. "We have grossly underestimated them. They spent the winters indoors feasting, gambling, and dancing. They had a lot of time for artistic expression."

Based on the size of the structures uncovered at Nunilak, Knecht infers vast differences between rich and poor in the old settlement, which sits on a bluff at the western end of Afognak Island. He decided to excavate there after spotting the mound-like village from the air during a flight over the island following the 1989 Exxon *Valdez* oil spill.

Winter feasts were given by the most powerful clan leaders, the men who controlled the prime fishing grounds, according to Knecht's reconstruction of events. "The feasts ratified their status," says the archaeologist, a full-time employee of the Kodiak Area Native Association. "These people comprised a pre-state society. They were on an upward trajectory. If the Russians hadn't arrived, who knows what they might have achieved?"

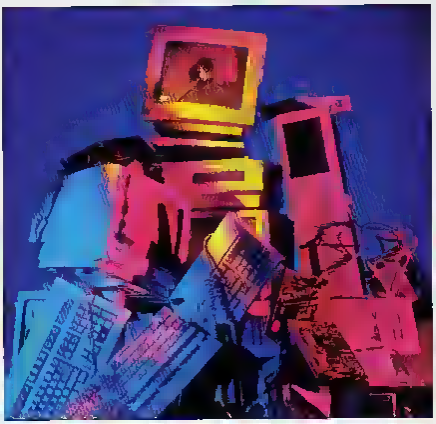
Knecht's research into the Alutiiq culture has sparked considerable interest among his peers. Knecht "has struck it rich, because this is the earliest Eskimo culture we can find," says William S. Laughlin, a University of Connecticut professor of ecology and evolutionary biology and an acknowledged expert on Pacific Eskimos.

Donald W. Clark, curator of Yukon archaeology for the Canadian Museum of Civilization in Hull, Quebec, believes that Knecht's estimates of the antiquity of the Alutiiq culture may even be too conservative. "It might even be much older than 7,000 years," proposes Clark, a veteran of numerous digs in the Kodiak area. "Perhaps 8,000 or even 9,000 years old."

CONTINUUM

DEADWARE:

In search of America's computer burial grounds. Plus, saving mouth-to-mouth resuscitation, and explaining sick statues



Our Radio Shack TRS-80 Model I Level II with not four, not eight, but 16 kilobytes of memory was something of a marvel in its heyday, but the glory was short-lived. With each new year, faster, leaner models pushed our trusty TRS-80 down the back side of the bell curve. Today the machine sits on a shelf, its circuits compromised by the forces of entropy, its station long since taken by a computer with more power and speed.

This year will mark the retirement of some 79 million personal computers, but where do those old computers go when they die? My investigation revealed some interesting clues about how an up-to-the-minute society forgets.

The Pawn Shop: The classifieds contain countless pleas to take an infirmed computer off someone's hands. Used machines find good uses as trainers for kids or as restricted-duty word processors. As operating systems change and software becomes unusable, sometimes old computers are kept just to play a favorite game, or to run an outdated but useful spreadsheet. Government agencies are a ready market for obsolete computers. (Wouldn't want bureaucracy to move too quickly, now.) Underfunded school systems and foreign countries such as Mexico are also eager for hand-me-downs, be they donated or pawned.

The Scrap Heap: When the secondary markets aren't buying any, a computer may suffer a fate worse than death: cannibalization. Lisa Cadena, manager of an Austin PC repair shop, wields a sharp scalpel. "But when a machine is beyond fixing—an atrophied 8088, a bone-weary 286—she often allows customers to pay the labor bill by letting her "part out" the computer. She extracts artifacts like 360K floppy drives and EGA video cards for sale on the used market. For terminal cases, she sometimes recommends a less involved solution. "People bring me these things and I just tell them to use it as a boat anchor."

The Recycling Bin: Computers aren't the most eco-friendly form of landfill. Nickel-cobalt found in disk drives, copper in transformers, silver, gold, palladium, and platinum in circuit boards, and cadmium, mercury, and lead in batteries make a noxious potpourri. Companies such as Aurora Electronics of Irvine, California, do a brisk business removing environmentally hazardous parts and recycling circuit boards. The company processed 3.7 million chips in the first quarter of fiscal 1994. Last year's revenues: $40 million.

The Retro-fitters: Take a 286, maybe something older like a quasi-IBM-compatible Tandy. Then add 90-MHz Pentium motherboard with 32-bit PCI local bus video ($1,400), 25 dot pitch, 17-inch flatscreen color monitor ($1,000), 16-meg RAM module ($700), quad-speed CD-ROM drive with 180-millisecond access time ($450), 28,800 bit-per-second fax/modem ($250), 420-MB, 12-millisecond, enhanced IDE hard drive ($225), and a mouse pad autographed by Bill Gates. What do you have: (a) the hottest silicon hot rod since the HAL 9000, (b) a paved on-ramp to the infobahn, (c) a paved on-ramp to personal bankruptcy court?

The Mausoleum: Progress marches double time. Historical memory grows at a glacier's pace. At a time when dozens of slick magazines hail each new generation of computer, older machines, born before the trade media boom, are only now getting their days in the limelight. Intel, Hewlett-Packard, and Motorola have opened shrines to their earliest products. In the hallowed halls of the Smithsonian sits a 40-year-old Bendix G15 which worked just fine, thank you, with its vacuum tubes and rotating magnetic drum. The Smithsonian isn't the only place where a computer can get an honorable burial. Outside of King George, Virginia, parts of a 1947 vintage Harvard Mark III lie interred beneath a farmhouse patio. (It's a long story.)

The Dust Bin: Most computers nearing retirement will meet a less noble end. Like our old TRS-80, they will be shunted aside like aged starlets into obscure retirement. They will join other obsolete hulks—TVs, eight-track players, toasters—in closets and attics, never again to feel the surge of electrons that brought them to humming life.

Let us not forget to thank them for their memories.

—JAMES D. HORNFISCHER

CONTINUUM

This snake's fast flicking tongue may be forked not to better taste its prey but to help in better tracking its path

TONGUE GUIDANCE

Through the millennia, scientists have grappled with the daunting problem of why snakes have forked tongues, offering explanations that range from the sublime to the ridiculous.

Aristotle thought it was to give them "a twofold pleasure from savours, their gustatory sensation being as it were doubled." And the seventeenth-century Italian naturalist Hodierna opined that their forked tongues were "for picking the dirt out of their noses."

"As it happens, Aristotle was close to the truth," says University of Connecticut herpetologist Kurt Schwenk, whose hypothesis is that the divided tongue tip is a chemosensory edge detector used to follow the chemical pheromone trails of both prey and other snakes. It's a guidance system rather than a taste organ.

"Its tongue is a delivery system for paired chemosensors in the snout, called the vomeronasal organs," Schwenk explains. "These organs communicate with the oral cavity through two tiny openings in the palate."

As the snake glides through its environment, it constantly flicks its tongue forward, sometimes oscillating it, then retracting it after the organ strikes the ground or some object in its path. What the creature is doing is collecting odor molecules which its tongue delivers to the chemosensors. As Schwenk explains it, the process enables snakes "to sample simultaneously two points along a chemical gradient, which provides the basis for instantaneous assessment of trail location."

The mechanism is one that snakes inherited from lizards, says Schwenk, adding that from the evolutionary point of view, "snakes are just very modified lizards."

—George Nobbe

BANG BACTERIA

German researchers hope that designer bacteria can clean up part of the mess left behind by the Cold War. Research teams in Berlin and Braunschweig, Germany, have developed bacterial strains whose special talent is eating explosives. The microbes will be employed for the biological decontamination of soils damaged by weapons production and other military activities.

Germany's Federal Office for the Environment, the Umweltbundesamt, believes that thousands of sites in the country may be contaminated with explosive pollutants. The problem is particularly severe on the bases abandoned by the former Soviet Red Army in eastern Germany.

The bacterial strains developed by the German researchers specifically target residual deposits of TNT (trinitrotoluene) and a related compound, DNT (dinitrotoluene). The microbes are derived from schizomycetes, primitive bacteria already normally present in soils. They work against target pollutants by breaking down the complex nitrogen compounds which make up most military explosives. The digested nitrogen compounds left in soils after decontamination are effectively a form of fertilizer.

The Berlin group employs a balanced culture of aerobic and anaerobic bacteria, which after inoculation in contaminated soils requires no further care. The system should eliminate up to 70 percent of the explosive pollutants present. Martin Wittmaier, of the University of Braunschweig, makes use of bacteria which seek out and destroy the aromatic hydrocarbons—benzene, toluene, and xylene—on which the explosive compounds are based. Wittmaier's bacteria must be fed nutrients through a network of tubes inserted into the ground as they work, but he claims the method can remove up to 99 percent of present contaminants.

Explosives-eating bacteria will soon be put to a practical test cleaning up the mess at the site of an abandoned explosives factory, where soil is severely contaminated with nitrotoluene compounds—to the degree that clean up squads prefer not to drill into the ground for core samples in some contaminated areas because they're afraid the soil will explode.—James Hansen

New bacteria find waste from weapons production tasty

CAN MOUTH-TO-MOUTH BE SAVED?

Can mouth-to-mouth resuscitation (MMR) be brought back to life? A recent study by California physicians Berry Brenner and Jane Kaufmann found that 45 percent of the 433 doctors studied, and 80 percent of the 152 nurses, would not do MMR on a stranger. Between 18 and 25 percent would not do it on a child. And 85 percent would not do it on a stranger in a gay neighborhood.

Brenner says medical personnel are afraid of contracting diseases, such as AIDS or HIV. During MMR, people may vomit—sometimes blood—and may bite. Brenner says no one knows if swallowed blood can transmit HIV, "but some literature suggests that occasionally bites have."

This has grave implications for MMR, according to Brenner, because in the past physicians and nurses have performed anywhere from 50 to 75 percent of nonfamily bystander MMR, where a stranger receives care in an emergency situation.

But Brenner isn't ready to perform the last rites for MMR just yet. He thinks medical personnel can be trained in the use of bag-and-valve masks, the clear plastic type that paramedics use when they give MMR. This provides a barrier between the resuscitator and the patient. It isn't foolproof—the patient can bite the stem off the mask—but it's much better than nothing, Brenner says.

Still, he is clearly worried. "We may be entering an era where MMR will only be done on family members and friends," says Brenner, "or in close-knit communities like the Amish and Orthodox Jewish."—Paul McCarthy

CRIB DEATH CLUES

A British pathologist acting on a hunch has uncovered another piece of the sudden infant death syndrome (SIDS) puzzle. Commonly called crib death, the syndrome's causes have eluded scientists for years.

William Roche, of England's University of Southampton, says his studies of lung tissue from 48 victims of the syndrome and 30 babies who died of other causes revealed a threefold increase in inflammatory cells called eosinophils in the SIDS infants. Roche says those cells' toxins can cause fever, leakage of fluid into the airspaces of the lungs, and constriction of small air passages.

The pathologist, a specialist in allergy and asthma, says crib death follows—but is not caused by—a pattern similar to that seen in allergic reaction. "I just had a gut feeling that might be applicable," said Roche. "We tend to think of infants as small adults, which they obviously are not. This occurs in an infant before the immune system is developed and regulation is established. Something in the assembly is wrong and it fires off the wrong messages, somehow triggering an inappropriate response."

His research team will now try to discover what agent causes the immune response. In an effort to learn why and how the chemical messengers carry the wrong messages, they hope to examine tissue as speedily as possible—optimally no more than three hours after death. Over 5,000 infants succumb each year in the United States to the puzzling syndrome, which scientists in Australia, New Zealand, and the Netherlands have linked to overheated nurseries, face-down sleeping positions, and wrapping infants too snugly in winter (when crib deaths peak).

—George Nobbe

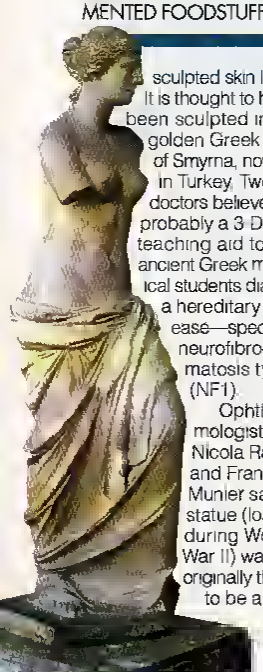
IN THE MIDDLE AGES, PEPPER WAS USED AS A CURRENCY FOR BARTERING. IT WAS OFTEN MORE VALUABLE AND STABLE IN VALUE THAN GOLD

An inappropriate immune-system response may be one of the causes of SIDS, more commonly known as crib death

CONTINUUM

SICK STATUES

The *Venus de Milo* and other ancient statues usually depict figures of enviable beauty. Not all statuary subjects are to be envied, apparently. A photograph of a 2,000-year old statue of a fellow covered with unsightly nodules has been unearthed. Hardly a traditional celebration of beauty like so many other ancient carvings, this statue is covered with authentically sculpted skin lesions. It is thought to have been sculpted in the golden Greek city of Smyrna, now Izmir in Turkey. Two doctors believe it was probably a 3-D teaching aid to help ancient Greek medical students diagnose a hereditary disease—specifically, neurofibromatosis type 1 (NF1).



Ophthalmologists Nicola Ragge and Francis Munier say the statue (lost during World War II) was originally thought to be a votive offering to the god of healing, Asclepius, in grateful thanks for curing an illness. "But such offerings," says Ragge, "usually depict a healthy, cured body part. A pathological representation is very unusual."

Ragge and Munier began their research after being puzzled over the lack of ancient reports of NF1, which causes tumors and large skin nodules all over the body. Affecting one in 3,000 people, its earliest convincing medical descriptions date from the eighteenth century. Genetic evidence that NF1 is an ancient disease made the scarcity of earlier reports surprising. Together the doctors hunted for illustrations in ancient paintings and drawings, as well as in old medical texts. They finally tracked down the picture of the Hellenic torso—headless and limbless—in a German academic volume published in 1921. The statue's skin lesions, they say, don't look right for diseases such as leprosy or syphilis. They're confident that the statue is probably the first known depicter of NF1, and thus the old-world equivalent of a medical school wall chart.

—Ivor Smullen

PINK FLAMINGOS, IN THE WILD STATE, OWE THEIR COLORATION TO THEIR COLORFUL DIET OF CAROTENOID-RICH ALGAE, WHICH STAINS THEIR FEATHERS PINK. IN CAPTIVITY, ZOO DIETS PROVIDE PINK SHRIMP AND OTHER SIMILARLY PIGMENTED FOODSTUFFS TO MAINTAIN THE COLOR

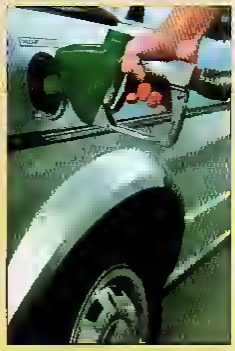
CANOLA FILL-UP

Electrically powered vehicles may get all the press, but for mass transportation the alternative fuel of the future could be biodiesel. This efficient, renewable, and relatively emission-free replacement fuel for diesel-powered vehicles is made from vegetable oils such as canola, soybean, sunflower, or rapeseed oil.

A mixture of 20 percent biodiesel and 80 percent petroleum diesel has performed well in over seven million miles of tests on buses and other vehicles in the United States. Tests show that with catalytic converters and adjustments to engine timing, it cut particulate matter by 31 percent, carbon monoxide by 21 percent, and total hydrocarbon emissions by 47 percent. The blended fuel costs about 40 cents a gallon more than conventional diesel.

Biodiesel is made by a process called estrification, in which an alcohol such as methanol is mixed with a catalyst such as sodium hydroxide and canola, soybean, sunflower, or rapeseed oil to produce a methyl ester. The idea of using this fuel in diesel engines shouldn't be surprising, according to Kenlon Johannes, executive director of the National Biodiesel Development Board in Jefferson City, Missouri. He points out that Dr. Rudolf Diesel used pure vegefable oil in his first engine, invented before petroleum refining had been perfected.

Ongoing tests by the Departments of Defense and Agriculture, the Southwest Research Institute, and ORTECH International of Canada are verifying biodiesel's improved emission characteristics. Demonstrations in several large cities with big municipal bus fleets have proven biodiesel's ease of use and performance. Further development and emissions refinement would improve its marketability, delight thousands of soybean and canola growers, and help meet tougher Clean Air Act standards due to come into effect in 1998.



Filling up with biodiesel may reduce harmful emissions

Biodiesel, already widely available in Europe, is distributed in the United States by Interchem Environmental in Overland Park, Kansas.—George Nobbe

CONTINUUM

BIODIVERSITY FOR SALE

Kenny Ausubel is hoping that Americans will buy the concept of biodiversity, and he means that quite literally. Ausubel is the former chief executive officer of a small Santa Fe company, Seeds of Change, that is hoping to get a rich blend of crops back into the food chain. The ideas behind this venture are laid out in Ausubel's 1994 book, *Seeds of Change: The Living Treasure*.

Many scientists—Harvard biologist E. O. Wilson included—regard the loss of biodiversity as one of the top environmental problems in the world. Plants and animals, according to Ausubel, are disappearing from the world at the rate of 27,000 species a year, 75 a day, and three an hour. "Though most people have heard about the species lost due to destruction of tropical rain forests, almost as much is being lost from farmers' fields as from the wilds," he says. Twenty years ago, there were 30,000 different varieties of rice. Today, 10 types account for 75 percent of world rice production. Similarly, he adds, 97 percent of the American food varieties available in 1900 are gone.

The narrowing food base makes our supplies increasingly vulnerable to disease, like that which wiped out Ireland's potato crop in the 1840s and the corn blight which struck the southeastern United States in 1970. "Nature doesn't favor centralization," Ausubel notes. Diversity, on the other hand, is "the fabric of life. If a pathogen comes along, some plants will be killed off, but others will survive."

With this principle in mind, Seeds of Change aims to reintroduce diversity into the food system. Of course, the 6,000 seeds in the company's collection are of limited value unless others choose to plant them. Ausubel notes that gardening is the most popular leisure-time activity in the country. "Most global problems, such as climatic change, seem so remote, so disempowering. But with biodiversity, individuals can do something profoundly important in their own back yards."

—Steve Nadis

Help rescue disappearing species by planting rare seeds

PIGEONS OF A POISONOUS FEATHER

The Pink Pigeon of the island of Mauritius in the Indian Ocean may still be around today thanks to its toxic flesh, a defense mechanism that's extremely rare in birds. Stanley A. Temple, a wildlife ecologist at the University of Wisconsin, brought the foul-flavored fowl to scientific attention. He remarks that hunters have long known of the toxic effect of the bird's flesh. "According to Mauritian folklore, people who eat the Pink Pigeon become deathly ill," he says. "The birds' reputation for inedibility probably saved them from being hunted to extinction like the dodo and the other pigeon species formerly found on the island."

The source of the bird's toxic properties was vividly revealed to Temple while he was taste testing a fruit which he had observed the pigeons eating, in order to determine if they preferred a particular flavor. "Within minutes I felt a growing numbness in my mouth and throat," he recalls. "I panicked as I realized the fruit was toxic."

As he became ill, Temple's thoughts raced. Perhaps the birds somehow accumulate this dietary toxin in their own bodies without ill effect, only to poison any who ate them. Hunters learned to avoid the conspicuously colored pink birds. The queasy wildlife ecologist quickly jotted notes in his journal so that "if I died, at least others would know why."

FOUR PERCENT OF A LIGHT BULB'S ENERGY OUTPUT IS LIGHT; THE REST IS GIVEN OFF AS HEAT

By accumulating the toxin from their food rather than manufacturing it from scratch in their bodies, the Pink Pigeons spare themselves an energy-demanding biological process. But exactly how the pigeons remain immune to the effects of the poison is less certain.

Many chemically defended species use conspicuous coloration to warn (or remind) predators—including humans—how unpalatable they are. "Scientists have coined the term *aposematism* to describe this combination of chemical defense and warning signals," Temple explains, pointing to such famous examples as skunks and coral snakes. But while the pigeons' defense appears to have helped them survive thus far, their future is in jeopardy due to habitat loss and depredations of exotic mammals, and fewer than 40 individuals are known to be left in the wild. —Mark Sunlin

ALIVE! ALIVE! ALIVE!

CARNIVAL DIABLO

THE FUTURE OF SIDESHOW

Forget about the safe distance afforded by the soft reality of cyberspace. This show is real and really outrageous.

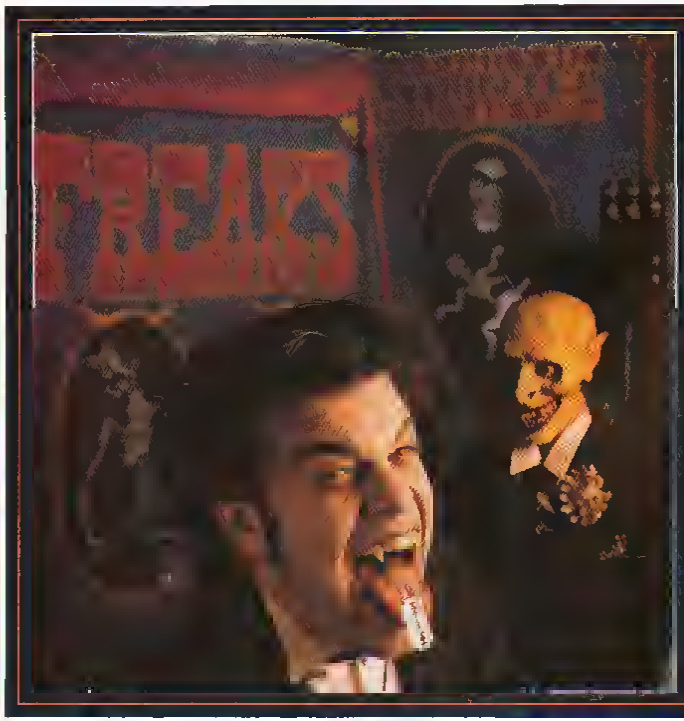
ARTICLE

BY PAT CADIGAN

THE IMPALER. THE BUG EATER. THE HUMAN BLOCKHEAD. THE BED OF NAILS. THE IRON-TONGUE MAN.

PHOTOGRAPHS BY TOM ZIMBEROFF

★★★★★★★★★★★★



SCOTT McCLELLAND

"When I was fourteen years old, my grandfather stood in front of me and took a big long surgical needle and drove it into his head through his nose. After he took it out, he handed it to me and said, 'Now you try it.'"

★★★★★★★

I have spent at least 13 of the last 40 hours in a rented van, driving from Calgary, Alberta, through the Canadian Rockies to Abbotsford, British Columbia, and my reality feels as if it has acquired a heavier-than-usual layer of grit. So it's not too surprising that I fit right in here at the Katz Club, whose reality it seems has also been crusted by a bit of travel dust from the road.

Covering the alcove leading to one of the pool tables, below a crazed Ren and a manic Stimpy, is a large hand-painted illustration of a man pierced in several places by long needles. "Impaler" is the legend across the top of the canvas. "Unusual," it says in the lower left corner, and in the lower right, "No Illusion." Everyone who comes into the club sees that one first. Then the eye travels on to the canvas hanging beside it, the one hiding the pinball machines and the videogames, the one that shows someone strapped to a wooden electric chair with the juice on. "Electric Chair! Real!"

On the other side of the room another canvas displays a hollow-eyed lady enjoying—if that is the word—a meal of pink worms from the bowl of some unfortunate's brain pan. "Bug Eater," states the legend above the image. "Weird," the canvas further assures. "Alive Alive"—in case there was any doubt.

Eventually, I notice the area where bands would most likely set up on live music nights. But there is no band playing. Tonight the stage is set in baroque, with overtones of the Gothic and the outré which draw the crowd for a closer look at the small, almost-human figure in the formal, pinstriped suit. Standing four feet high, he is poised beside an onstage banner as if he had just stepped out from behind it—perhaps to check on the rest of the set, or to count the house, or maybe just to see the expressions on people's faces as they tried to get a closer look at the bald head, the pointed ears, and the demonic, fleshless grin below cold, hard, absolutely dry eyes.

This is Boris, road manager for the current tour of Canada's only professional performing sideshow, Carnival Diablo, or so the ringmaster, Scott McClelland, told the staff of the club where Carnival Diablo performed that night. If the staff regarded this somewhat skeptically before the show, what they witnessed during the performance put them through enough changes that afterward, Boris seemed among the more normal aspects of the night.

Regulars frequent this place. It's that kind of joint, run by three guys still young enough to be in this business because they like their nightlife. They've tried some different diversions here, bar Olympics went over pretty well. As far as entertainment goes, the bands they book play a lot of covers. People like what they know, and they're here to dance. But not this evening.

"Ladies and gentlemen, what you see here tonight could change your lives . . . forever." Under the colored lights, the ringmaster's eyes are dark holes in his too-pale face. "Welcome to Carnival Diablo!"

The audience doesn't seem sure how to react. Is this guy putting them on? After all, they're children of their time—high technology, high expectations. The special effects that used to take movie-making teams months to

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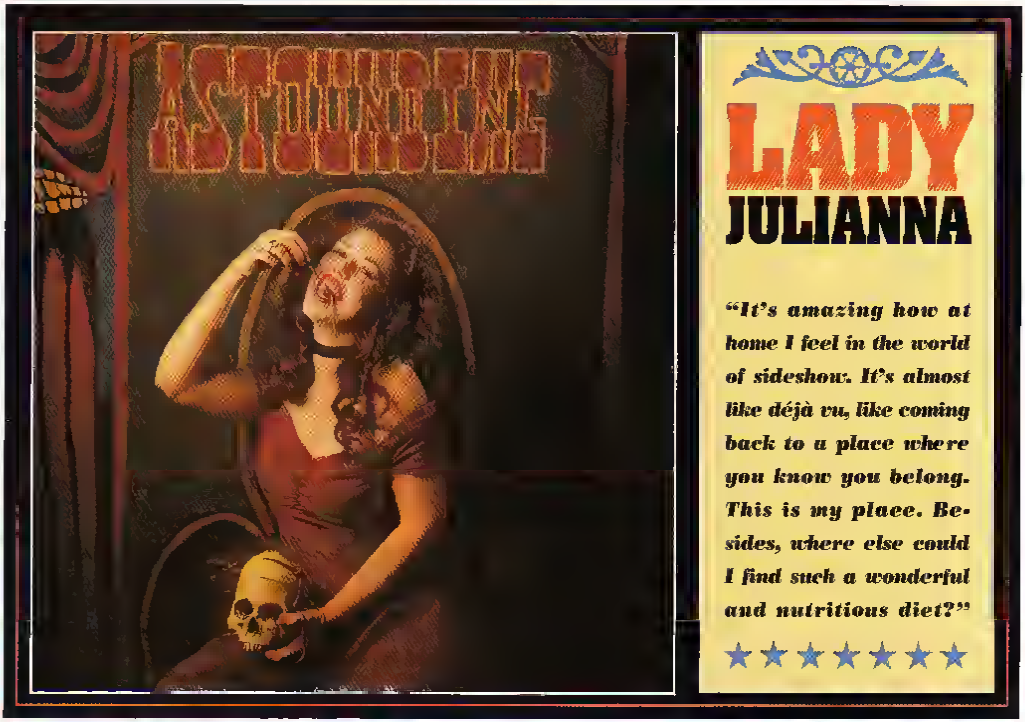


achieve are now available as screen-savers for desktop PCs and Macs. These people have seen aliens, predators, terminators, UFOs, superheroes, white worms, and black holes. They're giggling.

The giggles turn a little nervous as the man on stage warns them that tonight they will witness some very unusual practices involving the transcending of the human body and the negation of pain. In shopping-mall video arcades, they can pay a buck a minute for a VR helmet and transcend the body in some weirdo computer-generated cartoon full of angles and facets. Get shot by another player, there's a flash of light but no pain at all. How can anyone do that in real life?

And then there's Boris, grinning at them from one position throughout the night. Boris doesn't move like Disney's animatronic figures, so what is it supposed to be—besides creepy? The explanation never comes, but it doesn't matter. Because *this* isn't a bunch of special effects in a movie or a computer-generated picture or an animatronic re-creation of some historical figure, nor is it happening on the other side of the world and coming to them via satellite. *This* is right before their very eyes, this minute, no computer fudging, no instant replay in slo-mo. If you're going to get people to sit still for unenhanced reality, it had better be arresting. Remarkable. Extraordinary. Very extraordinary. If it's real life, it had better be bigger than life.

And that is precisely why the sideshow is back in town, Scott McClelland told me earlier that day. The carnival ideal that he and the other members of the troupe have done their best to adhere to is the encounter with the bizarre that sends the observer on an emotional roller coaster. If the capacity crowd in the club tonight is any indication, people crave to ride that roller coaster more than ever, even in these high-tech times—maybe even because of them.

But . . . sideshow? It's an unexpected juxtaposition, this shiny, high-tech, information-rich era we live in now, and this old-style entertainment reminiscent of a simpler time. Sideshow, McClelland says, is an art form made to remind us that our technology and our information deluge don't satisfy every part of the human spirit. Western society, he feels, is lacking a cultural expression for the thrilling curiosity which attends acts of mystery and of magic. "I think that when people come to a sideshow, it's a modern way of a primitive culture coming together to see the shamans perform their magic. People need to learn about the magical parts of themselves, and we're not talking about illusions. We're talking about their looking for that side that seems to have been lost because we live in such a high-tech society."

Is that really what we're looking for when we go to a sideshow—some kind of spiritual experience? Given the promises of Carnival Diablo's own sideshow banners—*The Impaler*, *The Electric Chair*, *The Bug Eater*—the experience waiting for us would seem to be a bit more primal. What we would really seem to be looking for, when we go to a sideshow, is something freaky to stare at—something or someone.

There are several parts to a traditional circus sideshow, as explained by McClelland, who should know—his

grandfather, Nicholas Paul Lewchuk, owned Canada's largest touring carnival sideshow and vaudeville troupe between 1920 and 1968. The Lewchuk Midway came to rest in Canora, Saskatchewan, and McClelland's mother, Sonia, grew up working the concessions. McClelland himself spent his childhood summers listening to his grandfather's stories of life in the carnival.

The stock features of the carnival are as familiar as elephants at the circus. First, there is the Freak Show, which consists of human oddities such as the fat lady, the human skeleton, and the Siamese twins, as well as anomalies in jars, known in the trade as "pickled punks," which can be either animal—two-headed calves and the like—or human. Then there are the sideshow performances: human marvels such as sword-swallowers, contortionists, and fire-eaters and physical freaks such as midgets or so-called giants who may have an additional talent, like singing or playing a musical instrument.

Finally there are the blow-offs—illusions like the Lady With No Head (just a lot of tubes coming out of her neck), the Snake Woman, or the Girl-To-Gorilla illusion. There was also the big blow-off, usually a hermaphrodite, cordoned off in an area meant for viewing only by people 18 and over. The hermaphrodite was the clincher aimed at making attendees spend a little more money than they already had, and it was usually so good that people really didn't mind—in fact, McClelland says, it was quite the opposite. "People felt privileged that they could see such marvels for just a little bit extra."

Given that the ever-vigilant and omnipresent media seem always ready to swoop down on any newsworthy event—and the more lurid, the better—then our so-called modern time is not as far removed from the sideshow as we would like to think. How else to describe the media frenzy over some British Royals' foundering marriages, a teenager who shot her much-older lover's spouse, or a former football star's day in court on murder charges but as, say, the Great Media Sideshow?

Tour the exhibits: Instead of JoJo, the Dog-Faced Boy, we have Michael Jackson. The Fat Lady is more likely to have her own TV show rather than her own tent, while the Human Skeleton can be seen modeling designer clothes on a Paris runway.

See the performances. Barnum had the Swedish Nightingale, Jenny Lind; we have Madonna—or Mariah, or Barbra, or whoever can draw the crowd this week.

No doubt about it, we are fascinated with our freaks, and if there are none handy to stare at, we are only too ready to turn somebody into one just so we can stare.

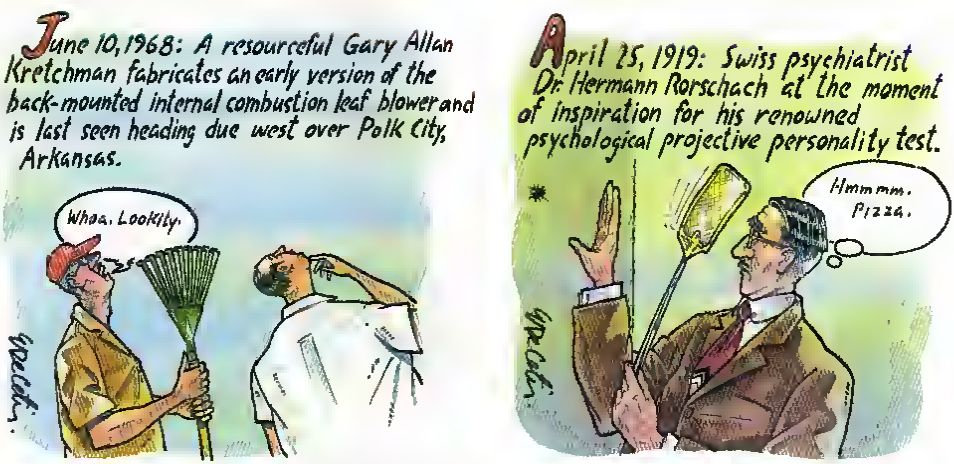
Sideshow is definitely not the sort of thing you'd watch beamed by satellite from an arena in Sydney on pay-per-view. It's in-person and intimate—actually a little too intimate and in-your-face with its sights and sounds. It will amaze you, shock you, scare you a little, probably offend you, and then laugh heartily at your discomfort with no apologies for any of it. Maybe that makes it the perfect antidote to the era of political correctness, when nobody wants to offend anybody else.

In anticipation of seeing the Carnival Diablo performance at the Katz Club, I'd been wondering exactly what—in a time when people are promised that in the very near future they'll have five hundred channels to surf and an artificial reality that will outdo anything natural reality has to offer—exactly what will make people still want to leave their homes for entertainment. Now I know.

The Lady Julianna plucks an earthworm from the bowl on the table in front of her and dangles it between two fingers for the audience so they can see that it is very much alive and squirm-

CONTINUED ON PAGE 80

GREAT MOMENTS IN SCIENCE



SATIRE BY ERIC JAY DECETIS

OMNI'S PROJECT OPEN BOOK

THE OMNI OPEN BOOK FIELD INVESTIGATOR'S GUIDE: PART ONE

ARTICLE BY DENNIS STACY

A GUIDE FOR THE SERIOUS UFO INVESTIGATOR SEEKING TO UNDERSTAND AND EXPLAIN ONE OF THE GREAT MYSTERIES OF THIS CENTURY

Editor's note: This is the first of twelve chapters in the Omni Open Book Field Investigator's Guide, *the ultimate tool kit for hunting UFOs. In his first installment, Dennis Stacy tells UFO hunters how to locate "prey"—in other words, a UFO worth investigating at all.*

The Need for a Guide

On November 2, 1957, at about 10:00 p.m.—long before the world at large knew of it—the Soviets launched their second dog-carrying Sputnik. An hour later, on the flat plains of the Texas panhandle, near the otherwise unremarkable town of Levelland, ranch hands Pedro Saucedo and Joe Salaz encountered something that forever changed their lives.

According to Saucedo's signed statement, "I was traveling north and west on Route 116, driving my truck. At about four miles out of Levelland, I saw a big flame, to my right front. I thought it was lightning." The white and yellow torpedo-shaped object Saucedo went on to say, apparently made his truck's motor stop and the headlights fail. Traveling at some 600 to 800 miles an hour, he estimated, the object generated so much heat he "had to hit the ground."

Over the next two hours, Patrolman A. J. Fowler would receive at least a dozen more calls, all of them from independent witnesses reporting much the same thing. For instance, at 12:05 a.m., a 19-year-old Texas Tech freshman said he was driving his car nine miles east of Levelland when the motor suddenly "started cutting out like it was out of gas." The headlights dimmed, then went out altogether after the car rolled to a stop. The student raised the hood but could find nothing obviously wrong with the engine or electrical wiring. Returning to the driver's seat, he now noticed an egg-shaped object, flat on the bottom, sitting astride the highway in front of him. It glowed bluish-green, he reported, and looked to be 125 feet long and made of an aluminumlike material with no visible details or markings. Frightened, he tried turning the motor over again, but the car would not start. Shortly, the UFO rose "almost straight up," disappearing "in a split instant." He tried the ignition again, the car started, and the lights came on, and he drove home, although he did not report the incident to Fowler—"for fear of ridicule"—until the following afternoon, after his parents told him he should.

Nationwide, the Levelland sightings garnered almost as much press attention as the new Soviet satellite, eventually forcing the Air Force's Project Blue Book to send an investigator to the site. (Project Blue Book, first under the auspices of the Air Technical Intelligence Center, or ATIC, and later run out of the Foreign Technology Division, was the official Air Force agency charged with investigating UFOs. Its immediate predecessors, also associated with the Air Force, were Project Sign and Project Grudge.) According to the now-deceased astronomer J. Allen Hynek of Northwestern University, then Project Blue Book's scientific consultant, the Levelland investigation, conducted by a member of the 1006th Air Intelligence Service Squadron (AISS), was cursory at best. Writing in his now-classic book, *The UFO Experience* (Henry Regnery Company, Chicago, 1972), Hynek states, "I was told that the Blue Book investigation consisted of the appearance of one man in civilian clothes at the sheriff's office at about 11:45 a.m. on November 5; he made two auto excursions during the day and then told Sheriff Clem that he was finished."

According to Temple University historian David Jacobs, author of another classic volume, *The UFO Controversy in America* (Indiana University Press, Bloomington, 1975), "the officer failed to interview nine of the fifteen witnesses and also erroneously stated that lightning had been in the area at the time of the sightings." Undeterred, the Air Force and Project Blue Book ultimately attributed the incidents to "weather phenomenon of [an] electrical

nafure, generally classified as ball lightning or 'St Elmo's fire' caused by stormy conditions in the area, including mist, rain, thunderstorms and lightning.' The engine stalls and headlight failures?' "Wet electrical circuifs," said the Air Force. "Privately,' Jacobs observes, "Blue Book officers believed the Levelland sightings were obviously an example of mass suggestion."

The upshot of the ball lightning pronouncement was an angry spate of criticisms by editorial writers and the growing legion of civilian UFO organizations charging the Air Force with ignorance or incompetence at best and a purposeful cover-up of the UFO phenomenon at worst. The outrage was exacerbated when 500 more UFO cases poured into Project Blue Book over the next couple of months, making it the most explosive UFO year since 1952.

In response to all the brouhaha, the Air Force launched an investigation of its own UFO operation. The recommendation? That some 20 men be assigned to a UFO detail. What's more, suggested the Air Technical Intelligence Center at Wright-Patterson Air Force Base in Dayton, Ohio, where the study was done, the Air Force would do well to create a standard UFO kit containing an operating procedure manual and other tools necessary for investigating the mysterious alleged craft. That way, when the 20 UFO experfs went out on assignment, there would be no more foolish errors. They'd know what to do.

The report also recommended that the Air Force investigafe press reports and not just those reaching Project Blue Book through direct channels, including Air Force pilots or radar operators. It was assumed thaf such actions might deflect civilian criticism and at the same time drastically reduce the number of reports classified "unknown" or "insufficient data." Indeed, as of November 1958, these two categones were accounting for 20 percent of all UFO reports received fo date.

Unfortunately, the staff recommendations were never implemented. The nofion of a UFO tool kit was quickly quashed, along with any idea of a rapid deployment team. Instead, Project Blue Book limped along much as it had before, understaffed and underfunded. Press clippings were stuffed into boxes and later thrown away. Letters and reports from fhe general public generally went unanswered and uninvestigated.

Even so, from the summer of 1947 until December 19, 1969, Air Force representatives amassed 12,618 official case reports of UFOs, defined by the Air Force as "any aerial object or phenomenon which the observer is unable to identify."

PROJECT BLUE BOOK, THE U.S. AIR FORCE'S RESPONSE TO THE PUBLIC FUROR OVER THE UFO PHENOMENON, WAS A PUBLIC RELATIONS DISASTER; IT WAS UNDERSTAFFED AND UNDERFUNDED, AND ITS INVESTIGATIONS WERE LACKADAISICAL AT BEST.

(Hynek would lafer amend the definition of a UFO fo refer to any flying objects which "remain unidentified after close scrufiny of all available evidence by persons who are technically capable of making a common-sense identification, if one is possible.") Of the 12,000-plus cases studied, 701, or almosf 6 percent, were classified "unknown."

Those cases that were investigated—like Levelland—were typically looked into lackadaisically when they were looked into at all. The Air Force also indulged in a little creative bookkeeping. Those cases classified as "probable" or "insufficient data" were counted on the solved side of the ledger instead of the unsolved side, skewing the percentage of true unknowns. A growing number of critics contended that, far from being an investigative agency, Project Blue Book amounted fo little more than a public relations ploy, one designed to downplay the phenomenon s prevalence and possible importance.

Even Hynek himself was ultimately disillusioned by his experience as scientific consultant. "I can safely say thaf the whole time I was with the Air Force, we never had anything that resembled a really good scientific dialogue on the subject," he said shortly before his death in 1986.

Project Blue Book's death knell was sounded in the spring of 1966, in the wake of another Air Force boondoggle. At a press conference in March of that year, Hynek attributed some intriguing Michigan sightings to "swamp gas"—the spontaneous ignition of methane. The resulting editorial uproar pictured the Air Force team more as buffoons than villains. If the ball lightning and mass hysteria explanafion of almosf a decade earlier had been the first straw in the public's negative perception of the Air Force's handling of UFO investigations, swamp gas was the straw that broke the camel's back.

Before the decade was up, the Air Force would be out of the UFO business for good. One driving force, a confroversial University of Colorado study directed by physicist Edward U. Condon. Condon's largely negative report summary concluded that chasing UFOs was a waste of time. Indeed, UFOs seemed shrouded in secrecy. Condon declared, only because the Air Force resisted "premature publication of incomplefe sfudies of reports."

Thrilled by Condon's publicized pronouncements—few reporters were about to wade through a 965-page report in search of any UFO gems—the Air Force seized the offered brass ring. On December 17, 1969, in the wake of fhe Colorado/Condon study, Secretary of the Air Force Robert C. Seamans Jr., announced the closure of Project Blue Book, saying that its continuance "cannot be justified either on the ground of national security or in the interest of science."

Hynek was one of several scientists who saw the situation differently. "When the long-awaited solution to the UFO problem comes," he said, "I believe that it will prove fo be not merely the next small step in the march of science, but a mighty and totally unexpected quantum jump."

A Civilian Blue Book?

With the Air Force out of the picture since 1969, the burden of investigating the UFO phenomenon has largely fallen on the shoulders of individuals and a handful of civilian UFO organizations. While individuals are hardly hampered by bureaucrafic rules, public relations considerations, and other policy requirements, they can only do so much on their own. Moreover, the weight of their public pronouncements is linked, directly or indirectly, to their personal and professional credentials. It's one thing for an established astronomer, such as Hynek, fo speak out about the phenomenon in general, it's another thing altogether for, say, an advertising executive or fast-food clerk to claim that Earth is being invaded by genetic engineers from another planet or galaxy.

The same is also true of UFO organizations, which are only as good and efficient as their collective members. One overripe member may not spoil the whole barrel, but he or she can certainly detract from the overall respectability of the subject by his or her unbridled comments about what the UFO phenomenon does or does not ultimately mean. As Hynek and others have been quick to point out, the U in UFO stands for "Unidentified," not necessarily for extraterrestrial spaceships and alien abductors in that order. All three may or may not be relafed. Some UFOs, however, are almost certainly unrecognized or little understood natural phenomena, swamp gas and ball lightning very possibly included.

The one undeniable truth about the UFO phenomenon—Air Force pronouncements aside—is that furfher investigation is still required. According to one Gallup Poll, some 15 million adult Americans have at one time or another in fheir lives witnessed whaf they believed fo be a UFO. Compare that figure with the 12,618 UFO reports the Air Force collected over 22 years, extrapolate if worldwide, and it's painfully clear that the UFO phenomenon represents both the mosf prevalent and underreported anomalous phenomena of fhis or any other century. Even if UFOs aren't a three-dimensional, solid, physical object, any student of human psychology or sociology worth his or her salt should be suitably intrigued as to why humans continue to report UFOs in vast numbers in the absence of any unusual stimuli. To say that the best interests of science will not be served by further study of the UFO phenomenon—in all its myriad, mysterious manifesfations—is to say that science should concern itself only with things humans *don't* do, as one of the things they *do* do is report UFOs—even in the face of peer and public ridicule for doing so. If human behavior isn't of scientific interest, then we might as well drop the soft science disciplines of anthropology, perceptual psychology, and social interaction from the academic curriculum.

In installments to follow, *Omni* will provide you with the UFO tool kif the Air Force never produced. The Project Open Book tool kit will allow you fo conduct your own investigation of the persistent UFO phenomenon. It will contain tips and techniques about locating and classifying UFO reports. It will tell you, precisely, how to investigate UFO reports. And, it will tell you how to report and then investigate a sighting of your own. You'll learn how to interview witnesses, how to collect physical evidence (where indicafed) and how to sniff out potenfial hoaxes. You'll

be instructed in the finer arts of audio and photographic analysis, both still and video. And you will be provided with the names and numbers of information sources, both print and electronic. Hopefully when your own research is done, you'll share it with your colleagues. Collectively we may be able to do what the Air Force couldn't.

Overcoming the Ridicule Factor

In order to investigate a UFO case, you must, of course, first find one. Despite the perceived plethora of sightings, this is not always as easy as it seems. For one thing, the overwhelming majority of UFO sightings are never reported. The reason for this reluctance is fairly straightforward: fear of ridicule. Hynek lamented this situation in a letter written to the magazine, *Physics Today*, in which he solicited UFO reports from scientifically trained observers. "It has been my estimate over the past 20 years," Hynek noted, "that for every UFO report made, there were at least 10 that went unreported. Evidence for this comes from the Gallup Poll, the many UFO reports I subsequently learned of that were not reported to the Air Force, and from my own queries. There has always been a great reluctance to report in the face of almost certain ridicule. It would seem that the more trained and sophisticated the observer, the less prone he is to report unless he could be assured of anonymity as well as respect for his report."

Many respondents only reinforced Hynek's fears. One report from a man who is now a professional astronomer, had gone unreported for 11 years precisely because of a reluctance to face ridicule or embarrassment by peers—and this despite the fact that his own sighting was corroborated by several other credible witnesses, including at least two police officers.

In the summer of 1960, near Walkerton, Ontario, the story went, the man had observed a ball of light hovering near a tree. As he and several of his relatives approached to take a picture, it noticed us, and noiselessly accelerating at a very high rate, headed almost directly south, disappearing over the horizon in about two and a half seconds."

Yet another astronomer had failed to report a pertinent observation out of embarrassment as well. To sustain his self-image as the ultimate scientist, he "preferred to regard his sighting as being of an unusual physical phenomenon," according to Hynek, "rather than admit the possibility, perhaps even to himself, that it was a genuinely new empirical observation."

Given the embarrassment that seizes the best, most respectable UFO witnesses, any investigator worth his or her salt must learn to cope with the "ridicule factor" before an investigation in earnest can begin. But given the right circumstances, the right individual, and the right approach, the curtain of ridicule can be overcome, as the large response to Hynek's letter in *Physics Today* clearly indicates. For this to happen, the witness/reporter must have confidence in his or her confidante as *Physics Today* respondents clearly did in Hynek after seeing his credentials. Even with such confidence, moreover, the UFO witness often must still be drawn out. Few of those embarrassed by a close encounter, after all, will volunteer the information unless asked to do so.

Given the ridicule factor, the UFO hunter in search of a case to investigate must follow two basic rules. First, to learn about someone's UFO experience, it's best to ask. Even a lifelong friend may be reluctant to broach the subject of a UFO sighting unless drawn out. And second, when you do ask, ask those who have the most confidence in you—your family members and closest friends. A complete stranger is likely to react with serious reservation when another stranger arrives suddenly on his doorstep, asking questions about UFOs. (The stranger-the-UFO-experience this subject has had, moreover, the higher his or her resistance will be.)

An example from my own experience may be instructive. In the early 1980s, I was hired to write a weekly column for the *San Antonio Express-News* about unusual events that had taken place in the state of Texas over the years. The first six months or so went well enough, but inevitably the scramble for material, or at least significantly different material, set in. By October (the series had begun the previous December), I was asking friends and acquaintances—except for "Rudy"—if anything strange or unusual had ever happened to them.

My reasons for not asking Rudy were obvious. He taught history at a local community college, and the shelves of his personal library in a prominent neighborhood on the north side of town were overburdened with straight literature, including some 10,000 historical biographies. I had worked with him on several occasions and was well aware of his disdain for anything unusual—typified by his attitudes toward mysticism, astrology, and anything else that remotely smacked of the occult. I assumed this would naturally include flying saucers and UFOs, too. But I also knew that he had been a B-24 bombardier during World War II and the heyday of the so-called "foo-fighter" phenomenon, in which glowing balls of light had perplexed both Allied and Axis aircrews during the closing nights of the war.

On the extremely remote possibility that he might have encountered a foo-fighter, I asked Rudy if anything strange had ever happened to him during his flying days in the war. "No, nothing ever did," he said matter-of-factly, and that, I assumed, was naturally that. After a brief pause, though, he said, "but last November, I was driving back from Austin [illegible]," and promptly launched into his personal UFO story. Rudy had a sister who lived in Austin, 75 miles north of San Antonio on Interstate Highway 35, whom he frequently visited. He had been returning to San Antonio alone late one night, probably after Thanksgiving, and was just south of New Braunfels, about 20 miles from his own home. The sky was overcast, with a ceiling of about a thousand feet, and traffic on the highway was relatively light, although there were other cars and trucks in both the north- and southbound lanes of the four-lane highway.

Rudy first became aware of something visible in the upper portion of his windshield, but continued driving while leaning forward to look up through the curved glass. To his amazement, he told me, what looked like a flying saucer flew into view, traveling slowly southward and directly over the right-hand lane he was in. He pulled off onto the shoulder—the only car to do so—stopped, and stepped outside for a better view.

The object was underneath the overcast, probably 800 or 900 feet overhead. "I can see it clear as daylight now," he said, a year after the fact. "It was perfectly circular and just under 100 feet in diameter. The outer rim consisted of a broad flange divided into what might be flaps or at least individual segments. An antenna hung down from the middle of the object, and the central portion, the area inside the flaps or flanges, slowly rotated on its own axis as the whole continued southward down the highway."

A short distance away, Rudy told me, the vehicle initiated a sharp U-turn and started back up the north side of the highway, slowly rising as it did. Eventually it entered the clouds and disappeared from view. Rudy waited a few more minutes to see if it would reappear. When it didn't, he got in his car and drove home. "All the way home," he said, "I kept thinking, 'Well, that's it. I'll get up in the morning and the headline will read 'UFO Mystery Solved!'" But if anyone else had seen or reported Rudy's UFO it certainly wasn't in the San Antonio papers, and it was almost certainly nothing Rudy himself would ever bring up in casual cocktail or coffee conversation unless directly confronted.

Almost as remarkable as the sighting itself, perhaps, was Rudy's reaction to it. True, it was unusual and unexpected, apparently a flying craft of technology radically different from his old B-24 Liberator—but also nothing to lose a night's sleep over. Class was tomorrow night, and life went on. Besides, who does the average citizen call to report a UFO, especially when that UFO has already disappeared into the clouds?

One might say, then, that the UFO investigation begins at home. Ask your parents, your husband or wife, your aunts and uncles, your cousins, your neighbors and acquaintances. Many of these cases may only be anecdotal, others may involve data—such as the names of other witnesses and a possible paper trail—that can be used to fill in and corroborate the historical record, if nothing else.

If the witness you wish to approach is a total stranger, we suggest you do so with kid gloves. It would help if you had some credentials—say a few UFO cases you have investigated in the past—to boost your credibility. Otherwise, you should utilize what, in the vernacular of the Nineties, we call "networking." For instance, if a friend has witnessed something unusual and then refers you to a second witness, the second witness, knowing your connection to the case, may be more willing to talk. Above all, do not

THERE ARE TWO BASIC RULES TO OVERCOMING THE RIDICULE FACTOR FOR THE UFO INVESTIGATOR: FIRST, TO LEARN ABOUT SOMEONE'S UFO EXPERIENCE, IT'S BEST TO ASK. SECOND, ASK THOSE PEOPLE WHO HAVE THE MOST CONFIDENCE IN YOU

approach potential witnesses, especially strangers, with theories involving aliens and extraterrestrial ships. You will be far more likely to gain confidence if you say simply, "I understand the other night you witnessed something a bit out of the ordinary. I've been collecting some information on this and wonder if I could speak to you as well." (This will be covered in greater detail in an upcoming chapter on interviewing witnesses.)

UFOs in Print

If you find it hard to get your leads from people, you may be interested to learn that a countless variety of fascinating cases—most merely reported but not thoroughly investigated—are described in print. Coverage of UFO sightings by the nation's major daily newspapers tends to vary widely, depending on whether or not UFOs are in vogue at a particular time. A much more consistent source of UFO sighting reports is the small community daily or weekly newspaper. So many sightings have been reported in the Gulf Breeze, Florida, area in recent years, for example, that the local paper, *The Islander* (P.O. Box 292, Gulf Breeze, Florida 32562) has been offering mail subscriptions to investigators.

Another excellent source of current UFO sightings in localities around the United States is the U.F.O. Newsclipping Service, edited and published by Lucius Farish, Route 1, Box 220, Plumerville, Arkansas 72127. Each 20-page issue consists of copies of newspaper clippings submitted by Farish's far-flung web of correspondents and clippers. It regularly includes Canadian and English newspaper clippings as well as articles translated from foreign-language papers.

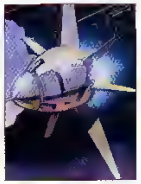
Numerous annual national and regional UFO conferences also provide a rich source of contemporary reports—and often the original witnesses themselves. To find out about local conferences and newsletters which may alert you to cases open for investigation in your area, you may contact:

The Mutual UFO Network of Seguin, Texas. MUFON holds an annual symposium every July; this year's will be in Seattle. For more information, write international director Walter Andrus, Jr. at MUFON, 103 Oldtowne Road, Seguin, Texas 78155-4099. For other case material, you can subscribe to the *MUFON UFO Journal*.

The J. Allen Hynek Center for UFO Studies, 2457 West Peterson Avenue, Chicago, Illinois 60659. The center also publishes the annual *Journal of UFO Studies* and the bi-monthly *International UFO Reporter*.

The nonprofit Fund for UFO Research at Box 277, Mount Rainier, Maryland 20712, which sells copies of its reports.

OMNI'S OPEN BOOK FIELD INVESTIGATOR'S GUIDE WILL PROVIDE YOU WITH THE TOOLS TO ASSIST US IN OUR WORLDWIDE QUEST TO UNCOVER, VERIFY, AND RESOLVE THE UFO CONTROVERSY



Finally, for those of you online, the Internet is a great place to learn of UFO sightings in your area. As you traipse from one bulletin board to the next, you will read the postings of local residents whose stories have never been reported before. You can correspond with these witnesses through E-mail, gathering potentially interesting data, possibly discovering a case you feel is worth further investment of your time.

Blast from the Past

If you can't find a suitable case in periodical literature, at conferences, or online, moreover, you might try digging around in the past. "Consult your local library or the major archives," advises Jan Aldrich, a UFO researcher recently retired from the military. "You'll probably be surprised by the treasure trove of uninvestigated cases."

With a grant from the Maryland-based Fund for UFO Research, Aldrich is presently re-examining UFO press clippings from the year 1947, popularly perceived by the public as the year the modern UFO era began, following the sighting by pilot Kenneth Arnold of nine silvery, crescent-shaped objects near Mount Rainier, Washington, on June 24, 1947.

Much of Aldrich's present work replicates an earlier 1967 study done by investigator Ted Bloecher while with the now-defunct National Investigations Committee on Aerial Phenomena. Bloecher's "Report on the UFO Wave of 1947" was essentially a collection and analysis of press clippings demonstrating that Arnold was hardly alone in his experience. In fact, UFOs were being seen and reported in large numbers up and down the country, from Washington to Maine.

But Aldrich's ongoing investigation delves even further. "Good as Bloecher's study was," says Aldrich, "it wasn't complete. For example, he didn't include any newspapers from Montana or from many provinces in Canada."

By examining the Helena, Montana, *Independent Record*, Aldrich discovered that a local flurry of UFO sightings was just getting underway, even as the national flap spurred by Arnold's sighting was fading in other areas of the country. Aldrich also discovered that UFOs continued to be reported in Canada in great numbers. "In fact," he notes, "the Canadian wave was even more pronounced in terms of population density than what was happening in the United States."

From a microfilm copy of Project Blue Book files scheduled to be destroyed but inadvertently discovered at the last minute by a university researcher, Aldrich was able to locate another unpublished discovery: 2,000 to 3,000 letters written by U.S. citizens in the wake of an April 1952 article about UFOs by Bob Ginna published in *Life* magazine. Blue Book was swamped at the time," says Aldrich, "and then-director Edward Ruppelt apparently didn't care about the letters or trying to follow them up. They were just stuffed into a file, which, fortunately, someone put on microfilm. The majority of the letters, says Aldrich, consist of individual theories or explanations for the UFO phenomenon, but about 20 percent were personal case reports, the earliest dating back to 1913."

Interestingly, letters addressed simply "Flying Saucers, Washington, DC," eventually found their way into the file. *In toto*, the letters indicate that, while Arnold may have gotten the headlines and generated the furor, the UFO phenomenon itself was arguably around much earlier. It also proves that one individual, armed with nothing more than a microfilm reader, can still make a difference in our eventual understanding of what may well be one of this century's most misunderstood mysteries.

Choosing Your Case

As a UFO investigator, you will soon find that, with the right approach and the right reading material, you will unearth endless instances of reported UFOs. But the truth of the matter is, not all reports are created equal. For instance, you may want to delve into the past, but if all the witnesses to a given sighting have died, and if there is little documentation, there may not be much you can do. A UFO reported by your friend, a college student while drunk and staring at the stars, is not as compelling as a UFO reported by three separate individuals—such as a policeman, an astronomy professor, and a teacher—while stone sober. If the second UFO has left any physical evidence—from a burnt area of land to some blips on the airport's radar screen—so much the better.

As you hunt down UFO cases you wish to investigate, you will also find it is better to pursue those closer to home. Indeed, a thorough UFO investigation is time-intensive. It often requires multiple interviews with multiple witnesses. You may need to visit the site of the report at various times of the day and year, sometimes with specialists in tow. What's more, the input of those well versed in local habits, history, geography, and atmospheric phenomena may be invaluable to your research.

For instance, a few years back, hundreds of witnesses reported a weird, boomerang-shaped UFO over Westchester County and other parts of New York. It later turned out that at least some of the reports were made when pilot-hoaxers using a local airport in the town of Stormville decided to fly in boomerang formation. Someone making a few phone calls from London could not have learned about the hoax as easily—if at all—as the local investigators on the scene who ultimately did. The take-home message is this: If you live in New Jersey, it makes more sense to investigate cases in Newark or Asbury Park than in Santa Barbara.

Starting a File

This chapter has given you enough material to get started. We suggest that you empty a file drawer, get a few folders out, and start collecting. We'd like you to spend the next few weeks just keeping your eyes and ears open. Speak to friends and relatives. Read the local paper. Scour the Internet. Anytime something of interest enters your field of vision, clip it, load it onto a disk, or jot it down, and put it in your drawer.

At the end of this period, you may have a case—a completely original case, never before investigated by anyone—you feel is worthy of your time and effort.

Next month, in the second installment of the *Omni Open Book Field Investigator's Guide*, we'll provide you with some tools of the trade, so your own investigation may begin.

Anyone hoping to investigate UFOs must, of course, keep track of research that has gone before. The best sources are those classics of UFO literature that tell the story of this controversial field, often in the words of the researchers who know it best.

UFO books vary widely in quality and reliability from sober, reflective studies such as Hynek's *Experience*, to the self-promoting personal anecdotes typified by the early contactee movement of the 1950s.

Any list of the best UFO books is highly subjective. Here, however, are 11 UFO classics recommended for any UFO investigator seeking the right reference tools.

1. *The Report on Unidentified Flying Objects* by Edward J. Ruppelt (Doubleday, New York, 1956). For many of today's mainstream UFOlogists, interest in the phenomenon was probably sparked by a reading of Captain Ruppelt, who was the acting head of the Air Force's Project Blue Book from 1951 to 1953. Widely available in used-book stores and libraries, *Report* was published in two controversial versions. The first edition ends with Chapter 17, "What Are UFOs?,' and Ruppelt's own response, 'Only time will tell." Subsequent editions contain three additional chapters in which Ruppelt seems to recant his earlier stance and casts doubt on the phenomenon as one of extraterrestrial origin.

2. *The UFO Controversy in America* by David Michael Jacobs (Indiana University Press, Bloomington, 1975). A Temple University professor of history, Dr. Jacobs' *Controversy* remains one of the few purely historical treatments of the subject as it examines how UFOs were approached by the American press, government, and public. Jacobs' most recent book is a study of UFO abduction cases, *Secret Life* (Simon & Schuster, New York, 1992).

3. *The UFO Experience* by Dr. J. Allen Hynek (Henry Regnery Company, Chicago, 1972). For 22 years, until its closure in 1969, astronomer Hynek served as a scientific consultant to Project Blue Book. *Experience* is a thoughtful account of his own experiences and gradual awakening and also an examination of the UFO phenomenon more or less in its entirety. It's here that Hynek first uses the marquee phrase 'close encounters of the third kind."

4. *Anatomy of a Phenomenon* by Jacques Vallee (Henry Regnery Company, Chicago, 1965). A colleague of Hynek's, Vallee is now one of the field's most original and prolific thinkers, although some of his most recent work has fallen out of favor with the hardcore UFO crowd. In *Anatomy*, however, and again in *Challenge to Science: The UFO Enigma*, (Henry Regnery, 1966) co-authored with wife Janine, Vallee is in fine phenomenological form.

5. *Passport to Magonia: From Folklore to Flying Saucers* by Jacques Vallee (Henry Regnery Company, Chicago, 1969). One of the more controversial books within UFOlogy as it posits parallels with the observed UFO phenomenon and various past legends and lore associated with the "fairy folk" and other nonhuman entities. Raises many questions, especially about UFO abductions, which remain unanswered.

6. *The UFO Encyclopedia*. Volumes 1 and 2, by Jerome Clark (Omnigraphics, Detroit, 1990, 1992). Clark's impressive and massive UFO survey is more up to date and more comprehensive than preceding UFO encyclopedias. A third volume, *High Strangeness*, is expected to be available this year.

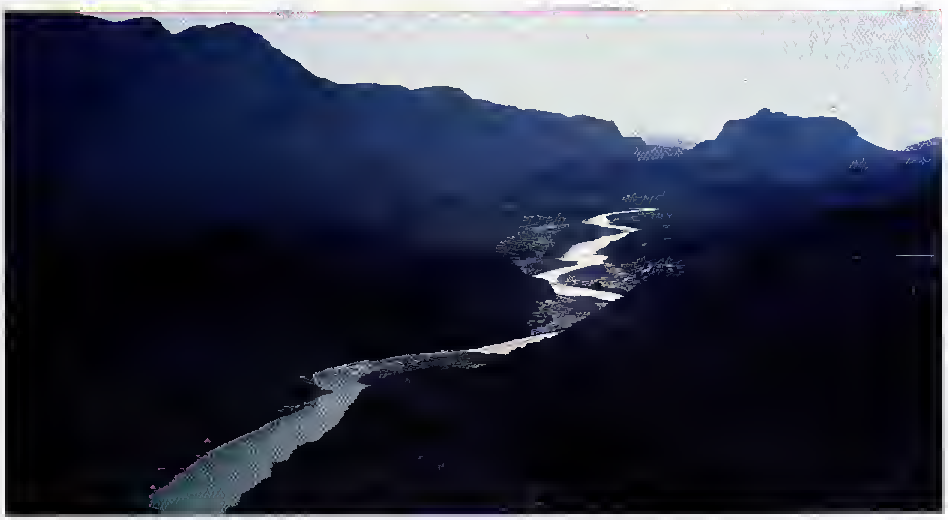
7. *Scientific Study of Unidentified Flying Objects*, edited by Daniel S. Gillmoor (Bantam Books, New York, 1969). The complete text of the controversial University of Colorado Boulder study directed by physicist Edward U. Condon under contract to the Air Force. Turgid and tedious in parts, but still an indispensable reference book.

8. *Observing UFOs* by Richard F. Haines (Nelson-Hall, Chicago, 1980). A former perceptual psychologist with NASA's Ames Research Center, Haines focuses here on perception, particularly the peculiarities of our visual field and sense of time, as related to the observation of anomalous aerial phenomena.

9. *Project Blue Book*, edited by Brad Steiger (Ballantine Books, New York, 1976). A wildly miscellaneous grab-bag of odds and ends drawn mostly from official (and declassified) Air Force Project Blue Book files, including a list of those cases classified "unknown." Contains much original source material found nowhere else.

10. *The Interrupted Journey* by John G. Fuller (Dell, New York, 1987). The book that first introduced the UFO abduction phenomenon to the public, this volume, first published in 1966, examines the case of Betty and Barney Hill, who experienced a UFO close encounter which resulted in nearly two hours of alleged missing time.

11. *Missing Time* by Budd Hopkins (Richard Marek Publishers, New York, 1981). Hopkins is an abstract artist widely recognized as the leading proponent of the genetic-engineering theory of UFO abductions. A pioneer in UFO abduction research, he gives his theories in this controversial volume. DO



CRASH AT EL INDIO

ARTICLE BY DENNIS STACY

DID AN ALIEN CRAFT ATTEMPT TO LAND IN MEXICO?

Investigator Dennis Stacy, journalist and editor of the *MUFON UFO Journal*, who has made three separate visits to Mexico in pursuit of this case during the past four years, most recently in September 1994 (Stacy's investigative aides include Tom Deuley, formerly assigned to the National Security Agency and the administrative assistant to the Mutual UFO Network of Seguin, Texas, who accompanied Stacy on each of the three trips, Elia Maldonado of Guerrero, who served as translator, and Enrique Ceverra, former mayor of Guerrero.)

Central Event The alleged crash and subsequent recovery of a UFO by a top-secret joint Mexican American military operation

Time December 6, 1950

Place Along the Texas-Mexico border near the towns of El Indio, Texas and Guerrero, Mexico

Ramifications Aside from its own innate significance, the El Indio-Guerrero crash, if verified, would lend credence to those claiming an extraterrestrial or otherwise unconventional explanation for the famous Roswell crash which occurred in New Mexico sometime in late June or early July 1947. It would also bolster the case for the much-maligned MJ-12 documents said to prove that government experts have been hot in pursuit of UFOs since the 1950s, most UFO researchers now regard these documents as a clever hoax or ingenious exercise in disinformation with possible ties to the Air Force Office of Special Intelligence, Kirtland Air Force Base, Albuquerque

Deep Background/The Roswell Connection Something crashed to the earth near Roswell, New Mexico, in the summer of 1947. The Army Air Force admitted as much in the form of a press release which first appeared in local newspapers on Tuesday July 8, 1947 and was widely reprinted around the world. "The many rumors regarding the flying discs became a reality yesterday," said the report authorized by base

commander Colonel William H Blanchard, "when the intelligence office of the 509th Bomb Group of the Eighth Air Force, Roswell Army Air Field, was fortunate enough to gain possession of a disc through the cooperation of one of the local ranchers and the sheriff's office of Chaves County."

Later that same afternoon, however, Eighth Air Force commander Brigadier General Roger Ramey called a press conference at Carswell Field, Fort Worth, Texas, to announce that what was *really* recovered was an ordinary weather balloon During the intervening years, many UFO advocates pushed an extraterrestrial interpretation of the crash And finally, on September 8, 1994 in response to a General Accounting Office inquiry into Roswell launched by New Mexico Republican Congressman Steve Schiff, the Air Force attributed the original Roswell object to Project Mogul, a top-secret balloon project it said was designed to monitor Soviet nuclear bomb tests

As we pursue the truth behind the El Indio story, our questions are straightforward What, if anything, did happen on December 6, 1950, and how, if at all, was this possible event related to the crash at Roswell Whatever the origin of the Roswell crash, is the incident reported at El Indio in some way related?

Deep Background/The MJ-12 Connection The suggestion that a second UFO might have crashed and been retrieved by the same recovery team employed at Roswell first arrived anonymously in the mail at the home of Hollywood producer Jaime Shandera in December 1984 Postmarked Albuquerque, the package contained a single roll of undeveloped 35mm black and white film When developed, the film revealed eight pages of what purported to be a top-secret report Dated November 18, 1952, the report itself claimed to be a UFO briefing paper prepared by the outgoing Truman administration for the recently elected Dwight David Eisenhower It described the creation of the Majestic-12 group, composed of 12 high-level military and intelligence officials, along with civilian scientists, to oversee the investigation and analysis of the UFO phenomenon, and it even referred to the Roswell crash by name What's more, the report referred to El Indio "On 06 December, 1950, a second object, probably of similar origin, impacted the earth at high speed in the El Indio-Guerrero area of the Texas-Mexico border after following a long trajectory through the atmosphere," the papers proclaimed "By the time a search team arrived, what remained of the object had been almost totally incinerated Such material as could be recovered was transported to the AEC (Atomic Energy Commission) facility at Sandia New Mexico, for further study'

DID A UFO CRASH TO EARTH ON DECEMBER 6, 1950 ALONG THE BORDER BETWEEN TEXAS AND MEXICO? AND IF SO, DID A SECRET RECOVERY TEAM DEPLOYED BY THE MILITARY CART THE EVIDENCE AWAY? WHAT RELATIONSHIP DOES THIS HAVE TO THE INFAMOUS CRASH AT ROSWELL?

The Air Force, along with most UFO researchers, has denounced the so-called MJ-12 papers as a hoax or a scam

But bogus or not we felt the reference to a crash along the Rio Grande between Texas and Mexico was worth looking into Obviously, if the incident could be confirmed then at least some of the content, if not the whole, of the MJ-12 document would be verified, Such verification would tend to support those claiming an extraterrestrial or unconventional explanation for Roswell, as well as charges long made by some UFOlogists, of an ongoing government UFO cover-up

By the same token, if the El Indio-Guerrero crash could be disproved, it would support the Air Force claim that the documents are indeed bogus and that the Roswell crash was just a weather balloon or something equally mundane

Either way, investigating the El Indio report could help shed light on the anonymous author of any Majestic hoax Who, after all, had even heard of El Indio (population less than 100) and Guerrero in any context? The former is so small that it isn't marked on most Texas highway maps

Early Evidence for a Crash at El Indio Shortly after the MJ-12 papers were first made public in 1987, Tom Deuley began a review of the case One tantalizing clue came from nuclear physicist Stanton Friedman, author of *Crash at Corona*, a book about Roswell Friedman, virtually alone in the UFO community in his support of the MJ-12 papers, wielded the Freedom of Information Act to procure a previously classified communique from a field agent named Auerbach (first name not given) in Richmond, Virginia, to FBI director J Edgar Hoover, dated December 3, 1950

According to Auerbach, of the Counter Intelligence Corps, his office had been asked to stay attuned to "any data on flying saucers " Any information, the memo added, would be telephoned, immediately, to Air Force Intelligence Although the date was theoretically "wrong" for El Indio—December 3 instead of 6—the coincidence, if that's what it was, was intriguing

The second piece of evidence was another declassified document found in the National Archives by Don Berliner, a board member of the Maryland-based Fund for UFO Research and co-author of the *Corona* book with Friedman. Previously stamped "Confidential," this six-paragraph memorandum for the Secretary of Defense from Colonel Charles B Winkle assistant executive, directorate of plans, announced an air alert effective as of 1030 hours According to Winkle, "The ConAC Air Defense Controller notified the Headquarters USAF Command Post that at 1030 hours a number of unidentified aircraft were approaching the northeast area of the United States and that there was no reason to believe the aircraft were friendly By 1040 hours, 40 aircraft at an altitude of 32,000 feet were confirmed by radar in the vicinity of Limestone, Maine Winkle added that President Truman had been notified and interceptors scrambled By 1104 hours, the situation was apparently defused Winkle noted that "the original track had faded out and it appears that the flight as originally identified is a friendly flight " The date was 6 December 1950

Truman even mentioned the incident in his memoirs, not published until 1979 At the time, he noted in his diary, "It looks like World War III is here I hope not—but we must meet whatever comes—and we will " Truman, however, attributed the radar returns and subsequent High Alert to an atmospheric disturbance

Friedman found yet a third account of the incident in *The Wise Men* by historians Walter Isaacson and Evan Thomas (Simon & Schuster, 1986) An assessment of the role played by cold war warriors like then-Secretary of State Dean Acheson and others, the book noted that on the same day—again, December 6 1950—Acheson was informed that "a national emergency was about to be declared' because "there is flying over Alaska at the present moment a formation of Russian planes heading southeast " The British ambassador to the United States, Clement Attlee, was visiting at the time, and Acheson was instructed to notify him to "take whatever measures are proper for his safety " In the Isaacson and Thomas version, the threat evaporated when the incoming UFOs were reportedly identified as flocks of geese

Despite the discrepancies—unidentified flying objects over Maine in one case, Alaska in the other—it is clear that the Air Force and government went into overdrive on December 6, 1950 the precise date given in the purportedly spurious MJ-12 papers for a flaming UFO crash in the vicinity of El Indio and Guerrero 'after following a long trajectory through the atmosphere " As it turns out, whether tracked through Alaska or Maine, the El Indio crash does represent a long trajectory, indeed. Moreover, the top-secret documents suggest an anonymous MJ-12 hoaxer may have hit upon this particular day in history not by sheer serendipity but rather by inside access to previously classified government reports

But why had MJ-12 placed the crash near El Indio in the first place? What, if anything, did the author of the MJ-12 papers know or suspect that we did not? As we pondered the papers both real and bogus, we realized our options had narrowed considerably To learn more, we would have to travel to El Indio and Guerrero in person

First On-Site Investigation (March 1990) El Indio overlooks the Rio Grande separating Texas from Mexico, and lies some 160 miles southwest of San Antonio The itinerary for our first visit, conducted in March 1990, was not overly ambitious Mainly, Tom Deuley and I intended to scope out the lay of the land, interview a few longtime residents who may have had knowledge of nearly half-century-old events, and establish contacts for a more thorough follow-up investigation later on. If we mastered the intricacies of crossing international borders and actually contacting possible eyewitnesses in Mexico, so much the better

We were both disappointed and encouraged by our initial foray into crashed-saucer terrain. Through contacts in San Antonio, we acquired the names of Jack

and Quixie Keisling, prominent local farmers who had lived in El Indio since 1939, a year after its establishment. Although they welcomed us into their home with typical Southern hospitality, they couldn't remember any significant event in the late 1949-early 1950 time frame that might have been associated with anything remotely resembling a flying saucer or crash.

"There was still a pilot training base in Eagle Pass after the end of the war," Jack volunteered, "and I could tell you some stories about that. The pilots used to love to buzz our pick-ups on the highway."

We also talked to the El Indio postmaster, Estelle Courtney, who had lived there since 1947, but she, too, was unable to shed any light on an alleged UFO, plane, or meteorite crash. Unfortunately, the widow of the town's original founder had died two weeks before we arrived.

We spent the night in Eagle Pass, 18 miles upriver, and crossed over into Mexico at Piedras Negras the next morning. Like El Indio, Guerrero (population 2,000), some 35 miles back down the river and south of its sister city, had seen better days. Knowing my high school Spanish would confuse, rather than clarify, any interviews we might be able to conduct, we sought a translator. We were fortunate enough to secure the services of Elia Maldonado, who had just moved back to Guerrero from Green River, Wyoming, and would prove invaluable on our first visit as well as those to come. Maldonado was able to put us in touch with former mayor Enrique Ceverra, who in turn directed us to Rosendo Flores, a retired schoolteacher (now deceased) and, according to Ceverra, the town's acknowledged historian. "If anyone knows anything about such an incident, it will be him," Ceverra assured us.

Straight of spine if slow in step, Señor Flores invited us into his home two blocks off Guerrero's *zócalo* or main square, a welcome respite from the already beating sun. Underneath a full head of gray hair, sparkling dark eyes peered at us through thick glasses. Seated in a simple wooden chair in his living room, Flores answered our questions promptly and to the point. Not only did he remember such an incident, he had actually witnessed it. Shortly after siesta, he had been working on his family's land north of town, toward the river and El Indio, when "a ball of fire fell from the sky," crashing on the adjoining ranch and igniting a grass fire. A day or two later, a military contingent arrived from Piedras Negras, blocked off the area, and "hauled something away by truck." We asked him if American soldiers, *norteamericanos*, might have been involved, but Flores said he couldn't be certain. What about the object or objects hauled away? Could it have been as mundane as airplane wreckage? "We never knew," Flores answered. "No one told us anything." When we asked how he could be sure of the date, Flores simply said that "it was common knowledge, everyone knew about it." The old gentleman even gave us the name of the landowners and the location where the "fireball" had impacted—El Rancho del Griegos (the Ranch of the Greeks). Before leaving, we asked if anyone had ever visited him previously about this incident. His reply was adamant and economical. "No, never. You are the first."

Buoyed by Flores' account, we sought out the people named but none was home. We spent the remainder of the day driving backroads bordering the ranch—Deuley's handwritten notes at the time refer to them as "stone washboards"—in search of other potential eyewitnesses, only to learn that many had long since died or moved away.

Indeed, as we delved deeper, we were unable to turn up any additional eyewitnesses to corroborate Flores' account. If a flying disc had crashed near Guerrero on December 6, 1950, it certainly hadn't insinuated itself into the local memory in the way Flores had suggested.

Still, we felt the case was worth a second visit. We had by no means interviewed everyone who might have remembered the incident, and we had not yet seen the alleged crash site. Maldonado and Ceverra agreed to assist us further by continuing to ask questions locally and trying to arrange access to the Ranch of the Greeks.

Second Journey Out

(November 1990). In the first week of November 1990, we returned to Mexico, having decided to concentrate our investigation in the Guerrero area. Ceverra learned that the original ranch had since been subdivided and sold, but he had contacted the new owners, who wish to remain anonymous, and obtained permission to search their property. He had also contacted two individuals who, while they had no knowledge of any fireball or other crash in the area, did know of a "mystery hole" on the ranch that had appeared sometime in the late 1940s or early 1950s as portions of the land were first cleared of mesquite and scrub brush for cultivation. At one point the hole had been large enough to trap a tractor, which had to be winched out. We chose to return in November, after the field had been harvested, facilitating our search.

In the meantime, Ceverra also contacted two of the four children whose parents had owned the land in December 1950. Both were of little help, alas, since they'd been younger than 10 at the time.

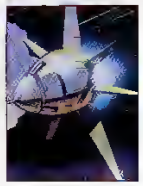
After we arrived in Guerrero, Ceverra arranged a guide, a young man with his leg in a cast who worked the ranch and would be able to lead us to the hole in the field. As with everyone else we talked to on this occasion, he had no idea how the hole had appeared, only that it had been there as long as he could remember. Its only direct connection to the alleged crash, then, as best we could determine, was that it lay in the same immediate vicinity where Flores had told us the fireball had come down more than 40 years before.

An afternoon spent searching the field proved hot, fruitless work. Unable to walk because of his injury, our guide could only give us general directions. And while the last crop had been cleared, the soft, loamy soil had quickly sprung up in weeds and grasses. Coupled with the flatness of the terrain, this meant that one part of the large field looked pretty much like another. As the day wore on, however, word leaked out that we were looking for a "UFO hole," and we soon drew a crowd of curious locals, all of whom were perfectly willing to help out. At one stage, we had some 15 people in the field, separated by outstretched arms, walking up and down the weed-grown rows, all for naught except a video of the event taken by our photographer, Steve Lewis.

It's no wonder that both Deuley and I were feeling a little foolish. In fact, with sweat pooling in my armpits, I couldn't help but hum the words of an old Grateful Dead song. "What a long strange trip it's been!" We had started out with a single reference to a crashed flying saucer in what in all likelihood was a bogus "government" document, we had located but a single eyewitness to an event of ultimately unknown nature, and yet here we were, stirring up dust in a field on the south bank of the Rio Grande, looking for a mystery hole of equally unknown origin, and with no incontrovertible evidence that the two events were connected by anything other than coincidence.

We thanked Maldonado and Ceverra for their gracious assistance, but advised we probably wouldn't return unless there were any new dramatic developments on either side of the border. Back in San Antonio, we continued to accumulate data in hopes some of it might prove relevant. The MJ-12 documents aside, we continued to hear rumor of some UFO crash along the Texas-Mexico border during our targeted time frame. Unfortunately these waters were muddied by known hoaxes, including the so-called "Tomato Man" case involving photographs of an alleged fried "alien" inside a burned-out "spaceship" said to have crashed near Rio Sabinas, Mexico, on July 7, 1948, some 130 miles south of Guerrero. The photos were later demonstrated to be of a human accident victim, the head having swollen and bubbled from the intense heat so as to resemble a giant, mutant tomato. Another unsubstantiated story in circulation had a UFO crashing in 1950, but 30 miles northwest of Del Rio on the Rio Grande, a good 100 miles north of Guerrero. We were still intrigued by the prospect, however remote, that all such stories had some common root, perhaps indicative of a real event, mundane or otherwise.

I COULDN'T HELP BUT HUM THE WORDS OF AN OLD GRATEFUL DEAD SONG. "WHAT A LONG, STRANGE TRIP IT'S BEEN.' WE STARTED OUT WITH A SINGLE REFERENCE TO A CRASHED SAUCER AND NOW, HERE WE WERE, STIRRING UP DUST IN A FIELD ON THE SOUTH BANK OF THE RIO GRANDE.



Another Long Strange Trip

(September 1994). Last year, at the behest of Project Open Book, we undertook a third trip to Guerrero with the intention of laying the case to rest one way or the other as a legitimate UFO incident, an example of runaway folklore, or some other as-yet-unidentified third category. This time we were accompanied by two other UFOlogists who had recently taken an interest in the case: Hal Landrum, an Eagle Pass attorney, and John Yates of Fort Worth, a

salesman for The Psychological Corporation. Landrum had earlier visited Guerrero on his own, and as for Yates, he brought his metal detector. We informed Maldonado of our impending arrival. She, in turn, told Ceverra, who by now had located a former ranch foreman, Jose Garcia, who said he could take us straight to the mystery hole.

It took awhile, but Garcia ultimately delivered a shallow depression in the same field we had searched in November 1990. Hairline cracks in the soil around the small circular depression indicated an original diameter of some 20 feet. Yet a search with the metal detector revealed nothing, not even the usual beer-bottle caps and soft drink pull-tabs one normally encounters in such situations. While we hadn't expected a perfectly preserved crater with still-smoking rim and flying saucer parts strewn about, we had hoped to be able to tie the hole to a particular place in time. Like others we had interviewed, Garcia could add nothing in this regard.

Our own assessment of the situation was that we were looking at a natural sink-hole phenomenon, probably attributable to the porous limestone underlying the Rio Grande-deposited silt on which we stood. As we left, in fact, we encountered several active wash-outs alongside the dirt road encircling the field, one of which could have swallowed a compact car easily.

Moreover, after interviewing more than 40 additional people on both sides of the border, we were unable to directly connect the hole in the field with the fireball described by Flores. Nor were we able to identify any additional witnesses to the fall of the fireball itself.

Tom Deuley may have put it best when he said, "I think we've triggered some sort of investigator effect. We ride into town and start asking questions about unusual events, and the people do their best to help out. We ask about UFOs and crash sites, and without necessarily making up anything, they show us the best they have. But every community probably has something 'strange' in its history. It doesn't necessarily mean that a UFO crashed nearby."

Ultimately, another avenue of investigation bore fruit. While researching the history of the area in general, we were directed to two retired historians now living in Fort Clark Springs, Texas. Neither had encountered UFO stories in their years spent up and down the Rio Grande, but one of them, Ben Pingenot, did remember that a plane crash had taken place in the area. The source he gave Landrum was *Wings Over the Mexican Border: Pioneer Military Aviation in the Big Bend*, by Kenneth Baxter Ragsdale. University of Texas Press, 1984.

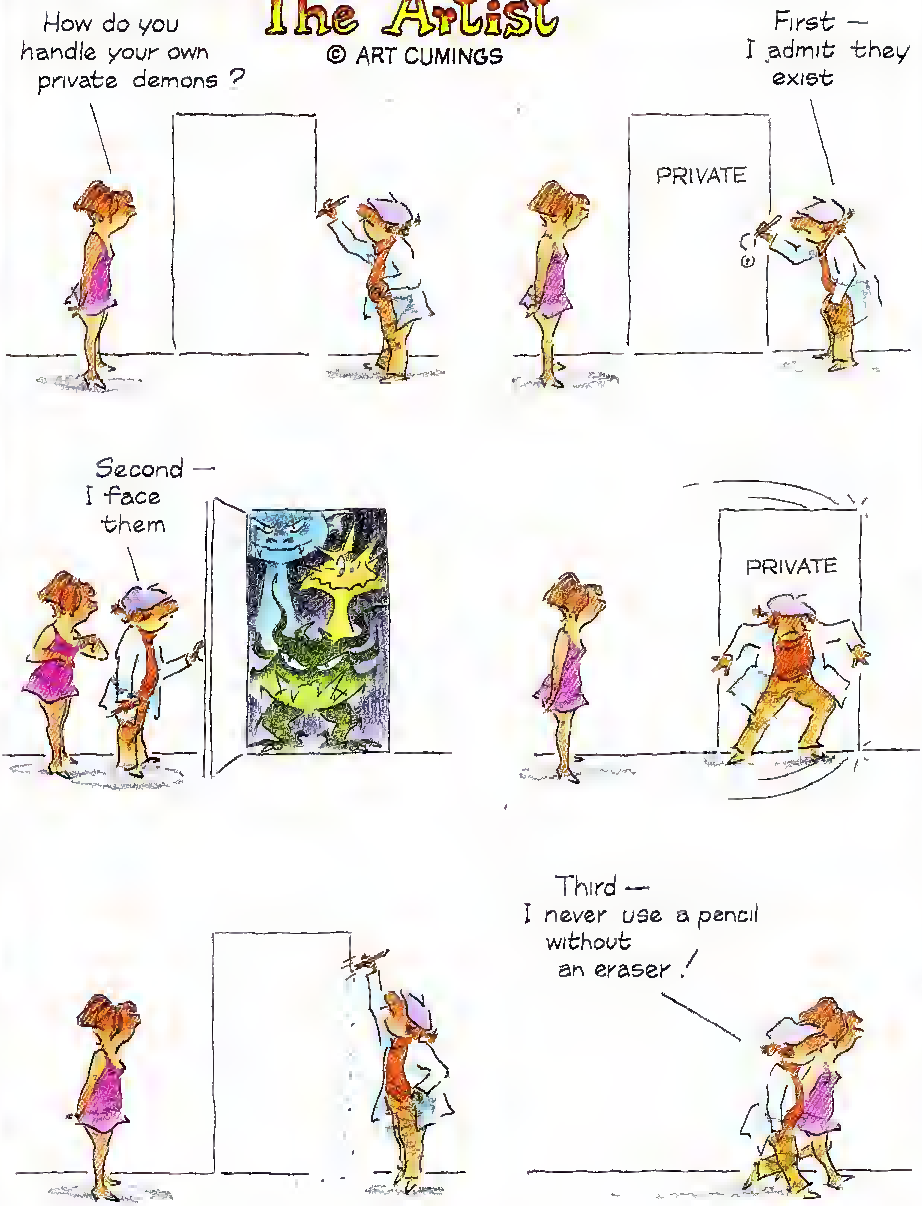
On January 16, 1944, according to Ragsdale, a Civil Air Patrol Stinson spotter plane had crashed seven miles from Guerrero, killing Lieutenants Harry Hewitt and Bayard Henderson. Aside from a brief mention in the *Laredo Times*, the incident was promptly hushed up for reasons that can only now be guessed. The international nature of the accident was probably one factor. Another, stronger reason for a cover-up is the suggestion that the Stinson was the victim of friendly fire—"a gunnery school accident"—from what Ragsdale was able to learn. And, indeed, a restricted gunnery range zone is still marked on aeronautical maps of the area, stretching southeastward along the American side of the border from El Indio.

Some sort of joint Mexican-American military cooperation would almost assuredly have been involved in the recovery of the bodies and any surviving wreckage, arguably triggering the inevitable bureaucratic tendency toward secrecy. Hewitt's widow was unable to obtain a cause of death from the authorities and was only granted survivor's benefits after the Oregon legislature introduced a bill to that effect in Congress.

As for the ultimate cause of the crash, Ragsdale concluded, "the facts will probably never be known. The military keeps its secrets well."

Conclusions: Sadly, we may never know beyond reasonable doubt whether or not an extraterrestrial object slammed to earth near Guerrero in December 1950. We do know, though, that an indisputably real terrestrial object impacted within seven miles of the very same Mexican town in January 1944. Could this have been the event, witnessed by a much-younger Rosendo Flores, before his memory of specific dates became blurred by the passage of time? If so, it's conceivable, depending on who was talked to and how the questions were phrased, that the crash of the Civil Air Patrol plane and its military retrieval could have given rise to all sorts of UFO rumors along the Rio Grande. In the end it's impossible to prove a negative—that a UFO didn't crash near Guerrero, Mexico, in December 1950. One might just as well search for the proverbial needle in the haystack—or a hole in the ground.

The Artist



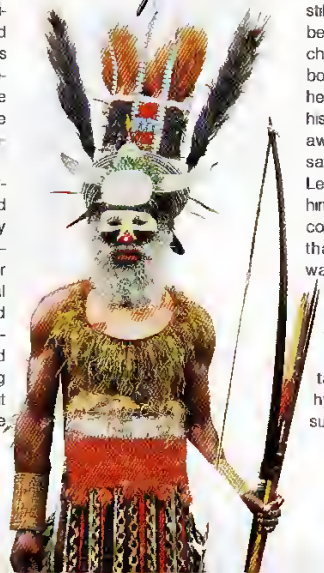
ARTICLE BY STEPHEN MILLS

LAST chance for first PEOPLES

Levi Yanomami squatted beneath the grassy fringe of the *moloca* (great thatched lodge), where an assembly of the world's tribal leaders sat patiently. The setting was the Kari-Oca Indian village an hour outside Rio de Janeiro, at the first-ever World Conference of Indigenous Peoples, where native peoples hoped to encourage world leaders to save the natural world from environmental disaster.

Levi was about to perform a little voodoo and answer tribal prayers: if only the chieftains would listen—and heed their own call for help in the face of cultural extinction. Clad only in red running shorts (for decorum's sake), flip-flops, and an arm band of shocking pink parrot feathers, Levi cut a discordant figure. But the best was yet to come—verging on the miraculous.

Can gene banks preserve the past?



Levi entered the hut and began to sing in guttural chants, stretching his stocky frame to appear gaunt as he paced up and down in stilted egret-like steps while beating his chest. His chants changed to choking fits and bodily contortions. Abruptly he left the circle to consult his companion, Davi Kopenawa Yanomami, a soothsayer who would interpret Levi's spiritual visions: tell him not to be afraid, and to continue the ritual. For more than half an hour, Levi wailed, stomped, and writhed, occasionally returning to Davi for comfort and advice.

Levi's physical incantations reached near-hysteria, then subsided suddenly. As he wandered

"We can speak for the earth because we have treated it well."

off mumbling, the entire hut and its occupants rose slowly as if on a cushion of air and hovered two feet off the ground—for this observer, anyway.

No kidding. Oh yeah, you say, what was I on? Air, it seemed. Eerie, uncanny, and downright spooky. This had to be some trick of the mind, but I could have sworn . . . Stumbling as I tried to step two feet down onto the ground only confounded my disbelief.

Tribal leaders emerged, exchanging knowing looks while Western observers appeared dazed and confused, still in a trance. Some remained in denial, unable to accept their own metaphysical encounter. But many others wanted to believe, and everyone's story was different. "It was as if I turned into an exotic bird and flew off into the forest," remarked one colleague, while others spoke of leaving their bodies, as in astral travel. The general consensus was that this was definitely a "happening."

But what exactly *had* happened, and just what was the message to the rest of the world? In essence, the tribal leaders' message was simply that only spiritual reverence for the earth would save it—and to fail would be fatal. As Kari-Oca organizer Marcus Terena remarked, "We can speak for the earth because we have treated it well."

Several thousand miles away north of the equator, an American university professor sat and also contemplated the collective fate of indigenous peoples threatened with cultural extinction. Luigi Cavalli-Sforza, a professor of genetics at Stanford University, is well aware that native peoples will be the first domino to fall in efforts to exploit the world's last remaining natural resources. "I am one of a group of scientists," he explains, "who have elected, on the initial suggestion of a smaller group of scientists, including myself, to collect a sample of the world population for a coordinated genetic study with modern means of analysis." Cavalli-Sforza is also chair of the International Executive Committee of the Human Genome Diversity project, which plans to study genetic samples from around the world, including samples from indigenous peoples.

But scientific research is not enough.

Professor David Maybury-Lewis, founder and president of Cultural Survival which fights for indigenous rights worldwide, expresses his concern that some scientists may overlook the need for more strident measures in regards to protecting indigenous peoples than the cataloging of their DNA. "If you're fearful of their dying out, you would have some kind of responsibility to do something for them as well. Just doing science and saying this is what I do, and what happens to them is none of my business, is quite unacceptable," he says.

Professor Cavalli-Sforza defends the value of his research, while acknowledging the obvious problem that genetic research cannot resolve what is essentially an economic problem. "I don't believe that a particular indigenous people could be damaged by our studies. There are examples where some people have been studied genetically, and it has been very good for them." But he says, "There are many other ethnic groups, indigenous or not, that need economic support or at least protection from abuse."

The struggle for cultural survival begs many questions. Who are indigenous peoples, what are their problems, who are the players in their survival or demise, and what are the viable alternatives to their extinction? The answers may come from many places, including political, economic, and scientific quarters which heretofore have been thought to be inimical to indigenous interests. In politics, changing attitudes in the United Nations, and positive signs from the Clinton administration have raised hopes for new support on indigenous issues. Science and technology, traditionally feared by indigenous groups because it identified and exploited their resources at their expense, have found new ways to preserve and harness rainforests' resources which may be the key to the forests' and their people's future survival. And indigenous peoples themselves have seized the initiative and begun to fight

From Huli tribesmen (previous page) in Africa to Asmat tribes in Brazil, indigenous peoples are fighting to save their cultural identity, while scientists hope to preserve genetic evidence that will help uncover the history of migration.

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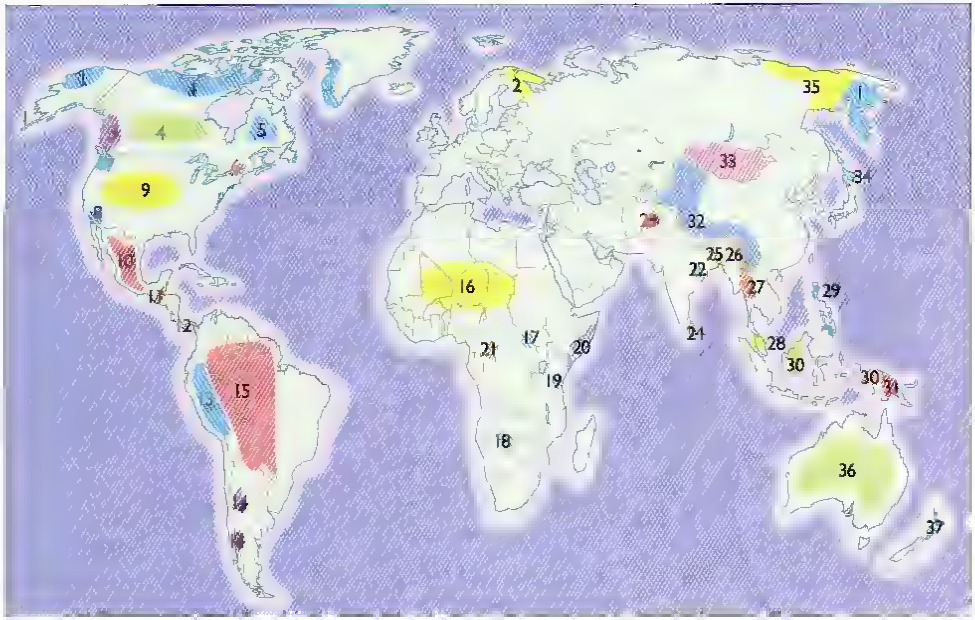

MAP OF INDIGENOUS PEOPLES

1 Arctic Inuit (Eskimo) in Alaska, Canada, Greenland, and the former USSR Aleut in Alaska
2 Europe Saami in Norway Sweden, Finland and the former USSR
3 Pacific Coast Haida, Tlingit, Kwakiutl, Bella Coola, Tsimshian, Nootka
4 Central Canada Cree, Metis Chipewyan Blackfoot Dene
5 Eastern Canada Innu Cree, including James Bay Cree
6 Canada/United States border Micmac the Six Nation Confederacy, or Haudenosaunee, comprising Mohawk, Oneida, Onondaga, Cayuga Seneca, Tuscarora
7 Northwestern United States Nez Perce
8 Southwestern United States Navajo Ute, Dine, Pueblo, including Hopi, Keres, Zuni
9 Plains States Crow Cheyenne, Arapaho, Pawnee, Comanche, Oglala Sioux Shoshone
10 Mexico Mayan descendants—Lacandon Yucatec Aztec descendants—Huichol Tarahumara Nahua, Zapotec, also refugees
11 Guatemala, Belize Maya, including Chol, Chuj, Kekchi, Quiche, Nicaragua Miskito, Sumu, Rama, El Salvador, Honduras Lenca Pipile
12 Panama Kuna Guaymi
13 Highland Peru, Bolivia, Ecuador Colombian Highlands Quechua, Aymara
14 Argentina Chile Mapuche
15 Amazon Basin—Brazil Tukano, Xavante Yanomami, Parakana Kreen-Akrore, Nambikwara, Kayapo, Makuxi Waimiri-Atroari Amazon Basin—Ecuador, Bolivia Peru, Colombia, Venezuela Amarakaeri, Amuesha Aguaruna Matsigenka Yagua Shipibo, Tukano, Panare, Sanema, Secoya Shuar Quichua Guajiro, Yanesha, Waorani, Ufaina, Paraguay Ache Ayoreo Guarani, Toba-Maskoy Guyana, French Guiana Surinam Arawak Lakono, Kalinja, Wayana, Akawaio
16 Sahara Sahel Tuareg, Fulani
17 Southern Sudan Dinka Nuer, Shilluk
18 Angola Botswana Namibia San (Bushmen)
19 Kenya Tanzania Maasai
20 Ethiopia Oromo Somali, Tigrayan, Eritrean
21 Zaire Cameroon Central African Republic Congo Mbuti Efe Lese
22 India Naga, Santal, Gond Kameng, Lohit, Dandami
23 Afghanistan Pakistan Pathan
24 Sri Lanka Vedda
25 Bangladesh Chittagong Hill Tract Peoples, including Chakma Marma Tripura
26 Myanmar (Burma) Karen Kachin Shan Chin
27 Thailand Karen, Hmong, Lisu
28 Malaysia Penan, Kayan, Iban
29 Philippines Kalinga, Ifugao Hanunoo, Bontoc, Bangsa Moro
30 Indonesia—Kalimantan Dayak, Lembata Kedang, West Papua (Irian Jaya) West Papuan including Asmat Dani
31 Papua New Guinea Mae-Enga, Dani, Tsembaga
32 China Tibetan, Uighur
33 Mongolia Mongolian
34 Japan Ainu
35 The former USSR Yuit, Kazakh Saami Chukchi, Nemet
Oceania
36 Australia Aborigines
37 New Zealand Maoris
Pacific Islands Kanak, Hawaiian Tahitian Chamorro

CONTINUED ON PAGE 82

Advertisement

Power Pyramid™ Awakens New Dawn

Let the Power Pyramid Lull You To Sleep, Transport Your Soul into 12 Amazing Universes, and Awaken You to the Light of a New Day

With a Power Pyramid on your desk or by your bed, you can escape the stress of your day by launching into 12 different aural universes, listen to AM/FM radio, and awaken each morning to a magical prism of light.

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- Crystal Capstone alarm activation
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- Digital library of 72 sound effects.

By Dane Spotts

Before I drifted off to sleep last night, I punched the button marked Pyramid Visions on my Power Pyramid. I was instantly launched 4 000 years into the past. Surrounded by 3-D sounds of night along the Nile, in a strange way I was comforted by ancient familiar feelings. And wow, did I dream. Awesome, lucid visions of another time and place.

Awaken to a Crystal Dawn

Only minutes passed (or so it seemed) and it was morning. I could hear the 3-D soundscape of a Spring Day, one of 12 complete universes programmed into the Power Pyramid's sound generation matrix. I yawned, stretched, and opened my eyes to look at the Pyramid clock display, which read 6:45 a.m. The Pyramid's Crystal Capstone glowed with radiant light, announcing the dawn. Incredibly refreshed, I got up, reset my Pyramid to the Mental Energizer mode (one of the 4 mind empowering environments), and got ready for the day.

Time Machine Built by Extraterrestrials?

More than just a tomb for pharaohs, the great pyramids, some historians believe, may actually be time machines. Ancient devices with mystical powers that (if you have the key) can project and store thought energy — a vast library of consciousness waiting to be opened. Who built them and why? No one really knows, but those who have spent a night in the Great Pyramid report strange phenomena: out-of-body experiences, and amazing psychic visions.

Now, with a Power Pyramid on your desk or by your bedside, you can launch into 8 different aural universes or 4 mind empowering environments, listen to AM/FM radio, and awaken each morning to a magical dawn of light and sound.

Transport Your Soul into 12 Amazing Universes

Look: the Power Pyramid uses a totally new technology for sound generation. It's something we call "Random Event Processing." My staff of audio experts and engineers spent the last year crafting the perfect environmental sound machine/dream seducer ever conceived. The result? When you punch in one of the universes, you don't end up with one boring sound effect looped over and over again. No. You get a harmonic universe of amazing sounds programmed to occur randomly, without recognizable repeating patterns. This is a huge breakthrough in sound machine technology because your brain becomes immersed in a virtual 3-D soundscape, just as in real life.

Twelve separate universes pull digital sound effects from the sound chip library, which includes 16 megabytes of memory. (See sidebar for a rundown on the Power Pyramid's 12 environments.) These sounds are then mixed according to the Random Program Generator built into the microcomputer which tells your Power Pyramid when and how to mix the sounds.

Push Chants/Angel's Song (#6) and it's as if you've gone to heaven. Try Amazon Rain Forest (#8), and you're in the middle of a Brazilian jungle. You can even program the Pyramid so you can fall asleep with one universe and wake up to a totally different one. Your Power Pyramid functions as a full alarm clock and AM/FM radio, too.

The Ultimate Desk Accessory

The Power Pyramid isn't just for sleeping and dreaming. I also have one on my desk. At the touch of a button I can launch my mind into any of the 12 different universes — to relax, focus, and escape the stresses of the outer world. Or condition my mind for success (4 of the universes use a special Zygon mind booster technology).

Some folks use the 3-D sound environments during the day to help meditate or focus their mind. Others dial in their favorite news or music stations on the built-in AM/FM radio. And with the glowing crystal of the special alarm function, you can alert yourself to important appointments. When your visitor arrives, the first comment is usually, "Wow! Where can I get one of those?"

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Perhaps the neatest feature (and the most difficult to describe) is the Crystal Capstone. Not only because it looks so impressive, but because it's programmed to fire a magical prism of light that illuminates your room with radiant beams. When your alarm triggers, you awaken to a light and sound show that is simply out of this world.

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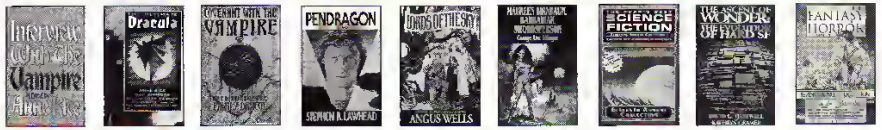

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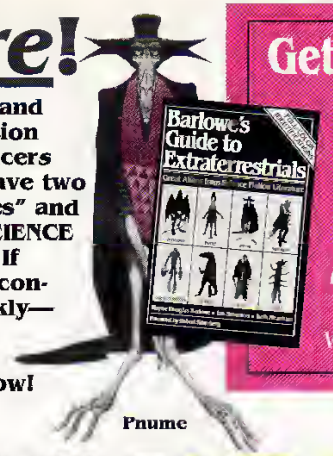

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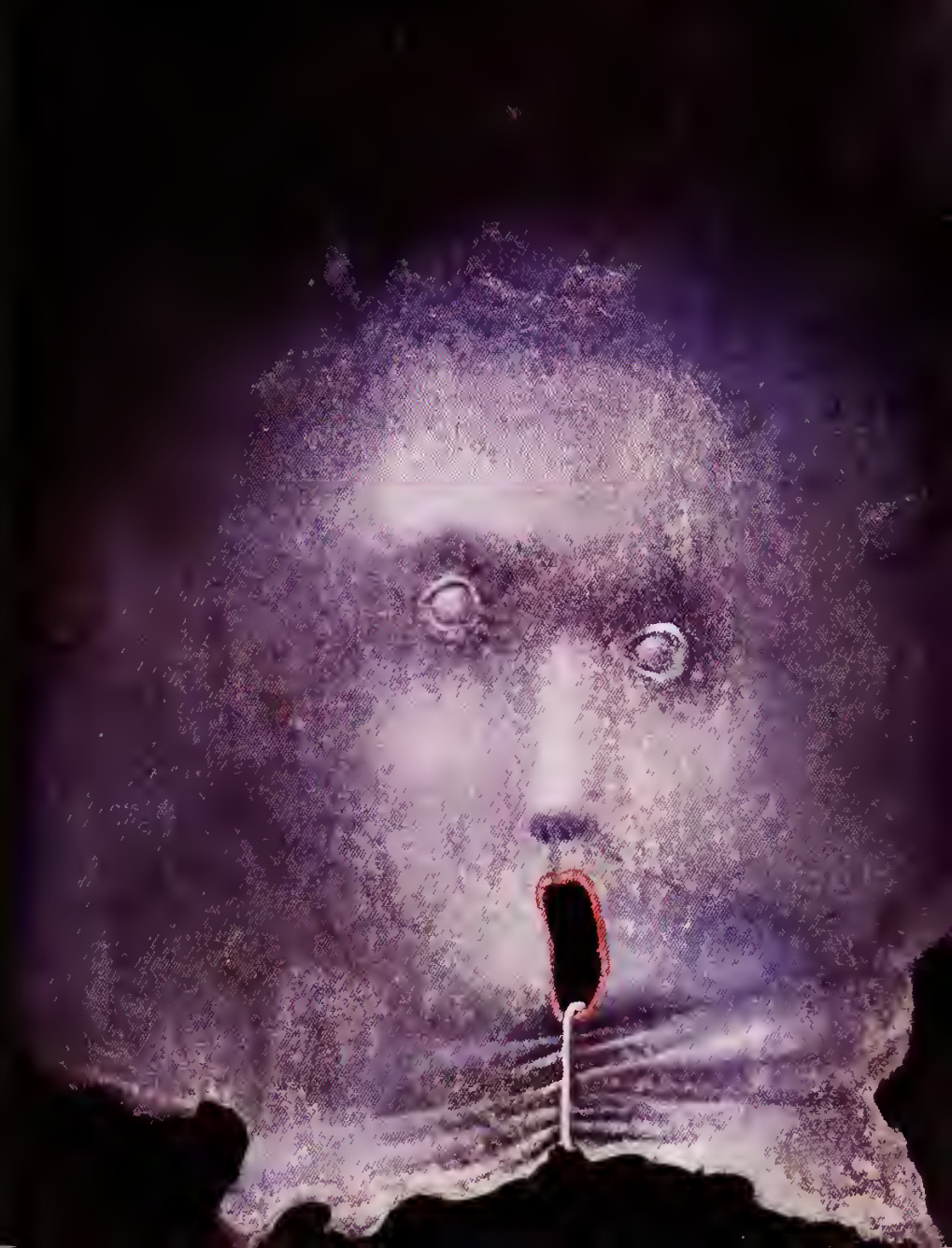
Robert Roth was due to meet me at six-thirty; I waited until eight, then I called him at home. I let the phone ring for a minute. My finger was half-way toward the off button when the dialing tone cut out. I put the phone back to my ear.

VOLATILE



NOTHING.

"Robert?"

I heard shuffling, a muted cough.

I said, "We were due to meet."

"I'm sorry."

"Robert?"

"Abigail. My dad—"

"Is everything okay?"

Firmly, with the precision drunks use, or stammerers, controlling their speech by force of will: "Everything is okay. How are things with you?"

"I'm worried about the film," I said. We were making a twenty-minute animation for Channel 4. His picture cut had arrived on U-matic that morning. I'd thought at first the tape was blank. Even now, I still clung to the hope that something technical had gone wrong, he couldn't have *meant* it, surely?

"Too long? Is it too long?"

"What do you mean, 'too long'? It's the content I'm worried about."

"Why?"

"There isn't any!"

He said nothing.

"Robert?"

Had I offended him? Well, what if I had? What reaction had he expected from me? I gritted my teeth. "Robert," I began, sweetly, "I'm sorry if I—"

"I think ... all wrong."

I couldn't tell if he was upset, or ill, or just half-asleep. I knew looking after his father exhausted him, but I had never heard him as bad as this.

"I'd like to talk it through," I said. "Can I come round?"

"Sorry."

"What?"

"I was supposed. We were going to meet. Your office."

"How's Nicholas?" I asked him, sure by now that something was wrong. "How's your dad?"

"My father is well," he announced. "How are you?"

He wasn't making sense. He wasn't listening to me. I began again: "I picked up Nick's medicine. Shall I pop round with it?"

Robert's father got his medicine direct from specialists in Harley Street. I worked in Rathbone Place, not ten minutes' walk away, and while Robert was working in his studio in New Cross I had been collecting the prescription: a bottle of plain white tablets in a brown glass bottle. But for the label on the front, they were indistinguishable from aspirin.

"Robert, I said shall I pop round with it?"

"Lots of trouble," he said.

"No trouble at all," I said, "you're on my way home. I'll see you in an hour." I put the phone down before he could frighten me any more than he already had, made sure the bottle from the surgery was in my bag, threw in Robert's videocassette, and headed downstairs.

I drove round the Elephant and Castle up Camberwell Road, left up Dog Kennel Hill and into East Dulwich. But rather than turn up Melbourne Grove toward home I headed east, across the Rye, to Robert's flat.

Robert and his father lived in the attic of an Edwardian terrace house on a quiet, tree-lined road, its gutters thick with gray leaves and old crisp packets. Opposite the terrace rose three squat council blocks on a slope of thick grass and scanty trees. I parked in the lee of the nearest block, the hill was steep enough that I left the car in first gear in case the hand brake failed.

I reached Robert's house and glanced up. The windows were dark. I went up the steps to the front door and rang the bell. I heard nothing. I stepped back and looked up. There was still no light. I glanced at my watch, it was barely nine. I rang again, and when there was no answer I crossed the road and tried peering through the windows.

I thought perhaps Robert had fallen asleep. Perhaps his father was frightened to answer the door. The curtains weren't drawn, and after a moment I thought I saw movement in the darkened room. I called: "Nicholas?" Crows criss-crossed and criss-crossed the window, flapping untidily from tree to tree like scraps of

CONTINUED ON PAGE 92

INTERVIEW

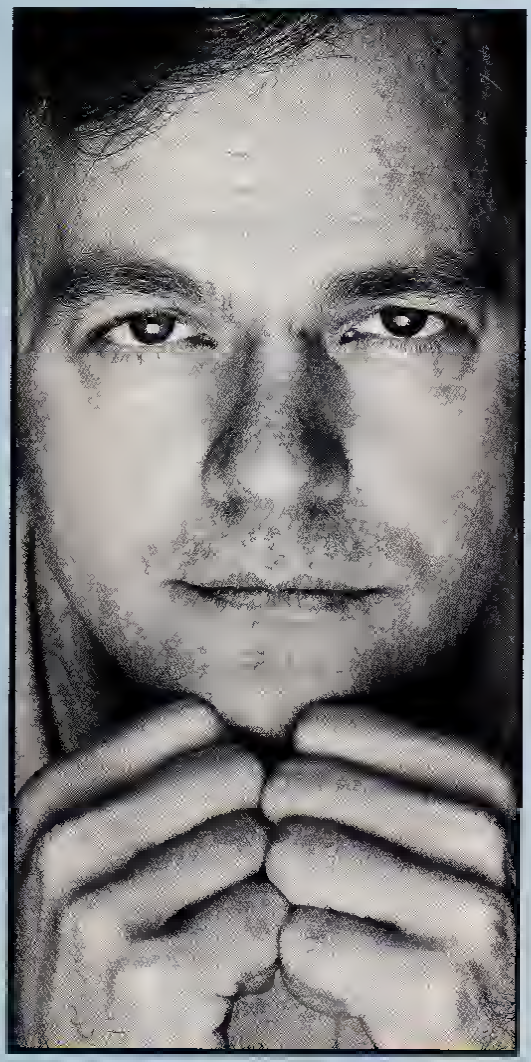
PAUL EWALD

IF EVOLUTIONARY BIOLOGIST PAUL W. EWALD IS RIGHT, THE KEY TO CONTROLLING THE AIDS VIRUS IS NOT A VACCINE, NOT AN ANTIVIRAL DRUG, NOTHING FROM A TEST TUBE, BUT A MASSIVE ORGANIZED CHANGE IN HUMAN BEHAVIOR

NOT LONG AGO, WE SEEMED TO BE LIVING IN A WORLD MADE SAFE FROM INFECTIOUS DISEASE. SMALLPOX, DIPHTHERIA, polio, whooping cough and yellow fever had been conquered; tuberculosis belonged to the quaint landscape of nineteenth century novels; an epidemic on the scale of the Black Plague seemed the stuff of legend. Then along came the Human Immunodeficiency Virus (HIV).

Chairman of the biology department of Amherst College, Ewald is the author of *Evolution of Infectious Disease*, which details how HIV became so deadly and why infectious diseases still loom large on our horizon. Now 40, the Smithsonian's first George B. Burch Fellow of Theoretical Medicine and Affiliated Science, compellingly explains how Darwinian ideas of fitness and natural selection apply to parasites. Like birds, lizards, and manatees, pathogens causing disease are subject to evolution, the difference being that theirs is rapid, measured in weeks and months instead of eons.

If you're a disease organism—a point of view Ewald likes to adopt—your goal is to survive and produce more offspring than competing organisms. One strategy is to multiply as fast as you can inside the host; but—here's the catch—if you make too many copies of yourself you risk killing, or at least immobilizing, your host before you can be spread. Changes in circumstances, including human behavior, can shift a pathogen from mildness to virulence, or vice versa.



PHOTOGRAPHS BY JESSE FROHMAN

The influenza pandemic of 1918 might never have occurred, claims Ewald, without the trenches of World War I. HIV, he theorizes, began centuries ago as a mild affliction in an isolated population. In the Sixties and Seventies, war, drought, and urbanization in East Africa created a climate where prostitution flourished, and the virus was able to travel rapidly from host to host, whereupon it evolved to cause the lethal syndrome we know today as AIDS. In contrast, most of West Africa was spared such social upheavals and, not coincidentally, the viral type HIV-2 found in West Africa is much milder than HIV-1. Our best hope of ending the AIDS epidemic is not a magic bullet, according to Ewald, but a proper understanding of evolution. We already know behavioral factors such as condoms, sterile needles, and safe sex could curtail the spread of infection. Now Ewald tells us they could actually change the virus itself—into something we could live with.

ON THE BUCOLIC AMHERST CAMPUS, WHERE IVY-COVERED NINETEENTH-CENTURY RED-BRICK BUILDINGS FORM A PERFECT QUADRANGLE, I WONDERED IF I'D WANDERED INTO A BROCHURE DEPICTING COLLEGE LIFE IN NEW ENGLAND. AT FIRST GLANCE, EWALD LOOKS LIKE SOMEONE YOU MIGHT MEET AT THE WHEEL OF A PORSCHE OR HIKING WITH ALL THE RIGHT equipment through a redwood forest. But after a few minutes I realized he would likely go without food or sleep—let alone the right clothes—for days, to monitor a good experiment.

When he grew up in the suburbs of Chicago, his bug collection overran the house. And he followed his bliss into adulthood, with a biology major from the University of California at Irvine to a Ph.D. in zoology from the University of Washington. When he is not teaching or thumbing through five-pound epidemiology bulletins, he spends his time fixing up the eighteenth-century farmhouse he shares with his wife and two children.

But if Ewald appears to live a charmed life, he also lives on intimate terms with the sheer magnitude of AIDS' geometric progression—not to mention other premonitions of other plagues in the making. It can't be easy to be a Cassandra, to foresee all the suffering that lies ahead. Since my introduction to the secret life of pathogens, I know I've come to see the world as a more dangerous place.—Judith Hooper

Omni: What is a parasite?

Ewald: It depends on whom you talk to, but I define it as an organism living in or on another organism and causing harm to that organism. What is harm? Probably the least ambiguous way of defining it is a negative effect on the fitness of the host organism.

Omni: Is a virus a true parasite?

Ewald: Yeah, sure. Some people require that parasites be made up of cells, but for nearly a century many biologists believed all life had to be formed of cells; they thought they'd found the fundamental unit of life. Then they found viruses that cause disease and are much smaller than cells and lack cellular organization—just genetic material and a protein coat. But instead of saying, "Wait a minute, we were wrong about all living organisms being made up of cells," they said, "Oh, viruses are not living organisms." They didn't want to throw away the model. Okay, don't call viruses organisms—call them something else—but the central issue is that they reproduce, using the same machinery other life forms use.

Omni: Aren't parasites an odd preoccupation for an evolutionary biologist?

Ewald: They're certainly something few evolutionary biologists were studying. Since the discovery of germs about 100 years ago, most people writing about the evolution of infectious diseases were health scientists who didn't understand evolution. They couched their arguments in terms of benefits to the species rather than differences in the passing on of different genes. And they concluded that diseases always evolve to a mild state, because any disease organism that harms its hosts harms its long-term chances of avoiding extinction.

Omni: What's the basic misunderstanding? It's not the species as a whole but the individual that counts in natural selection?

Ewald: Right. Natural selection is the result of competitive advantages individuals have over other individuals within the species. If an individual reproduces better than another, in the future there'll be more copies of the instructions for those characteristics that made the individual a better competitor.

Omni: And this is as true of hummingbirds or yaks as of viruses?

Ewald: For any living organism. That's why evolutionary biologists' eyes light up when they hear these ideas, because they're based on fundamental principles. If you produce six offspring in a generation, your instructions are going to be represented in the next generation more than an individual that produces four. The benefits of extensive reproduction for a disease organism inside a host are obvious.

The question is, when do you start paying a price? You pay a price when the organism starts making the host immobile, because mobility is often important for transmission. Say I've got a cold, and the cold organisms reproduce so extensively I feel too ill to do anything. I'm forced to stay home, which severely limits the spread of the organism. If that were the only factor involved, the disease organisms would generally evolve toward a more benign state. But that's not always the case. One kind of transmission that immobilizes the host perhaps without incurring any costs is that by insects such as mosquitoes.

Omni: The insect just bites a sick person and flies off to infect somebody else?

Ewald: Sure. In fact, a person ill with malaria, say, will be less likely to swat mosquitoes. So disease organisms transmitted from an immobilized infected individ-

RECENTLY WRITTEN:
Evolution of Infectious Disease

ON MEDICAL HUBRIS:
We'd eradicated smallpox. We knew how to control diphtheria, measles, whooping cough. We figured we had the tools—antibiotics, vaccines, ecological approaches such as mosquito control. But all these set evolution working against you.

SMART VIRUS:
HIV

STUPID VIRUS:
Smallpox

PRIMATE CONCERN:
Quite possibly the HIV virus went from humans to chimps. If so, we'd better keep track of it in chimps because they change sexual partners frequently, and if it evolves to increased virulence, it could wipe out much of the chimpanzee population.

ual to a susceptible one should evolve to high levels of harmfulness. And arthropod-borne diseases such as malaria and yellow fever, do tend to be highly virulent

Omni: How do evolutionary principles apply to such diarrheal diseases as cholera and dysentery?

Ewald: Does the infected individual need to be mobile to transmit the disease? In places with unpurified water supplies, mobility becomes unnecessary Somebody's going to wash the soiled clothes and bed linens and the contaminated water will act like a horde of mosquitoes moving pathogens from an infected individual to the rest of the population I studied whether different disease organisms showed a statistically significant association between water-borne transmission and mortality And there was

When you purify a water system the virulent strains drop out, leaving the mild strains. It works like clockwork The United States started purifying its water around 1900 When we finished at the end of the Fifties, the transition to the mild strains of the dysentery organisms was complete. The strains we had at the turn of the century are the same kind of bacterial dysentery organisms that caused the death of thousands in Central America in the Seventies Including some North American tourists

Omni: To prolong an infection over years a pathogen must avoid being destroyed by the host immune system How does HIV do this?

Ewald. With HIV—or any venereally transmitted pathogen—the pathogen that reproduces quickly and continuously will have difficulty getting into new hosts if people change sexual partners infrequently If they change partners every five years, say then either the immune system will likely knock out the virus or the infected person will die after a short time Either way the virus won't survive long enough to be transmitted So the requirements for transmission will favor viruses able to be infectious for a long time One of the best ways to do that is to go into a latent phase. Retroviruses like HIV are good at this because they infect a cell and copy their RNA into DNA Their DNA then inserts into our DNA, so they just sit there without doing much for a long time Of course, the virus doesn't sit there thinking, *What strategy should I use?*

Omni: How does natural selection work on HIV?

Ewald: HIV mutates very rapidly so many different variants of the virus can potentially coexist even within a single person This variation is the raw material on which the culling process of natural selection can act Rates of evolution depend on two factors time and the intensity of selective pressure How many individuals of one variant are dying out or not being passed on, relative to another variant? Because disease organisms have a very short generation time and intense culling this leads to rapid rates of evolutionary change By the time a person has AIDS, the virus is more severe than it was soon after infection and is reproducing quicker You could get evolution within a five- to ten-year period in a single person

Omni: Why does a patient become resistant to AZT after a time?

Ewald: AZT inhibits replication rate—for a time It interferes with the enzyme, reverse transcriptase, so that it can't copy the RNA code into DNA code. But if even one amino acid in the enzyme changes, it may reduce its binding to AZT but can still synthesize DNA from RNA Giving people AZT distavors HIV variants blocked by AZT, so it leaves variants that aren't blocked These forms will predominate, and after two years almost all variants can reproduce themselves well in the presence of AZT.

Omni: At that poinf patients are sometimes treated with DDI—but the virus does the same thing with DDI Might a combination of drugs wipe out all the HIV variants?

Ewald: That's what people have been hoping for, but the virus seems to evolve resistance to the combinations we can generate There may be 5 10 or 15 ways the virus can change ifs conformation We know of five mutations right now that change ifs shape to allow it to continue to form DNA in the presence of AZT Many more we don't know about, as well as different combinations of those mutations

Omni: Several years ago the U S policy was to initiate AZT treatment when patients' T-cell counts fell below 500, but that seems to be changing Didn't you argue against premature AZT treatment for years?

Ewald: In Europe, they were using a more sensible criterion T-cell counts below 500 and rapidly falling Many people with counts below 500 are at least five years away from experiencing the first symptoms of AIDS. So they'll probably be getting an AZT-resistant form of virus by the time they really need that drug The optimum time to begin AZT depends on whether the patient wants a longer symptom-free period or if he wants better control when

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CARNIVAL

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ing. Then, grinning madly, she places it on her tongue and closes her lips around it, leaving half hanging out so she can suck it in like a piece of spaghetti. Her chewing is exaggerated and she shows the squealing audience the mashed-up worm on her tongue before she washes it down with a bit of liquid refreshment.

The Bug-Eater is a staple of the old-time sideshow entertainment, and most modern audiences find this sort of act highly disturbing, especially so because a woman is doing it. Later in tonight's performance, Lady Julianna (real name: Julianne Manchur) will disconcert everyone further by eating glass as well and then will top off her part of the show by lying on the Bed of Nails.

Except for the tent of hoochy-koochy dancers and the odd tattooed woman here and there, the carnival sideshow was dominated by men. But in the process of sideshow being reinvented as the theater of cruelty for the twenty-first century, it isn't just a man's world anymore. When she lies on the Bed of Nails in her backless dress, the audience is simply in awe, especially when the ringmaster stands on her. Afterward, when she gets up again, she displays her back for the audience so they can see that there is no trickery, no illusion. A woman who eats worms and glass, a woman with marks on her back from a bed of nails—does this disturb you? The Carnival Diablo performers would only smile and say, good, it's supposed to.

Carnival Diablo's Eric E. Everlan is an accomplished escape artist as well as a sideshow performer. This tour is the first outing for an escape he developed, an arrangement in which his wrists and neck are chained to a wooden board. He calls it the stocks, though onstage the effect suggests crucifixion as well.

This is one of the audience-participation portions of the show, in which the ringmaster prevails upon someone sitting close to the stage to come up and lock the chains around Eric's neck and wrists, someone who can later tell everybody else that they were real chains and real locks. Audience participation is another sideshow tradition. Today, we might describe this as interactivity—the old-fashioned way, and it is definitely not the safe and sanitary interactivity of the high-tech era. There is a certain riskiness—any stranger plucked at random from an audience is an unknown quantity and some are less manageable than others. Tonight, the man selected for the task turns out to have had more to drink than anyone realized. Despite several stern warnings from McClelland, the man tried to fasten the neck chains too tightly. Hours later, after closing time, someone claimed that the man was currently out on bail with murder charges pending.

Eric touches the red marks on his throat reflectively, that wasn't the most dangerous thing he did tonight. He could have lost a finger when the animal leg-hold trap closed on his hand, and he risked real injury to his spinal column when the ringmaster threw darts at his back—they lined up perfectly, one atop another, along his backbone.

All in a night's work—torture feats are also mainstays of the traditional sideshow. Being chained around the neck by a possible killer, however, does throw him for a moment in a way that being fried in the electric chair by the ringmester does not. It may seem odd that a man who lights a torch off his tongue from the electricity coursing through his body every night would be so disturbed by such an encounter, and it makes for a very freaky story—pun intended. Tonight, these performers who bill themselves as freaks came face to face with someone far more outré than they are.

> IN WESTERN CULTURE, WE SEEM TO HAVE FORGOTTEN THE MAGICAL PART OF OURSELVES. SIDESHOW IS JUST A MODERN WAY FOR A PRIMITIVE CULTURE TO COME TOGETHER AND SEE THE SHAMANS PERFORM THEIR MAGIC.

But then, sideshow outré is a different brand of grotesque altogether, more like a mirror of the society it lives simultaneously in the midst of and apart from. "Sideshow is part of the now, it's always there," McClelland told me. "People today," he continues, "have more than enough problems of their own. They don't want to see any whimsical fancy-assed little flower show. They need something that's going to wake them up."

While Carnival Diablo is authentically old-style sideshow, McClelland loves current technology and all the possibilities it presents for building the better sideshow entertainment. He plans to use animatronics so that tomorrow's audiences can meet John Merrick, the Elephant Man, and JoJo, the Dog-Faced Boy, and the most famous Siamese twins of all time, Chang and Eng. "These are the kinds of things that give sideshow a historic value but also give it a really nice bend to the future. If I could, I'd have a holographic image of Barnum, even if it was just on a small pedestal on the stage, to introduce the show."

Even virtual reality—he'd love putting an audience into VR helmets just for the sake of giving each person an extra jolt. Perhaps he should be wired for his fire-eating act, with the audience wearing helmets during that portion of the show. 'So they see the torches coming toward their faces and they see the fire leaving their heads,' he says. 'I think that would be an interesting thing, because the primal thing that all animals have is the fear of fire."

Primal creatures may well describe the sideshow audience of the future. "When you're watching the sideshow, we're in control, and your emotions are not in control anymore—you're not going to know when you're going to feel aversion, or fear, or anything else. And you could turn your head, but you won't."

True enough—one would expect a lot of people in the audience to turn their heads when McClelland goes into his impaling act, which is both excruciating and sadistically beautiful to watch. More than anything, it is thorough, performed slowly, so that everyone in the room can see the skin on McClelland's arm tenting on the point of the needle before it goes through the flesh. But while there are gasps and hollers, some revolting and some almost lascivious, no one turns away from the sight.

Eventually, McClelland plans to take the sideshow out of the clubs and put it back inside a tent, where it got its start and where McClelland feels it really belongs. So someday in the not-too-distant future, enthusiasts will go out to some fairgrounds and find, amid a number of brightly-painted banners picturing things like The Bed of Nails and The Bug-Eater, a blood-red tent with a sign over the entrance proclaiming Carnival Diablo and underneath, Freaks, Freaks, Freaks. A man in the ringmaster's outfit with a sinister smile on his too-pale face will be waiting for them, chanting a seductive invitation: Alive! Alive! Alive!

LAST CHANCE

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back through legal channels and protests which have attracted international attention and support.

The world's approximately 500 million indigenous people, sometimes called "first peoples," are found throughout the world, from Australian Aborigines and African tribesmen to Native American and Amazon Indians. Conversely and perversely, they are also described as the "Fourth World," firmly lodged at the bottom of the global socio-economic pecking order.

Summing up their plight, veteran campaigner for indigenous peoples' rights, Jason Clay, remarked, "What we're talking about here is a quiver of arrows between them and cultural extinction—they have nothing else with which to deal with the problem." Similarly, Julian Burger, a U.N. coordinator responsible for indigenous peoples, explains that "indigenous cultures are threatened by forms of contemporary development when they are removed from their lands. However," he points out, "they are not victims. They are organizing in order to defend their interests."

Despite this bleak assessment, there are signs of significant change. In the political arena, the United Nations, heretofore intractable on the issue of sovereign rights for indigenous peoples, designated 1993 as the U.N. Year of the World's Indigenous People. It has been a critical window of opportunity for the cause, providing a world platform for debate, raising money for community projects, and drawing up a universal Declaration of Indigenous Rights. Rigoberta Menchú, the Guatemalan Quiché Indian and 1993 Nobel Peace Prize winner for her crusade against the brutal repression of her people, was named goodwill ambassador for the U.N. indigenous year, and has successfully launched a Decade of Indigenous People, which began in 1994, to extend and expand the program.

Considerable hope has also been generated by President Clinton's pledge to address the needs of impoverished Native American Indians, with speculation that he will support the indigenous cause internationally.

Indigenous peoples themselves have now also actively joined the fight to defend their rights and resources through protests and the courts, aided by media campaigns by private organizations like Cultural Survival and the Body Shop. Both of these organizations also help them economically by creating markets for sustainable products they harvest from their wild homelands.

Meanwhile, back in the lab, the tribal gene bank will allow scientists to study the origins of vanishing tribes long after they are gone. It is part of a much larger international project by the London-based Human Genome Organization (HUGO) to map all the human genes. When all the information is in, the tribal gene bank will be used to help draw up mankind's entire family tree, revealing how humanity colonized the planet over the past 100,000 years.

The project has already identified as many as 600 groups of interest. This number will probably be reduced to about 100 distinct or pure ethnic groups, including the Marsh Arabs in southern Iraq, believed to be descended from the ancient Sumerians and currently threatened by Saddam Hussein's plan to eliminate his Shi'ite political foes; Stone Age Amazonian Yanomamo Indians and highland Papua New Guineans, both threatened by invasion of their lands; and African pygmies and bushmen and the Ainu peoples of Japan, all threatened by assimilation.

In his genetic study of tribes to plot the migration of man across the planet over millennia, Cavalli-Sforza has already had considerable success as a pioneer of "gene geography," since he first began gene mapping 40 years ago. His earlier research supports archaeological evidence that mankind first emerged from Africa 100,000 years ago and demonstrates that intensive farming practices which began in the Fertile Crescent led to a population and cultural explosion that triggered migration across Europe. The establishment of communities and cities effectively froze genetic drift, making it possible to track movement through genetic similarities. For example, the timing of the diffusion of farming showed that the spread was slow and regular, taking some 4,000 years to cover the approximately 4,000 kilometers from the Fertile Crescent to the remotest area north of Britain—a rate of 1 kilometer a year.

Perhaps the most compelling and widely cited argument for safeguarding indigenous environments (and hence their human inhabitants) is the environments' unequalled abundance and diversity of medicinal plants. The case has again been made by various researchers who say that many indigenous lands, especially rainforests, may hold the key to treating pernicious ailments like AIDS, cancer, and heart disease. Genetic scientists argue that preserving precious indigenous knowledge to unlock the secrets of potential plant species is an

essential element in the equation.

Although 1.4 million plant species have been cataloged, there may be as many as 100 million different species, of which up to 80 percent are found in raintorests. One estimate further claims that about 80 percent of the world's population rely on plant-derived medicines for health products.

Recent discoveries of cancer-fighting extracts from plants as diverse as broccoli and the yew tree have sparked a scramble to find other miracle cures. As a result, chemical prospecting, biodiversity, and ethnobotany are among the new mantras in pharmaceutical boardrooms in the race to capitalize on biotech products. In the United States alone, 25 percent of all prescription drugs are plant-derived, and the biotech industry, currently worth $2 billion a year, is expected to soar to $50 billion by the year 2000. Businesses are beginning to realize that preserving the raintorest is an investment in that future.

Scientists have recently discovered that raintorests are actually more profitable left standing for their medicinal uses than cut down for lumber, farming, ranching, or new settlements. For instance, in a recent study, Dr. Michael Balick, director of the Institute of Economic Botany at the New York Botanical Garden, studied small plots of native forest which yielded herbal remedies worth $1,346 per acre, based on sustainable yields. In contrast, clearing rainforests for agriculture is worth only $137 per acre in Brazil and $117 per acre in Guatemala.

According to Dr. Balick, "It seems clear now that the decision whether to cut a forest or preserve it revolves around the question of how much money a farmer can make, how effectively he or she can feed the family. One of our jobs is to find economically viable alternatives to deforestation."

Scientists have also demonstrated the flaw in the argument that old growth forests can simply be replanted. Studies clearly show that understory flowering plants of replanted secondary forests are only one third as abundant and only one-half as diverse as in original old-growth forests, and may take as long as 1,000 years to fully recover.

Through his work for the National Cancer Institute, Dr. Balick is involved in a $1.2 million, five-year partnership with colleagues from many countries, including Belize, working directly with traditional healers to evaluate, promote, and preserve natural medicines. If any successful medicines are developed, royalties will be paid to the indigenous communities. A similar effort to preserve and prospect for medicinal plants in the forests of Costa Rica has been sponsored by Merck & Company, the world's largest drug maker, which has invested $1 million in the project and also promised royalties for any successful drugs developed.

Dr. Balick also points out that the value of plants is intrinsically tied to indigenous peoples' knowledge of which plants are useful and how to prepare them. But he warned that much of that precious knowledge is being lost forever as forest-dwellers increasingly come into contact with the outside world.

"I work with the Maya, for example, in Central America," Balick said, "who were thought to have crossed the Bering Strait 25,000 years ago. By my calculations, that's given them at least 200 generations of trial and error experimentation to become familiar with their environment. And most of this is being lost in this generation."

"The great tragedy," he continues, "is that we are on the cusp of identifying hundreds if not thousands of useful plants for medicine, food, and fiber, and the forest is being converted at unprecedented rates. It's a false economic analysis that leads to the conclusion that land is more valuable cut than forest left standing. It's terribly sad to see 300-year-old trees being cut down, and then the fires that follow. You see devastation of both plant and animal life, and you know that devastation to humans is not far behind."

The level of suffering for native peoples was all too apparent at the Kari-Oca Indigenous conference in Brazil. Between colorful spectacles—of Xingú Indians daubed in bright body paint and blowing bamboo pipes, Karaja Indians donning exquisite feather headdresses for photo sessions, and plaintive song rituals by Japanese Ainu and Norwegian Sammi peoples—native spokesmen sat grouped in circles and testified about the systematic destruction of their people and their environment.

Mimmie Degawan spoke of the "Total War Policy" by the Philippine government to eliminate resistance to hydroelectric and logging projects on ancestral lands. "If the government takes away our land, we will starve and cease to exist as a people," she said. "So we have to resist—to resist is to exist. They not only walk through the land and kill people, but also drop bombs on entire communities."

Sinjbout Jackman recounted how the new civilian government in Bangladesh has pursued a policy of genocide against the Jumma hill people. In one recent massacre, soldiers herded 1,200 villagers into their homes and burned them alive. Murder, torture, and rape

remain daily terrors for the Juma. Jackman said, "My people have been compelled to leave their own villages and forced to live in cluster villages like in Vietnam and Peru. They are effectively enslaved, working for the military camps and the forest service. The government doesn't want us, they want our land."

Charles Uwiragiye of the African Batwa pygmy tribe in Rwanda, the world's fastest growing country, related how population explosion had triggered an invasion of his tribal lands. "We are the first people, the indigenous people, but two other tribes came in and took everything," he said. "We have problems of being removed from our lands, and other people replacing us. My people were thrown away, just like you throw away rubbish."

The desperation was summed up by Kanhok Kayapo of the northern Brazilian Kayapo tribe. "We need help to stop the white man from cutting down our forest and killing our people. The white man says Indians don't work, don't plant, and sends his machines to plant for himself. But the Indian does work, with the plow, and plants many things. He asks why the Indian wants to live in the forest, but he doesn't want to live in the forest. He just wants to take it away from us." His brother, Tutopombo Kayapo, added, "Who is going to help us? Will any government help us? I don't think so. I have asked before, and nothing happened, so I'm asking again. You say you don't want the forest to be burned away. So send us money to help my people, to buy medicine so they don't die. We will use it to keep the woods safe."

Threaded through these countless stories of invasion, slaughter, and displacement is the stark realization that the laws of nations were never designed to protect their rights. Worse still, many governments do not even recognize the existence of these tribes as a legitimate group of peoples.

Closer to home, in the United States, there is considerable concern about the fate of Native American Indians. The Oglala Sioux Indians in South Dakota, descendants of those who suffered the horrific defeat at Wounded Knee, are among the poorest citizens in America. According to the government's own Census Bureau statistics, 63.8 percent live below the poverty line, compared with the national average of 15.1 percent, and death rates from suicide, alcoholism, infant mortality, diabetes, and homicide are some of the highest in the country. Among Native Americans' many concerns are disputes over sovereign rights, land rights, gambling casinos on reservations, and efforts to entice reservations to accept toxic and nuclear waste.

Robert Leavitt, the former education and public policy director at Cultural Survival, a Boston–based organization supporting indigenous rights worldwide, is nonetheless optimistic about changes to come. "Clinton made some effort during his election campaign to reach out to Native American Indians," Leavitt noted. "He has since followed through in terms of further consultation with Native American leaders and in terms of making several appointments. Al Gore is at least knowledgeable and understanding of native affairs, and when they organized the Oregon Forest Summit, they asked Native Americans to participate. Hillary Clinton has talked about the deplorable state of health care on reservations. Ada Deer, the incoming head of the Bureau of Indian Affairs, is very well-respected and is a Native American Indian, which is not usually the case. Carol Browner, the head of the Environmental Protection Agency, is concerned about the government and companies targeting reservations for toxic and nuclear-waste dumping. Bruce Babbitt, Secretary of the Interior, has worked with Native Americans in Arizona. So on the Native American Indian side, we're more optimistic, and there should be some steps forward."

The current education and public policy director at Cultural Survival, Marchell Weshaw, is similarly encouraged. "I'm indigenous myself, so I see the whole indigenous rights issue on a personal level as well as a professional one. I do see conditions improving. The indigenous peoples—as communities and as nations—are coming together to make a stand. The positive aspect is that they're doing it for themselves. I also think that public awareness has grown steadily within the last five years, riding piggyback on the environmental movement."

On the other hand, Leavitt notes that there had been much less support from the Clinton administration for global indigenous rights and a signal lack of financial commitment. "There's a real unwillingness to accept the idea of group rights on an international level—that groups, peoples, collectively have sovereign rights over land, natural resources, and governance," he says.

The United States has rejected an appeal to fund the U.N. Year of the World's Indigenous People. A State Department official said the United States was in substantial arrears to the United Nations already and owed millions more for peacekeeping activities, adding, "That's not to say the year isn't

important. It's a matter of having to make choices. We have obligations that we legally need to meet before we can go about making grants that are purely voluntary."

Despite the lack of U.S. support, the U.N. program on indigenous issues, coupled with private projects, remains the best hope of future gains for native peoples. A U.N. voluntary fund has already raised over $300,000 with donations from other developed nations.

Six community projects recommended for approval include two democracy and indigenous-rights programs in Bolivia and the Philippines; a chicken and rabbit farm for Mapuche Indian women in Chile; a reforestation project in Guatemala; a community bakery in Ecuador; and a community center in Belize. The news of the grant for the community center in Belize provoked Garifuna peoples' representative, Felix Miranda, to observe, 'This is good news. The community center will allow us to open a museum of artifacts together with books and displays about our history, and provide a cultural focus for the community.'

Similar projects worldwide by private groups have also provided economic alternatives to environmental destruction for indigenous peoples. Among the best-known proponents of this philosophy is the London-based Body Shop. Through its Fair Trade project, the Body Shop has several co-op agreements with native peoples who produce sustainable products like nut oil in Brazil, Nepalese paper, New Mexico's organic blue-corn oil, Mexican cactus body scrubs, Bangladeshi baskets, and Siberian birchwood combs. Body Shop spokesman Mark Johnston said the company seeks to "make consumerism a moral act. I remember going back to Nepal and being flabbergasted at how well the project had helped the community put all its kids through school and buy smokeless ovens, because smoke-related respiratory ailments are a problem in that part of Asia. It was the same with the Nanhu women in Mexico, who in the absence of their men—forced to find work elsewhere—were able to feed, clothe, and house their children. It's as basic as that, and very rewarding.'

Cultural Survival Enterprises trades in sustainable products like Brazil nuts for Rainforest Crunch, Zambian organic honey and beeswax, Minnesotan wild rice, and Amazon rainforest cookies, with plans for many new product lines. Since its 1989 launch, product sales have totaled $2.5 million, and a 5 percent price premium has yielded another $250,000 which is plowed back into participating communities. The program has attracted another $600,000 from foundations, governments, and businesses to start new projects. Former program director, Jason Clay, said, "People have to take responsibility for their consumption, and ultimately they can force corporations to market sustainable products they want to buy."

As executive director of Rights and Resources, a private Washington, DC, agency which defines and defends native resources, Clay plans to develop an early warning database system to identify and prevent potential disasters for indigenous peoples before they happen. "I think we need to start looking at root causes,' Clay said. "Humanitarian assistance after the fact, when people are in real jeopardy, is fundamentally wrong. We need to be able to see more accurately what forces contribute to persecution, ethnocide, and genocide, so that when those indicators appear, we can target attention on those areas to actually prevent those killings from occurring."

For those involved in the struggle, the strategy for the future is clear. Consolidate the United Nations' lead to defend indigenous rights at both the

QUARANTINE

BY GREG EGAN

Review by Andrew Wheeler

Picture this: on November 15th, 2034, an immense bubble (roughly equivalent to a black hole's event horizon) appeared instantly around the solar system, cutting off the rest of the universe. The stars disappear. No one knows why.

Thirty-three years later, the inevitable disruptions have died down, and people are learning to live with the Bubble—they have no choice. Software that runs on human brains (to do repetitious tasks, keep you alert, and so on) has been perfected, and is used widely. But except for a nihilist terrorist group, the Children of the Abyss (all born after Bubble Day and devoted to chaos and senseless violence), life goes on much as it always did. Until private eye Nick Stavrianos is hired to find Laura Andrews. Laura's severely retarded, with a brain that hardly works at all. She can't even turn a doorknob, but somehow she's escaped from her hospital. For the third time.

I can't tell you what Nick finds when he goes after Laura, but I will say it makes the "big idea" in Greg Bear's *Moving Mars* look like small change. This is a *real* hard SF book, and Egan has taken a cutting edge scientific idea—quantum mechanics—and translated it into fiction. I can't explain any more than that—it would spoil the surprise, and this book is so original I don't want anyone to miss the thrill of discovering it themselves—but I will say that both the Bubble and brain software play an integral part in the plot. If you have a friend who claims that there isn't any really rigorous hard SF anymore, shove this book into his hands. I guarantee he hasn't heard *this* idea before.

Quarantine is available in paperback at book stores and exclusively in hardcover from *The Science Fiction Book Club* on p. 69.

grassroots and international levels, harness science and technology to identify, protect, and safely utilize indigenous resources; economically empower native peoples to finance legal campaigns for their sovereign and resource rights; encourage alternative land use through consumer demand for sustainable products; and build public support for indigenous issues through education and media campaigns.

Many problems remain, from ethnic cleansing in the Balkans which threatens to discredit indigenous calls for autonomy, to the Asian block's refusal to address serious human rights abuses against native peoples, to the resource plunder of Siberia in Russia's desperate search for foreign investment.

Despite many hopeful signs, Clay conceded, "It's still going to be a thousand points of light—not light. For those of us who have been doing this work for the last 20 years, the work in 1995 will be just as hard as the work in 1994, but the work has to go on."

"If over the next 10 years we as a world don't do something, it will be too late for many cultures," Robert Leavitt said. "But we do have a wonderful opportunity to build a much stronger movement for indigenous peoples. What we have to do is institutionalize the gains. The real challenge for Cultural Survival—and other organizations involved—and indigenous peoples themselves, is to cement our gains, strengthen indigenous participation in the United Nations and Native American participation in the U.S. government, and take advantage of popular culture and concern, so that the movement goes from being flavor of the month to flavor of the decade, and beyond." ☒

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INTERVIEW

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he finally gets symptoms.

Data from the large Concorde trial [the joint French-English venture named after the aircraft] indicate that people who are less than a year away from the probable onset of symptoms get a benefit from it. But starting treatment two or three years before symptoms offsets any possible benefits by negative effects—either of the drug itself or those associated with the virus's having developed resistance earlier. So when you really want to control that virus—later on—you can't. I raised this point a few years ago in a manuscript I sent to the *New England Journal of Medicine*. They rejected the manuscript.

Omni: How bad might the AIDS epidemic get before it burns itself out?

Ewald: It will burn through the population of people who change partners frequently without protection. How large that population is will determine how disastrous the effect is on the population as a whole. The Black Plague killed about a third of the people in Europe over a 50-year period, and I think something similar will happen with AIDS in some regions of Africa. But at least we know that by invoking defensive measures, we should be able to drive this organism to a milder state. Anything we do to reduce the rate of needle-borne and sexual transmission should not only curb new infections, but also reduce the harmfulness of the virus. If we could reduce the potential of transmission to such a low level that a person will only transmit the virus once every 15 years on average, then we'd probably knock out most harmful HIV variants within a few decades.

Omni: How mild could it become?

Ewald: Other HIV variants give us a ballpark figure. West African HIV-2 viruses are so mild most people infected will probably die of old age. It seems to reproduce very slowly and it's in a population where people don't often change partners. Some HIV-1 strains seem similarly mild. Researchers have been following a chain of infected people in Australia for years, and none of them has come down with AIDS.

Omni: What factors promoted the spread of AIDS in the United States?

Ewald: If people change partners often, more harmful viruses should overgrow the other viruses. Comparing infections originating among gay men in the late Seventies to those that occurred in, say, 1984—after several years of rapid transmission—you'd expect later infec-

tions to be more severe. You can measure severity by the time between infection and onset of AIDS. That appears to be the case. Using stored blood samples, we pinpointed the time of infection for about 30 gay men who were infected before 1980. None came down with AIDS within five years. But 15 percent of the infections occurring in 1984 caused AIDS within five years.

Omni. Does it look like HIV is now declining in virulence?

Ewald. Perhaps in some groups. After 1984, gay men started having fewer partners and practicing safer sex, so you'd expect the virus to become less virulent. Increased virulence happens on a short-time scale, because it depends on a geometric increase in the number of infections. But decreased virulence takes more time to assess because it results from the death of people having the more harmful viruses. How long will it take the virus to evolve to a milder state? Something on the order of five to ten years. And from 1987 we started seeing an increased length of time between infection and AIDS. Researchers at the National Cancer Institute found the delay of symptoms up to mid 1988 could be attributed to AZT, but from mid 1988 on there was an additional delay. So the next few years will be important for evaluating that trend.

Omni. You're pessimistic about an AIDS vaccine. Why?

Ewald. Vaccines work by introducing particular parts of a virus into a person to trigger an immune response. Viruses have proteins called gp12 protruding from their surfaces that, like a kind of hand, grab onto the parts of molecules protruding from a cell. When a vaccine introduces these proteins into a person, his or her immune cells learn to recognize and attack them. That works well as long as those proteins on the virus stay constant. But the high mutation rate of HIV causes them to change. The immune system wipes out the particular form of the virus that generated the immune response, leaving you with forms that look different. And the immune response can't deal with those forms.

Omni. Couldn't you design an all-purpose vaccine that would recognize features common to all types of the virus?

Ewald. That's what researchers have tried unsuccessfully to do. The best vaccines still leave many uncontrolled variants around, and they are the HIVs of the future. You have to deal with many thousands—probably hundreds of thousands—of variants.

Omni. How did we, for example, design a vaccine for smallpox, then?

Ewald. Smallpox is a stupid virus. Being a DNA virus, it doesn't have a high mutation rate, and it doesn't much change its surface proteins. It's as if all the variants wear the same coat, so once you use that coat as a target, you can get rid of all the adversaries.

Omni. Is diphtheria stupid, too?

Ewald. That's a different twist. When it runs out of nutrients, the diphtheria organism produces a toxin that destroys the cells around it and releases their nutrients. By injecting a vaccine based on the toxin, you induce an immune response that made the toxin impotent. Then the toxin-producing bacteria were spending 5 percent of their budget making these fruitless weapons, while the toxinless forms weren't wasting their valuable resources. This shifts the competitive balance to the milder bacteria forms. It's a model for vaccines of the future. Instead of trying to make vaccines cover as broad a spectrum as possible, we should usually narrow our focus to those proteins making certain strains harmful.

Omni. Can we solve the problem of antibiotic resistance this way, too?

Ewald. An evolutionary approach to antibiotics would selectively use them to treat people with severe strains. In some hospitals, when a patient is found with a severe infection, everyone in the ward is treated prophylactically. That practice should knock out milder strains that could compete with severe ones. People studying hospital-ac-

quired infections now claim harmful organisms are evolving resistance more rapidly than we're generating successful new antibiotics

At present we have no good way of controlling some strains of tuberculosis. For most other diseases we're getting close to the last drug that works. The good news is that when you reduce exposure to these antibiotics, the organisms often evolve back to sensitivity. So antibiotics now ineffective may be effective again several years from now. But that's no consolation to people who have the antibiotic-resistant organism and whose problem is surviving the next few weeks. Over the next 10, 20, 30 years antibiotics will always be useful on a case by case basis, but will not be the magic bullet we'd hoped for.

Omni: So could we see new plagues in the future in countries with up-to-date health care?

Ewald: We have them now in hospitals: diarrheal diseases, staph and strep infections. Organisms in hospitals may have evolved into these severe variants because they can be spread by attendants' hands and don't require the patient to be mobile. By some estimates, hospital-acquired infections are the tenth leading cause of death in the United States. Obviously, hospitals don't like to talk about this. "Oh yeah. Your husband died of an infection he acquired in the hospital. Sorry." They say, instead, the patient died of "complications from surgery." In the United States about one out of ten people who check into a hospital acquires an infection there, and those are just infections researchers have managed to trace.

Omni: Should we worry about things like the skin-eating strain of strep we've seen on TV and in the tabloids?

Ewald: Invasive strep and staph infections have been around a long time. Some strep in hospitals cause bloody, oozy skin infections, which if they invade the bloodstream, can cause death. Some strains eat away at the skin and muscle and can reproduce in body areas where antibiotics can't effectively reach. In favoring both virulent strains and antibiotic resistance, the hospital environment can generate both harmful and difficult-to-control strains. Fifteen years ago, in Melbourne, Australia, antibiotic-resistant staph jumped from hospital to hospital as doctors or nurses moved within and between hospitals or as patients were moved. Investigators were able to document over 100 deaths largely attributed to these infections and estimated that about 1,000 people died altogether from the resistant staph.

Omni: Can we avoid being infected at the hospital?

Ewald: Unfortunately, we're at the mercy of the hospital. When my daughter was born, in a good hospital in Washington State, my wife and I were appalled that a nurse stuck her finger in the baby's mouth to quiet her. We tried to explain why we didn't think it was a good idea, and she was offended. When we talked to the pediatrician, he got indignant and said, "I do it all the time myself."

Omni: What's the most dreaded infection you know?

Ewald: What worry me most are those things we have no way of controlling. HIV at least gives people time to live before they die, and we may be able to deal with it evolutionarily. What constitutes the worst disease depends on the kinds of interventions used to control it.

> THE BLACK PLAGUE KILLED ABOUT A THIRD OF THE PEOPLE IN EUROPE OVER A 50-YEAR PERIOD, AND I THINK THAT SOMETHING SIMILAR WILL HAPPEN WITH AIDS IN SOME REGIONS OF AFRICA.

Smallpox would've been one of the worst 300 years ago, because there was nothing to control it. Actually, the worst parasites infect insects. I'm just glad I'm not an insect, because insect diseases make anything we're exposed to look mild. Some are almost 100 percent lethal, often within days. One that affects honeybees turns them into goo. Researchers have followed these parasites for 50 years, and the organisms show almost no limit to their ability to survive outside the host.

For humans, too, I'd worry about organisms that survive for a long time outside the body and have a high level of lethality like TB or smallpox. The *Mycobacterium avium* complex have these characteristics. Related to TB and affecting AIDS patients and others with compromised immune systems, they could be just a few mutations away from developing the ability to infect healthy people. We might then have something like TB that could be with us a long time.

Omni: What traits make a pathogen a severe threat?

Ewald: The virus responsible for Rift Valley Fever, which is transmitted by mosquito, that caused some outbreaks in Africa, may have increased in virulence as it began to gain a toehold in the human population. Tiger mosquitoes got into the United States a few years ago in the water inside recycled tires imported from Asia and have spread over some southern states. They're capable of transmitting several very damaging viral pathogens, but the pathogens don't seem to have the capability of being transmitted from person to mosquito to person yet. If they acquired this capability, they could be damaging. We need to worry if an organism is transmitted by attendants, like those hospital-acquired infections, or if it's water-borne, from person to water to person, or if it's a virus with a high mutation rate that lives in an individual's white blood cells for a long time.

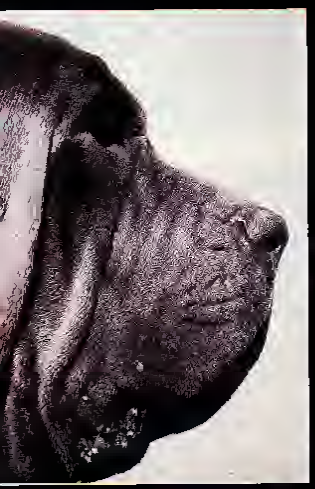
One that worries me: HTLV [human T-cell lymphotropic virus], a cousin of HIV belonging to a different retrovirus subfamily, causes leukemias and lymphomas. It may be moving down a similar evolutionary path as HIV. Pockets of HTLV-II exist in the southeastern United States, Caribbean, and Japan. HTLV-II is present in Native Americans; has been around a long time; and appears to be fairly mild. HTLV-I is distributed in humans worldwide and is better studied. About one in 30 infected people may eventually die from it. The rest never develop cancer.

It's transmitted in the same ways as HIV. But in some areas, particularly Japan, it's transmitted primarily from mothers to their babies. It takes about 60 years for offspring to develop the leukemia. If we could drive HIV down to that level of mildness, I'd consider that a great success. But data suggest HTLV may be becoming more like HIV. If people start transmitting the virus more frequently by having unprotected sex with more partners, fast-producing viruses should have an advantage.

Omni: If you had a billion-dollar grant and all the time in the world, what would you do?

Ewald: An HIV study where we can go to areas where people have been reducing sexual contact and assay the harmfulness of the viruses. We ought to see a reduction in harmfulness. If there's a time when we need to know whether we can use evolution as a tool, this is it—with HIV.

ANTIMATTER



DOGGONE MYSTERY

Last spring, several hundred people in North Georgia discovered their pet dogs missing, often from fenced yards. "There were no forced entries, no evidence of dogs digging out, and no signs of struggle," notes Ken Johnson, investigator for the Humane Society of the United States.

From Athens to Dahlonega, dogs of all shapes and breeds simply disappeared. "Some were tattooed with IDs, and even two ten-year-old dogs were taken," notes Hall County Sheriff Bob Vass. "But there were no witnesses, and we've made no arrests."

What's the scoop?

According to Tate MacQueen, a pet supplies store owner in Athens, "Strangers were spotted in some neighborhoods a few days before the dogs were nabbed. About five dogs returned home, emaciated. Some were covered with sawdust and smelly, gooey stuff. One had a deep puncture wound to his neck."

Adds Sally Fekety, spokesperson for the Humane Society of the United States in the Washington, DC, office, "No assumptions can be made about the disappearances, especially when many people allow their pets to roam. However, we suspect there may be a network stealing animals for research."

> STRANGERS HAD BEEN SPOTTED IN SOME OF THE NEIGHBORHOODS A FEW DAYS BEFORE THE FAMILY PETS DISAPPEARED.

Whatever the problem, local publicity and heightened awareness seems to have halted the dog-napping for now. The Humane Society is offering a $2,500 reward leading to the conviction of anyone responsible for the thefts.—Sherry Baker

KOOKS

Donna Kossy has such a great affection for kooks that she has written a book about them.

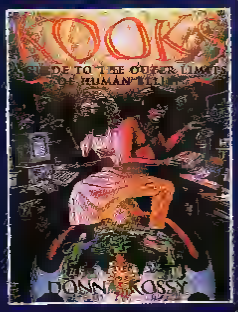
Kooks: A Guide to the Outer Limits of Human Belief (Feral House) portrays such eccentric people as Les U. Knight, who heads the Voluntary Human Extinction Movement. That group's goal: phasing out the human race voluntarily by convincing people not to reproduce. Then there's Paul Laffoley, a Boston artist and architect who says he expects to develop a working time machine by the year 2013. Laffoley is glad to be included in Kossy's new book. "I love it," he says, "for its investigation of ways of thought that people have not paid serious attention to before."

Kossy, 37, a former computer programmer, encountered her first kooks in San Francisco in the early 1980s. Their street hand-outs—badly typed, dense tracts on everything from mind control to the hollow earth and free energy—fascinated her. "Kooks should not be confused with crazies, psychotics, schizophrenics, quacks, frauds, hoaxers, and eccentrics, nor should they be dismissed out of hand. I listen to them," Kossy explains, "because I'm deeply curious why it is people believe as they do."

Besides, Kossy is well aware that kook status is relative. While the geologist Alfred Wegener, who developed the theory of continental drift, was seen as a kook in the nineteenth century, today he is honored as the founder of plate tectonics. On the other hand, phrenologists—who thought the shape of the skull revealed one's personality—were respected in the nineteenth century, but are regarded as kooks today.

Kossy hopes her book will cause people to be more aware of their own beliefs—where they came from, how they got them, and why.

—Patrick Huyghe



BIG SPLASH

GERMANY HAD A QUESTION: COULD THEY HOME IN ON VALUABLE SUPPLIES OF UNDER GROUND WATER WITH A PENDULUM OR A ROD?

Some people claim to have a nose for water. While such abilities are rarely taken seriously, a few years ago the German government decided to test the notion and funded an investigation of water dowsers—those who say they can locate underground water without obvious conventional or technical means other than using, say, a forked branch, rod, or pendulum. The experiments, which were conducted by the government's Society for Technical Cooperation, in association with its Ministry of Foreign Aid, aimed to see if dowsers could help find water sources in especially arid areas of poor countries around the world.

At least according to the German study, some apparently can. In one dramatic experiment, a "face-off" took place between an experienced dowser and a team of hydrogeological experts attempting to provide a water supply for several small towns in the Kurunegala District of Sri Lanka, where water had been difficult to find. "The objective," says Hans-Dieter Betz, a physicist at the University of Munich in charge of the experiment, "was to find the location of several wells with yields of at least 100 liters per minute."

The hydrogeologists chose their drilling sites with the standard geophysical techniques—using geoelectrical data, geological maps, and aerial photographs. They also had at their disposal classified military data and information on former water searches in the district. After several weeks, they selected 14 sites. Then the dowser, who happens to be a GTZ civil and sanitary engineer, inspected the same area and, within a few days and supposedly without the information available to the scientists, selected seven potential drilling sites. All 21 sites were then drilled in the same fashion.

The results? While only three of the 14 sites chosen by the experienced team of hydrogeologists hit the required minimum water yields, the dowser proved correct in six of his seven site choices. "The dowser was then sent to other countries," says Betz, "and wherever he was called in, he was successful." Betz is now convinced of the reality of the dowsing phenomenon, though he is at a loss to explain just how it works.

The studies generated considerable excitement in Germany when they were first released. "But now it has cooled down quite a bit," says Amardeo Sarma of the German skeptical organization, the Society for the Scientific Investigation of Parascience, "since we and others have been criticizing the way these tests have been done. We are not very sure, for example, about the way the dowser collected and evaluated the data for some experiments, and it seems the Sri Lanka experiments were not properly controlled. We also offered to test Betz's best dowsers and he has refused."

—Patrick Huyghe

VOLATILE

CONTINUED FROM PAGE 72

black plastic bin-liner. There was movement again, a figure I only glimpsed before it vanished. Seconds later it came back, nearer this time, and in the light from nearby streetlamps, I recognized Robert's father.

"Mr. Roth!"

His disembodied head ducked and bobbed like a balloon in front of the dilapidated sash windows. I was about to call again when a second balloon bobbed up, similar to the first but smoother, broader, better inflated. "Robert!"

They were staring at something in the tree nearest the window, craning forward together, eyes wide, heads to one side, like mannikins. There was nothing there, nothing but frosted branches and crows flapping from one tree to another continually.

I slipped into the garden at the front of the house and scooped up a handful of stones from the ornamental path. I lobbed one at the window. It snapped against the glass. They ducked out of sight. A moment passed, then Robert poked his head up above the sill and peered at me.

"Robert," I yelled, "you silly bugger, let me in!"

He seemed not to recognize me. He leaned his head to the left, and to the right. I think he smiled, but in the light I couldn't be sure. He raised a hand. He didn't seem to know what to do with it; he lowered it again.

I gestured angrily at the door. He nodded and disappeared. The hall was dark. I waited for the light to go on. Nothing happened. I stamped my feet and looked around, feeling foolish. I wondered if anyone was watching, from the flats opposite, perhaps. There was a mild fog. At the top of the road the air glowed sodium-orange in the light of a dozen powerful lamps, hung up on gantries around the newly modernized Nunhead Reservoir. A crane cast shafts of shadow through the luminous air, as the crane turned, the shadows wheeled like torch-beams on a film negative.

I turned back to the door. There was still no light. I thumbed the bell again, and again. I got no reply. I had had enough. I got Nick's medicine bottle out of my bag and shoved it through the letter box.

I crossed the road again and looked up. Robert and Nick were pacing backward and forward in front of the window, appearing and disappearing as they crossed and recrossed each other, eyes fixed, unblinking, upon the trees opposite, the icy branches, the crows—

I walked back to the car. I wanted to call somebody: the police, perhaps, or an ambulance. But it wasn't a crime to ignore a doorbell, and hardly a sickness to stare at a tree. There was no one else I could turn to, no mutual friend, no one who would know any more than I what was wrong.

I told myself I was angry and affronted, but I was lying. The sight of them had disturbed me. I drove home slowly, cautiously, I felt slightly unsure of everything.

I found Marlene perched on the TV. She glanced at me, then turned back to the tank, the tetras were playing in the wash from the oxygenator. Marlenes eyes glazed over. She went still as stone.

> I COULDN'T TELL IF HE WAS UPSET, OR ILL, OR JUST HALF-ASLEEP. I KNEW LOOKING AFTER HIS FATHER EXHAUSTED HIM, BUT I HAD NEVER HEARD HIM AS BAD AS THIS. HE WASN'T MAKING SENSE. HE WASN'T LISTENING TO ME.

I said, "Don't even think it," swept her up in my arms and wrestled her into the kitchen. She leapt onto the draining board and sat in the sink, tail swishing.

"No," I said. "No baths."

She peered up into the mouth of the mixer tap. A droplet fell on her nose. She sneezed it off. I put some food down for her and washed up the breakfast things. I was through just in time to stop her getting into the water. She stared up at me from the work surface. I pulled the plug. She glanced at the sink, the receding water, and back at me—betrayed.

"Some cat you are."

She began grooming, her idea of a shrug.

I went back to the living room and fed the fish. "Relax, she only wants your water." Kicking off my shoes, I curled up in my big cuboid sofa chair.

Not the chair—*my* chair. I felt as if nothing else in the house—and I had furnished it more or less from scratch—was really mine. It was entirely my own fault, a minimalist phase that had seen me bagging up my entire wardrobe for Oxfam and replacing it with one designer grunge dress by Issey Miyake. Not content with making a wraith of myself, I had gone on to make a mausoleum of the apartment: polished floorboards, stained black, white walls, green gloss over the woodwork, Japanese tables, expensive black boxes with famous names hotfoiled on the side. Belongings that didn't belong. Belongings *designed* not to belong.

Marlene hated it. She spent most of her time outside now, in the jungle I had let grow in the back garden. I only saw her at meal times.

I opened my bag, took out Robert's video and let the box drop from my fingers onto the floorboards. Marlene flung herself out of the kitchen and pounced on it. I told her, "Be my guest," and slotted the video into the monitor.

Robert's film was a sort of test card—a white surface through which a black cube emerged, point first. The cube passed through the white surface, loomed up toward the screen, filled it, blacked it out, and disappeared. So much for the action.

Abstract animation is a wide field, and very intellectual, very etiolated. It's difficult to make a film that somebody, somewhere, won't appreciate for some wild and complex reason of their own. Robert's film was, for all the wrong reasons, something of an achievement, therefore, I could think of no artist, no movement, and, more to the point, no editor, who would want what he had made.

I clambered out of my seat and crossed to the desk. Marlene had stretched herself across the study chair; she was peeking at the TV through the gap between the seat and the backrest.

"Still here?"

Marlene's ears twitched. She hunkered down.

"I'm honored." I dug Robert's file out from under a pile of papers. I glanced through the budget I had agreed with Channel 4's animation department. They'd allotted us £40,000, less than half the usual budget for a film of this length. Robert had spent barely £10,000. I wracked my brain for a way we could lose money quickly, the more expensive I could make the film, the more willing the channel would be to mount a rescue operation on it. Nine-thousand-odd pounds wasn't enough, they would simply pull the plug. I chucked the file onto the desk and

went back to my seat. Marlene jumped down after me and weaved round my legs. I stumbled about, disentangling myself from her, and cuffed her gently with my foot. She came straight back at me, purring. I tell back in my seat and she leapt on my lap.

"Why thank you," I said, surprised.

Admittedly, our rapprochement was not total. Rather than face me, Marlene sat staring fixedly at the screen; the cube had emerged halfway from the white ground. Each plane was textured, glimmering through translucent surfaces, invisible at a first glance and meaningless at a second. Strange scratches and squiggles disrupted the surface now and again. I wanted to think them deliberate, to believe that they were meant, but no amount of mental acrobatics could prevent them from looking like what they were: stray hairs, bits of fluff, smudges on the lens.

Marlene bobbed her head, shuddered, rolled around stupidly. Absently, she clawed me through my skirt. I threw her off. "Call yourself a critic," I said.

She settled on the floor, still purring.

"Easily duped, eh?" I said, feeling about for the remote. "You should write for the *Modern Review*." I hit the stop button.

Marlene fell silent. A moment passed. She got up, stretched, shot me a chill glance, and padded through the kitchen into the great outdoors.

Robert's film had proved problematic from the very beginning. Our working relationship, which had started so auspiciously, had begun to show signs of strain. Perhaps I should have taken more care of him, but I was a producer, not an analyst, and to my mind his insecurities made him selfish and perverse.

I think he had decided early on to conceal his worries from me; his subconscious, however, had other ideas. He began to miss appointments, to arrive late, or at the wrong venue; he became vague, unsure of what he wanted when his opinion was needed; and at the next moment obstreperous, belligerent, picking holes in the budget and the way the channel wanted to oversee the project. Thanks to him, what had begun as a £100,000 film became a £40,000 film. Nobody likes paying for something they are not allowed to see.

Then, of course, there was his father.

It was a typical evening. I had booked a table for seven o'clock and Robert called at my office at eight, having already eaten. "We could have a coffee, first," he suggested, in tones calculated to deaden whatever sparks of enthusiasm might still be lurking in the room, so I trailed him round to Frith Street and elbowed a path into the Italia, past Soho hopefuls chaining Marlboros as they wound down from post-production sessions at the Mill, or lighting the evening set at Ronnie Scott's across the road. At the end of the bar there was a flat-screen TV tuned to a jazz concert. Orphy Robinson was playing.

"—no use," said Robert.

I glanced at him. "What?"

"You're not listening."

"It's Orphy Robinson."

"Who?"

I shrugged. "What's no use?"

"My dream diary."

Last time I'd tried to drag out of him what the matter was, he'd told me his imagination was drying up, that he felt like a hollow shell: a zombie, not a person. Startled by this abrupt confession, I had suggested he keep a dream diary. It was patronizing of me, and I was surprised he'd tried out the idea. I thought he was just being polite. It never occurred to me that he might be desperate—desperate enough, indeed, to grab at whatever straw was thrown his way.

"What went wrong with it?" I asked.

The waitress upended a big tin shaker and shook cocoa powder on my *caffè latte*.

"I've lost any real connection with my subconscious."

"You mean you didn't dream."

"Oh, I dreamed, all right."

"What about?"

"Timetables," he said, with bitter relish. "Late trains. Traffic jams in the rain."

I handed him his espresso. "Anything else?"

"Forgotten appointments. Badly lit offices. Jammed sandwich machines. No narratives, no insights. No frights. I dig deep inside myself, and all I come up with is daytime TV."

I found us two stools next to the mirrored wall and sat him down beside me. I said, "I haven't got time for dinner now. Will you be in the studio tomorrow? About eleven?"

He shook his head. "I'm picking my dad up at the airport. He's flying in from San Francisco."

"He's staying?"

Robert nodded.

"Can I meet him?" I asked, in an instant swapping professional cool for little-girl effusiveness. Like Pavlov's dog, I chided myself, salivating to the sound of a bell. I couldn't help it. Back in the Fifties, Nicholas Roth had been Hollywood's most powerful headhunter.

"I'm sure you can," Robert sighed,

slipping himself seamlessly into the role of the Great Man's private secretary. He said, "He's coming to London for treatment."

"He's ill?"

"Alzheimer's."

I couldn't think what to say. Robert took my silence as a question. "I'm looking after him. There's a clinic in Harley Street. They've developed a technique."

"Robert," I said, "I had no idea—"

Robert treated me to a bitter smile. "I've known for a long time," he said. "It's not why my works going badly, if that's what you're thinking. It's not an excuse."

"I never thought you were using this—"

"That's not what I meant," he said. "Is this—is it going to take long?"

He shrugged. "As long as it takes."

I asked Robert whether, under the circumstances, we should cancel the film. He said no. I made up every conceivable excuse for him; he turned them all down. He wanted to go ahead with it.

I was sure Robert would never be able to juggle looking after his father with the demands of the film, but I tried not to listen to myself. Robert was the best young director I had; juries at Stuttgart and Oberhausen had awarded him major prizes. I had inquiries and offers of work from the BBC, the BFI, even the English National Opera. The last thing I wanted to do was stop him working.

I let things ride for a while, and hoped against hope for the best.

I got to meet Nicholas Roth about a month later, when Robert invited me round for dinner.

When I got there the flat was in chaos. The kitchen surfaces were blotched and smeared with tomato sauce, coffee grounds, God-knows-what-else; there were crumbs and onion skins all over the floor tiles; in the dining area the carpet was rolled up and piled with library books. The floorboards beneath were cracked and filthy.

Robert had taken all the clipframes off the walls and fitted a green sheet over the sofa, his father Nicholas sat at the far end, hunched up, bobbing his head in time to queer, internal music.

"Dad?"

Nicholas Roth was not old. In his mid sixties, perhaps. Like his son, he wore his hair short. His eyes were hooded, the lids slightly mongoloid. His cheekbones, like Robert's, were pronounced, but his mouth had lost all its firmness. As I watched, a droplet of saliva worked through the stubble on his chin.

"Nick?"

"Huh!" He turned, and saw me, and grinned.

I forced a smile for him. "Hi," I said, "I'm Abigail."

'Have we any stamps?"

"This week's subject," Robert murmured behind me, adjusting the controls on the oven.

The old man said, 'I'm sending letters to Pinewood.'

"Oh. Right."

"Do you send letters to Pinewood?'

"Sometimes."

"Buggered if I can see the point, myself."

"Oh."

"Since we haven't any fucking stamps."

"Dad," said Robert, "this is Abigail."

"Who?"

"Beside you."

Nicholas stared at the green sheet, rucked beneath him. "Chair's broken."

"Sofa."

"Needs new covers." His voice trembled.

I said, "I'm a producer.'

"Films," he said, to no one in particular.

'Yes."

His eyes came alive at last. "I've been in films!"

All through dinner he regaled us with tales—some of them obscene, all of them incoherent—about his first days in Hollywood.

'So much screwing around."

"Dad," said Robert, "at least put your bloody spoon down before you start waving your hands around."

"So much tit.'

'You'll put my eye out," Robert muttered, wresting the spoon from him.

"Sorry," he added, turning to me. I could see he was enjoying himself.

Afterward, Robert put his father to bed and we sat down to talk.

I said, "He doesn't recognize you, does he?"

"Not often," Robert admitted.

I put my cup down on the floor. "What happened to the carpet?"

"He's afraid of it."

I remembered it was red. So was the sofa. "The color frightens him?"

"There's a place in Heathrow where the carpet color switches from green to red. When I met him off the plane he stopped dead at the edge of it, screaming his head off."

I adjusted the sheet where it had rucked up underneath me. Something behind me rattled. I felt for it, picked up

a bottle of pills. I thought at first they were aspirins.

"That bottle," Robert said, "is more expensive than your car."

I read the label. It made no sense. "What does it do?"

"It turns on new parts of the brain."

"The 99 percent we don't use?" I said, skeptically.

Robert waved his hands dismissively. "It's not about that. It's about the way neurons communicate with each other. It's possible for neurons to pass messages chemically, without the need for synapses. Half the brain's presynaptic receptors are dormant; the trick is to turn them on."

I tossed the bottle in my palm. More expensive than a car. If Nicholas Roth had this much money, why was he staying with Robert in a one-bedroom conversion in Peckham? I said, "What's the advantage of that?"

"When the brain needs to reroute a signal, to bypass a lesion say, it tries the route out chemically first. If presynaptic receptors pick up a chemical signal, they tell their neighboring axon to use this or that synapse and to pick up the rerouted signal. If you promote chemical uptake, the brain gets into the habit of rerouting its signals more often. It can do more with less."

I said, "It sounds like a treatment for stroke."

"That's how it started," Robert agreed.

"You take quite an interest."

Robert shrugged.

I turned to read the titles of the books piled on the rolled-up carpet. They were all about medicine. I picked up the nearest, *Hannah's Heirs* by Daniel Pollen. It was about the genetic origins of Alzheimer's disease. I said, "I didn't know it was heritable."

"It isn't always," said Robert.

The obvious question hung between us for a moment, unspoken. My nerve failed me. I dropped the Daniel Pollen back onto the pile. There were other titles, not all of them to do with medicine: *How Monkeys See the World*, a book about sharks, Daniel Dennett's *Content and Consciousness*.

"Some new ideas?" I suggested.

"Every animal sees the world in a different way."

It dawned on me suddenly that he was afraid.

"Afterward—will Nicholas . . ."

He swallowed, stared at me. "We don't know," he said, giving nothing away. "No one's done this before."

I'd expected Robert's picture-cut to appear rough around the edges, nothing could have prepared me for what I received. It was no surprise when, a week after my abortive visit to Robert's flat, I received a letter from Channel 4's animation department terminating all funding.

I rang Robert and as usual I got no reply. About an hour later someone from the Wheelhouse rang in to say Robert had left some belongings in the studio I had hired for him. I sensed that something was wrong so I agreed to pick them up myself. I headed over immediately, feeling stupid and obscurely ashamed, like the hard-pressed parent of a difficult child.

My contact at the Wheelhouse, an advertising consultant called Terry, put the bravest face she could on matters, but from her manner I guessed that Robert hadn't made himself welcome. In the lift I asked her straight out how things had been with him. "He was a bit abrasive," she admitted.

"How do you mean?"

"Kept the door to the studio locked. Wouldn't answer the phone. Ignored the security men. Left chicken bones on the Harry deck."

"It's being that cheerful keeps him going," I said, hiding my embarrassment behind gallows humor.

"Is there a problem of some sort?"

"Not now," I said, with a malign smile. "I give you my word, he won't be darkening your doors again."

"Only I thought he might be ill."

I shrugged, said nothing. I don't take kindly to people who jeopardize my hard-won contacts so I wasn't going to make excuses for him.

Terry let me into the studio. Vertical blinds of plasticized rice paper screened wall-length windows. The Harry deck stretched along the far wall, its monitors rained cornflakes, tuned to the antics of the producers in the studio next door. Near the door, on a foot-high dais, were two steel-blue sofas. Robert's gear had been piled neatly upon the nearest. I gathered it up: jumpers, pads of cartridge paper, a camera, empty videocassette boxes—

"And his aspirins," Terry said. She reached down into the gap between the cushions and drew out a brown bottle.

"Might as well chuck them," I said. I slid his belongings into my shoulder bag and zipped it up. I took a deep breath. "Terry," I began. "I'm really sorry that Robert—" and then I stopped.

Terry gave me a commiserating smile. "Forget it—and the offer holds for next time. Anything to escape the cornflakes . . ."

I waved her to silence. "Aspirins?"

She fished them out of the bin.

I read the label, or rather, I tried

"Are they special?"

I nodded

More expensive than my car. "They're his dad's," I said. "I'd better take them."

I lumbered back through Soho with my bag full of blank drawing paper and jumpers and a £6,000 pill bottle rattling about in the shallow, next-to-useless pocket of my designer jacket, and if an acquaintance had asked what I was doing I think I would have killed myself. I had decided young in life not to be a mother, and I resented having to start now.

But Robert's hapless behavior had awakened my maternal instinct and as I climbed the stairs to my office I found to my chagrin that I was rehearsing all the usual motherly lines: "How *did* you expect to keep warm without your jumper?" and "What *were* you doing with Daddy's tablets?"

I let my bag drop from my shoulder. It fell back down the stairs. I plucked the bottle from my pocket. I shook it. It rattled. I opened it, teased out the cotton wool plug, shook the pills into my palm. Chalky, with a single line across, like aspirins.

I think . . . all wrong.

The bottle was half empty.

I got home to find Marlene, as usual, perching on the TV. She howled. I headed for the kitchen. She followed me in, purring frantically and headbutting my ankles. At one point she leapt up and dug her claws into my leg and I nearly dropped the tin on her head. "Please," I sighed, "it's been a bad day." I put the dish down in front of her, went into the living room, and poured myself a gin.

Just like a mother, I had done my best to ignore the truth of what Robert was doing. "They look just like aspirins," I told myself. "They should have put them in a funny-colored bottle or something." But I wasn't taken in.

I recalled that night in the Bar Italia, when Robert told me about his father. He'd said, "I've known for a long time."

Not every case of Alzheimer's is hereditable. But was Nicholas Roth's? If it was, it would explain why Robert had taken on the job of looking after his father—at risk of Alzheimer's himself, it was the only way Robert could guarantee himself a supply of those miraculous, unaffordable pills.

I recalled how that night, and on countless other nights, he had told me how his imagination had died, had shriveled up, had vanished—but I had not listened. I should have put two and two together when I heard about his father's Alzheimer's, but who could have imagined that he would treat himself with someone else's medicine? Fearing the onset of the disease, why had he not sought treatment for himself? Why had he behaved so surreptitiously?

Unless—

I stepped back from the drinks cabinet and fell over the cat. "For Christ's sake," I snapped, shaking gin off my fingers, "what is it now?" Marlene howled. I went back to the kitchen. She'd merely picked at her food. "You sure you're okay?" I asked, with grudging sympathy. I checked her water bowl. It was full. I emptied it and refilled it. She ignored it, leapt up on the kitchen counter and howled again.

"Oh for God's sake." I put the plug in the sink and ran the hot tap. Marlene edged forward. "Mind," I said, pushing her out of the way. I ran enough cold in for the water to be comfortable for her, then went back to the living room, fell into my chair and slugged back what little gin hadn't spilt over the floor. A few seconds later Marlene leapt into my lap. Her fur was dry.

"What's the matter now? No bath salts?"

Marlene looked up at me and whined.

I sighed, and tickled her behind her left ear. "Of all the nights to kiss and make up," I chided her, softly.

She whined back at me.

"A small boy gets trapped in a faulty garbage compactor?"

She wouldn't stop whining.

"An old drunk twists his ankle on a deserted dance floor?"

She just wouldn't stop.

I ignored her, picked up the remote and pressed play. The screen went white. A black point emerged in the left-hand corner. I was going to change the cassette but Marlene had started to purr.

"Happy now?"

She circled twice and lay down.

Stray hairs, smudges, fleeting lines and stains flickered across the screen. The spot grew bigger.

Marlene clawed me absently through my skirt.

I yawned. "Do we have to watch this?"

She swiveled her ears like radar.

"Earth calling Marlene."

She growled ecstatically.

"You're as bad as they are," I said, 'staring at their bloody tree."

I went cold.

Minutes passed. The video snapped off. Marlene's purr trailed into silence. When it was clear the show was over, she yawned and stretched, slipped off my lap and headed for the cat-flap.

I wondered. What if Nicholas's Alzheimer's wasn't heritable? What if his son ran no special risk of developing the disease? Why, then, would he have taken his father's pills? Simple curiosity? No, that sort of juvenile experimentation went out of fashion in the Sixties, besides: it wasn't in Robert's character. He must have been taking them for a reason. Something other than Alzheimer's, perhaps. Something he could not explain to any doctor. Something for which no legitimate treatment yet existed.

Boredom?

Self-disgust?

All that talk about his hollow, worn out self . . .

I rewound the film and played it again. It was no good. I couldn't think my way into it the way my cat could. Robert's film had bored me, but—

Afterward.

We don't know. No one's done this before.

I went back to the living room and dialed treble-nine.

When the police broke into Robert's flat they discovered remains, dismembered and part-eaten, in a corner of the living room. Further investigation traced these remains to several sources: stray dogs, in the main, a pet rabbit, a missing child. In the opposite corner, Robert and Nicholas Roth were curled up asleep, wrapped round each other, naked, under a nest of shredded bed linen and soiled, crumpled clothes.

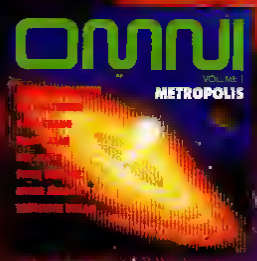
An ambulance took them to King's College hospital and later that evening, mewling and spitting, they were admitted to the Maudsley, South London's leading psychiatric hospital.

They are still there. DO

I TOLD MYSELF I WAS ANGRY AND AFFRONTED, BUT I WAS LYING. THE SIGHT OF THEM HAD DISTURBED ME. I DROVE HOME SLOWLY, CAUTIOUSLY; I FELT SLIGHTLY UNSURE OF EVERYTHING. THERE WAS NO ONE ELSE I COULD TURN TO.

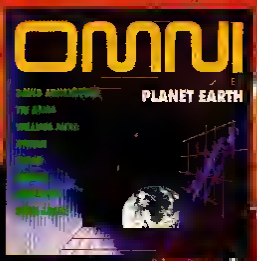
OMNI

the Music



METROPOLIS

STARSCAPE



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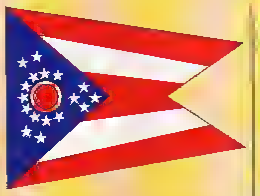
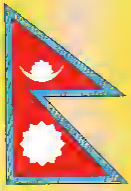
GAMES

ANSWERS IN COMMON:
From "only" things to colors to word derivations

By Scot Morris





The flags of Libya (far left), Ohio (center), and Nepal (near left) all have something in common. What is it?

There is just one four-letter word that summarizes what the following have in common. What's the only word? President James Buchanan, the two-toed sloth, the chow chow dog, the hyoid bone, mercury, -40 degrees, Kahoolawe, the pyramids, *Midnight Cowboy*, the flags of Nepal, Libya, and Ohio, and a logophile's attraction to Pierre, South Dakota.

That was one of three questions I left unanswered in the January Games column, a quiz on things in common. It turns out that everything on the above list is famous for being an "only" something, so the only word *is* only. Buchanan was the only bachelor president; the two-toed sloth is the only land mammal other than man that mates face-to-face; the chow chow is the only dog with a black tongue; the hyoid bone, which supports the tongue, is the only bone in the human body not attached to another bone; mercury is the only metal that's a liquid at room temperature; -40 degrees is the only temperature at which Fahrenheit and Celsius thermometers read the same; Kahoolawe is the only uninhabited Hawaiian island; the pyramids are the only one of the Seven Wonders of the Ancient World still standing; *Midnight Cowboy* is the only X-rated film to win the Academy Award for Best Picture; Nepal is the only country with a nonrectangular flag (it's shaped like a sideways W); Libya has the only single-color flag (it's all green); and Ohio is the only state with a nonrectangular flag and a logophile (word-lover) would be interested to know that South Dakota is the only state that shares no letters in common with its capital.

When I raised this question on the Scot Morris's Games message board in Omni Online on America Online, I asked people to contribute to the list. Here are my favorite additions: Titan, two; Maine, Frank Robinson, Don Larsen, Rocky Marciano, Lake Michigan, the elephant (three different ways!), Linus Pauling, and, according to a popular misconception, the Great Wall of China. I'll reveal what makes them unique in an upcoming column.

FOUR-PARTER. The second unanswered question from January asked what the ten companies and/or products in each grouping below have in common.

A. Coca-Cola, Budweiser, Dentyne, Marlboro, Baby Ruth, Campbell's, *Time*, Avis, STP, Old Spice.

B. Coors, Kodak, Hertz, Cutty Sark, Squirt, *National Geographic*, Shell, Bayer, McDonald's, Preparation H.

C. Kraft parmesan cheese, 7-Up, Heineken, Doublemint, Salem, Tanqueray, MJB, Fuji, Quaker State, American Express.

D. IBM, Minolta, Ivory, Alka-Seltzer, Entenmann's, Maxwell House, Lowenbrau, *USA Today*, WD-40, Phillips' Milk of Magnesia.

Readers came up with many similarities between them, but the real link lies in the colors of their logos or packaging. A is red, B, yellow; C, green, and D, blue.

MOST DIFFICULT. The third question was to find the connection between these: sole, shark, sloth, vampire, parasite, booby. I warned that this was a very tough puzzle indeed and that you'd "have to know all about these animals and their names to derive the correct answer."

The hint was *derive*. The words have a similar derivation. Many animal names sometimes apply to humans—pig, chicken, rat, and so on. But with the ones on this list, the original naming went the other way. The animal was named after the human characteristic. For example, the first reference to "booby," describing a stupid person, is circa 1600. When a bird was later discovered that seemed stupid, it was called a "booby" because the name fit.

When a fish was discovered that was as flat as the bottom of a shoe, it was called a "sole." When biologists found a sluggish arboreal animal in South America, they called it a "sloth" because it reminded them of that deadly sin. The blood-sucking vampire bat got its name from the vampire of folklore, and so on. These are the only animal names I know that possess this characteristic.

Incidentally, I said in January that one very difficult quiz question (the one that actually contained the answers to the rest of the quiz) was "derived from Sam Loyd's classic Only Color Problem." There is no such problem. I phrased the sentence that way to give hints for the three questions left unanswered: *derived*, *only*, and *color*.

OLD BUSINESS. In June last year the formula printed should have looked like this:

$$\frac{12 + 144 + 20 + 3\sqrt{4}}{7} + 5 \times 11 = 9^2 + 0$$

It reads as a limerick. A dozen, a gross, and a score/Plus three times the square root of four/Divided by seven/Plus five times eleven/Is nine squared and not a bit more.