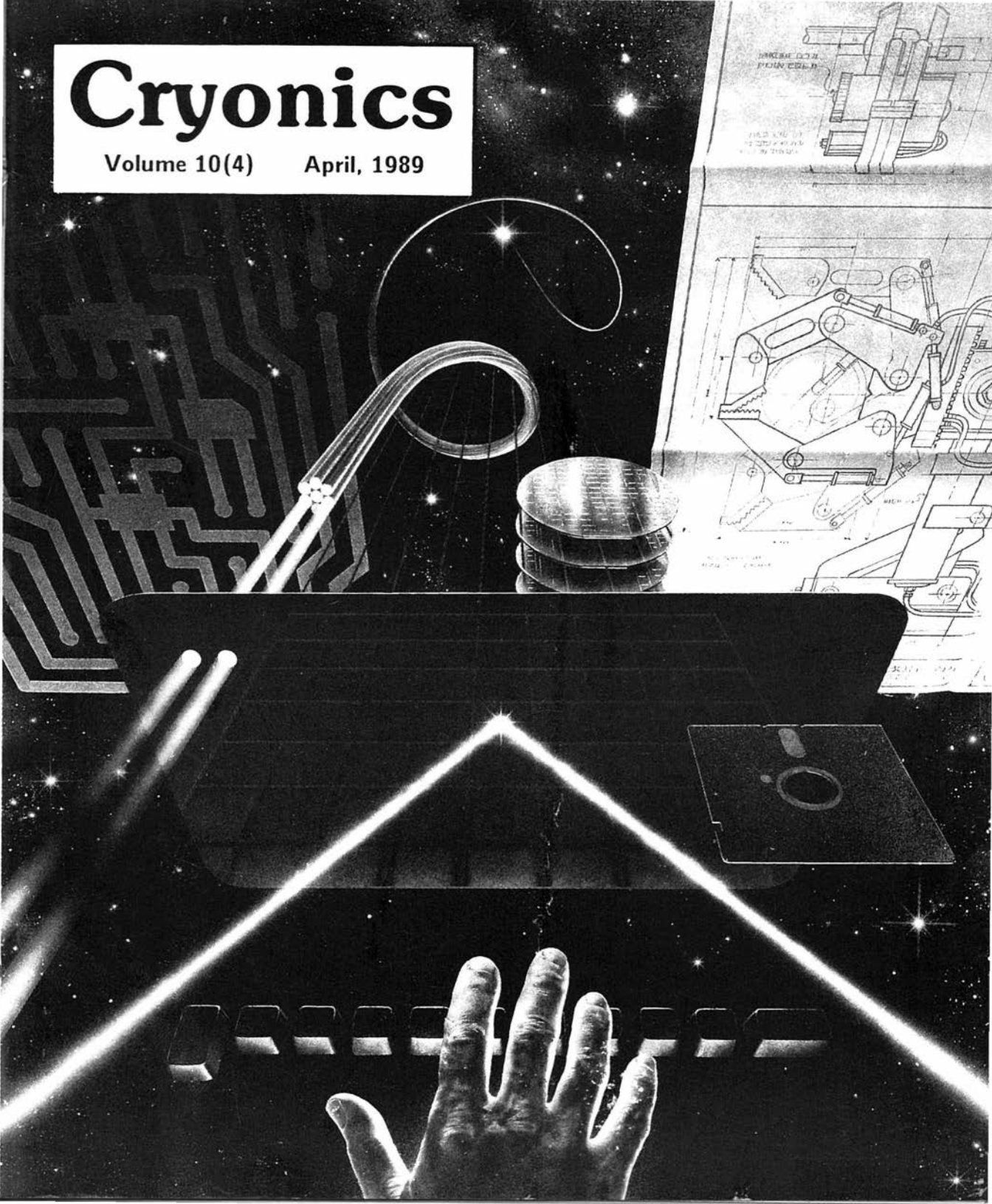
Cryonics

Volume 10(4) April, 1989



CRYONICS ■ Volume 10(4) ■ April, 1989 ■ Issue 105

CRYONICS is the newsletter of the Alcor Life Extension Foundation, Inc. Mike Darwin (Federowicz) and Hugh Hixon, Editors. Published monthly. Individual subscriptions: $20 per year in the US; $30 per year in Canada and Mexico; $35 per year all others. Back issues are $2 each in the US, Canada, and Mexico; $3 each all others.

Please address all editorial correspondence to ALCOR, 12327 Doherty Street, Riverside CA 92503 or phone (800) 367-2228 (in California: (714) 736-1703.

EDITORIAL MATTERS

This month we turn from the past in cryonics toward the future. Mike Darwin has just returned from a trip to Europe, and says he saw it there (the future, that is!). And Steve Harris examines the future from the angle of the near-term effects of improvement in computer memory and data transmission techniques, and predicts *change!!*

* * * * * * * * * *

ANOTHER ALCOR SUSPENSION

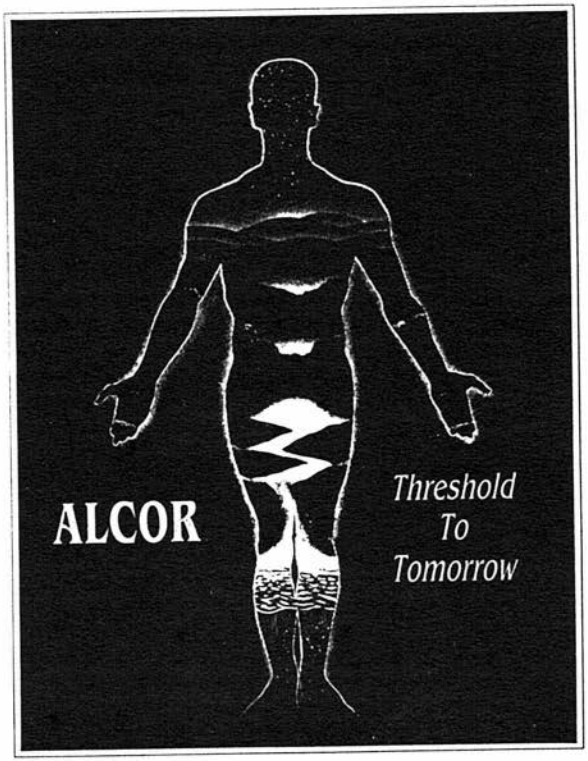
On March 21, 1989 Alcor placed another of its members into cryonic suspension. The suspension involved a lengthy Remote Standby, and as usual, created a great deal of additional work (although considering the fact that we've averaged a suspension every four months for the last 24 months, they're becoming almost routine). We hope to have a full report on this suspension in the May issue of *Cryonics*.

* * * * * * * * * *

NEW BLUEBOOK

The second edition of *Alcor Threshold To Tomorrow* is now available. The second edition is *much* improved over the first. ATTT now has a reworked version of the art on the original cover done by professional artist Judy Cloyd. The cover is also done in attractive two-color blue and gold. Other improvements in the printing are that this edition was done "professionally", in other words not by a quick-printer. We ran off *2000* copies of this edition using metal plates and high speed printing. The appearance is thus considerably slicker than the first edition.

Just as important, we have added two chapters which help to provide more narrative and "bridge" things better and we have corrected many (but no doubt not all) of the literally hundred(s?) of glitches and errors in the text of the first edition. One notable oversight that was corrected in the second edition is that the authors' names now appear in the frontispiece to

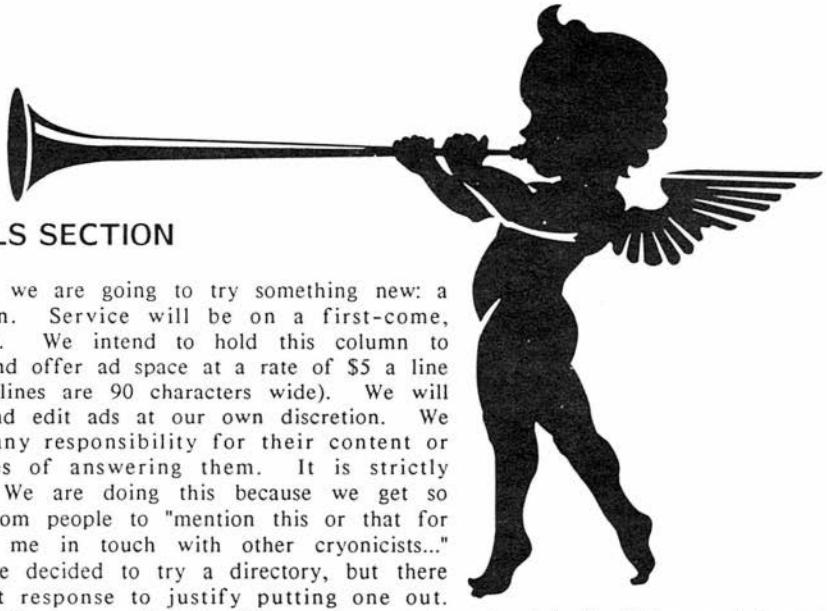


the book! Several other credit omissions in the first edition were also addressed.

We now feel we can say that we are *proud* of ATTT and that we think it makes a fine tool for introducing people to cryonics and to Alcor. The booklet now has a nice professional feel to it and we think you'll be proud to hand it out too.

The booklet is now available from Alcor in quantities of 1-4 for $5 each, or $4 each for 5-10, or $3.50 each for more than ten.

* * * * * * * * * * * * * * * * * *



A PERSONALS SECTION

This month we are going to try something new: a Personals section. Service will be on a first-come, first-served basis. We intend to hold this column to 1/2 of 1 page and offer ad space at a rate of $5 a line per month (our lines are 90 characters wide). We will accept, reject, and edit ads at our own discretion. We do not assume any responsibility for their content or the consequences of answering them. It is strictly *caveat emptor*. We are doing this because we get so many requests from people to "mention this or that for me" or to "put me in touch with other cryonicists..." A while back we decided to try a directory, but there wasn't sufficient response to justify putting one out. Hopefully this will accommodate the folks who want to network/write letters and keep the workload for us down to a minimum. The **Personals** section will appear in the back of the magazine just before the **Meeting Schedules** section.

* * * * * * * * * * * * * * * * * *

LEST DARKNESS FALL

Recently, as we readied the Alcor Riverside facility for a cryonic suspension our lights went off. And so did everything else that ran on electricity. While the kind of nightmare scenario envisioned by the press wherein all the patients thaw out during a power outage *did not* occur, we were nevertheless inconvenienced. Had the patient in question become ischemic as soon as we thought he might, the power outage could have been more than a minor inconvenience. *Much more.*

Alcor maintains a back-up generator for running the heart-lung machine and some emergency lighting during a suspension. But we are not set up to adequately light the areas of the facility that would normally be needed to prepare for a suspension, or really

even to properly carry a suspension out if the power-down time was extensive.

The source of our recent power outage was a bulldozer in an adjacent field which *tore* the power line out of the ground with its ripper. It took approximately four hours to restore power to the facility. In the midst of urgent preparations or a suspension, such a period of electrical down time could be a disaster.

Our first response to the outage was to buy two propane-powered lamps so that we can light parts of the facility without using the very limited capacity of our back-up generator. Our second response is to modify our electrical system so that we can completely power-up the operating room (including lights, computers, and analytical equipment) within a few minutes. Power comes in as 208 volt, 3-phase, and each phase is split off onto a 110 volt bus. By designating one bus as "essential" and putting the circuit breakers for the operating room functions on it, we can disconnect it from the line during a power outage and plug the essential bus into the generator. With only a 2 KW generator, we will still have to monitor what is put on that line, but the operating room should be able to function.

In the future, we hope to acquire a larger generator which can completely meet the power needs of the facility and which will not require the regular servicing our current unit does. This would also put us in the position of having a back-up to the back-up: a much to be desired situation when dealing with a cranky and infrequently used gasoline engine.

* * * * * * * * * * * * * * * * * * *

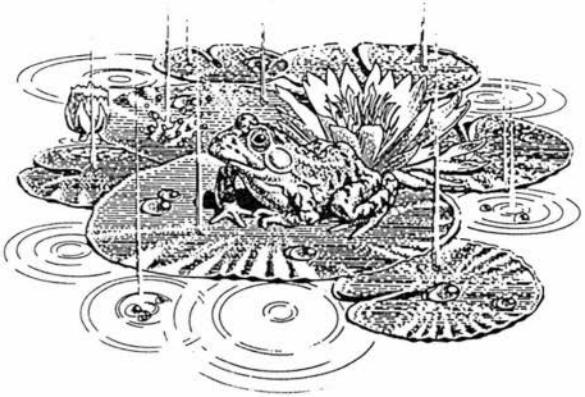
PROBLEM WITH HES SOURCE

The worst is not,
So long as we can say,
"This is the worst.

-- Wm. Shakespeare
King Lear, Act IV. Sc. 1

Shakespeare was right. Still and all, it's sometimes the "little" things that get you down. Amid all the crisis and controversy we now have another one to contend with. As some of our readers may remember in the February issue of *Cryonics* we joyfully announced the patenting of the revolutionary UW organ preservation solution by Jim Southard and its licensing to DuPont Critical Care. Well, it seems we need to quote a little Newton as well as a little Shakespeare: "For every action there is an equal and opposite reaction."

One of the critical ingredients in UW solution is hydroxyethyl starch (HES). It is a colloid which helps to prevent edema (the accumulation of fluid between cells during perfusion). HES was one of the critical perfusate ingredients which allowed Alcor to carry out its phenomenally successful dog bloodless perfusion experiments (*consistent*



recovery of animals after four hours of bloodless perfusion at 4°C with no long term ill effects). It is also the colloid we've been using for human cryonic suspensions. It is the only colloid we've found that will prevent lung edema and death in dogs during extended bloodless cold perfusion, and it works to prevent brain edema in suspension patients (particularly ischemic patients) incredibly well. Also, unlike the dextrans or PVP (two other colloids) it is not toxic to the cells which line the capillaries. Both Dextran and PVP can cause serious injury and even disintegration of these critical cells upon prolonged exposure (such as during remote blood washout and air shipment of the patient).

So what's the problem? If HES works why not use it? In fact we've used it since 1982, and on six of the last seven Alcor suspension patients, with very gratifying results. The problem is that our supply has been cut off. DuPont has simply stopped selling the powdered material, except under extremely tight control. This is apparently an attempt to control the availability of UW solution (since it is *the* one patented ingredient essential to the solution which they control the sole supply of).

We have been trying for nearly six months to find a supplier, to no avail. We are now trying rather desperately to locate supplies of the material outside the U.S. Nor are we alone. When we tried to order Dextran as a last resort we found out that the sole manufacturer for powdered pharmaceutical grade Dextrans was out of stock and back ordered until the end of May or early June, apparently because of demand from lots of other people like us who can't get HES.

What all this means is that we now have only enough HES on hand to do one whole body suspension or two neurosuspensions (normally we maintain enough to do two whole body suspensions and one neurosuspension). We are currently back-ordered on Dextran 70, which we will be switching to in place of HES.

We are telling you about this so that you can be aware that the *quality* of perfusion we can offer you will likely decrease once we are out of stock on HES and forced to use dextrans instead. How much of a decrease in quality this represents we can't really say. All we know is that Dextran 70 will not support dogs during extended cold perfusion, is toxic to capillary endothelial cells, and does not control brain edema well in ischemic human patients.

We are still *vigorously* pursuing sources for HES with the appropriate molecular weight outside and inside the United States. We'll keep you advised of our progress, or lack thereof.

* * * * * * * * * * * * * * * * * *

MEMBERSHIP STATUS

Alcor now has 126 Suspension Members, 199 Associate Members, and 12 members in suspension.

EAST COAST AND OTHER PRESS

by Mike Darwin

Alcor and cryonics have been getting press, press, and more press, with much of it being on the East Coast. On February 20th, Alcor Board Member Brenda Peters flew to Boston for the taping of the *People Are Talking* show. Brenda appeared on the show with Alcor member Jerry Arthus and did a commendable job of representing Alcor under adverse and at times even somewhat hostile circumstances.

Brenda and Jerry were not the only guests on the show. Dr. Avi Ben-Abraham and Irving Rand from the American Cryonics Society (in San Francisco) were also present. Unfortunately, Dr. Ben-Abraham refused to appear on the stage with Brenda and Jerry. Consequently, Brenda and Jerry had to leave the set and participate from the audience when Mr. Rand and Dr. Ben-Abraham took center stage. This would not have been so noticeable had the host not chosen to make an on-air issue of it with Dr. Ben-Abraham. There were also some contentious moments when Dr. Ben-Abraham took issue with the show's host for failing to introduce him properly.

Several weeks later Curtis Henderson did the *Best Talk In Town* show along with *Omni* Editor Patrice Adcroft. Curtis's performance was stellar. He was witty, got the message out, and was the only one on the show who seemed to know what he was talking about.

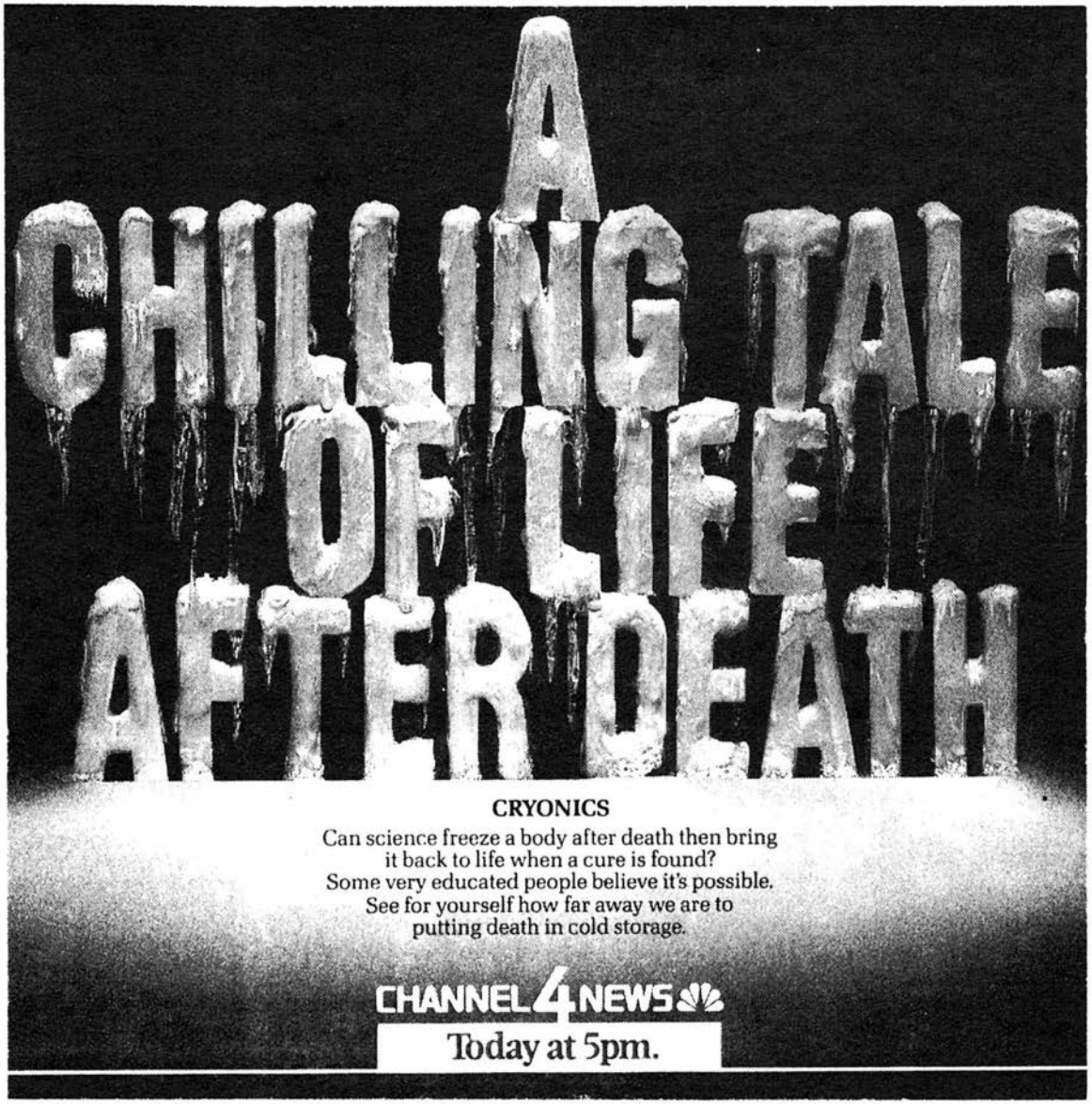
There was a very favorable segment of *Evening Magazine* (formerly *PM Magazine*) which is syndicated in a number of the larger East Coast media markets. A lot of the footage for this show was taped at Alcor's Riverside facility. The show also featured an interview with Saul Kent regarding the Dora Kent case. All of the Alcor folks who saw this show liked it a lot. It was basically fair, and it contained some very nice and *positive* camera work.

A five-part series on cryonics aired 1-5 May on the Los Angeles area NBC affiliate's evening news. This was a series of three- to five-minute long pieces which discussed the basics of cryonics, the scientific controversies, and the legal battles in which we have been engaged.

In addition to the TV spots, there have been a number of East Coast radio shows as well, and it is apparent that media interest in cryonics is at a high level. A helpful by-product of this kind of press is a seasoned core of spokespeople who know the ropes and can spread the word wherever and whenever an opportunity arises.

In print, the May issue of *Spy* magazine (a high circulation, glossy monthly for cynical and trendy New York Yuppies) has done a feature on Alcor and cryonics. We awaited the *Spy* article with some trepidation, but we've now seen it: it is the funniest and perhaps the cleverest thing ever written about cryonics. We haven't laughed so hard in a long time. Author Ned Zeman sometimes takes dramatic license and sometimes outright fibs about what was said and done by the "Alcorians" he covers, but the article is *so* hilarious all we can do is laugh and say "What the hell!" According to Curtis Henderson and a couple of the people who've called here for information as a result of it, the *Spy* magazine article was excellent. Apparently it is some of the best press Alcor and cryonics have ever had.

There was also an article about cryonics and the American Cryonics Society which appeared in the April issue of *Saturday Evening Post*. This article was by ACS President Dr. Ben-Abraham so it was naturally enough completely favorable to cryonics. We understand that another article about ACS appeared in the April issue of *Women's Day*, although we have not seen a copy. The *Saturday Evening Post* and *Women's Day* articles did



not mention Alcor.

Perhaps the most crucial piece of press was a five page article focusing exclusively on Alcor with a large accompanying photo lay-out which appeared in the May "premier" issue of *Longevity* magazine. This article discussed cryonics in broad brush strokes and dealt with Alcor and the legal battles we confront in considerable detail. The tone of the article was neutral to mildly supportive and we would rank it as favorable overall. It has proved very productive for us and has yielded a large number of information requests.

Other articles worth mentioning were a cover story which appeared in the April 23 issue of *The Sacramento Bee Magazine* and a piece of fiction entitled "The Gentle Seduction," by Marc Stiegler, which appeared in the April, 1989 issue of *Analog*.

The *Bee* article is mostly about gerontology and in particular the world of Roy Walford and Steve Harris at UCLA. But it has the usual lurid lead-off about the Dora Kent affair and does deal with cryonics. As usual, it asks the wrong experts about the feasibility of cryonics: in this case University of Southern California *gerontologist* Caleb Finch who says: "There's a lot of reprehensible, mercenary propaganda on things that are totally unrealistic and [cryonics] is one of them."

The Stiegler piece is not about cryonics *per se*. Rather it deals with nanotechnology and the coming control over human aging and evolution. His point is that sweeping changes are easier to take if they are introduced *incrementally*. Stiegler does a fine job of making us *see* this in his story. This is achieved through a mixture of fine writing, believable technology, and thoughtful speculation about the the distant future of humanity. This story continues a trail-blazing group of fine articles in *Analog* dealing with cryonics and nanotechnology. Almost two years ago, *Analog's* Editor, Dr. Stanley Schmidt, laid it on the line to his authors that Drexler's *Engines of Creation* was required reading for producing believable science fiction. Stiegler's piece is about the best so far.

* * * * * * * * * * * * * * * * * *

QUALITY CONTROL AND COMPLAINTS

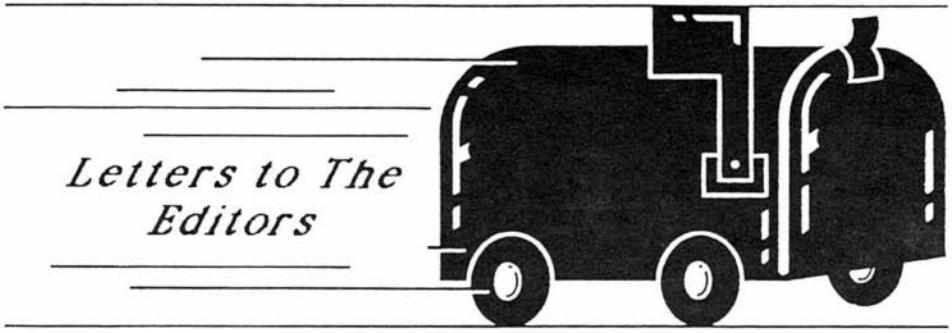
One of the problems associated with growth, especially in an all-volunteer organization, is quality service. There are many reasons for this which are beyond the scope of this article, but suffice it to say we've been getting more than our share of complaints in the past few months.

We are attempting to address this problem by creating an administration which is more streamlined and more responsive. To this end we want you to know that: a) we want to hear about any problems and dissatisfactions you may have in dealing with Alcor. and; b) that we will do something about them when you call. To facilitate this we've appointed two Quality Control People (QCPs) to handle complaints and fast-track fixes where necessary. They are Jerry Leaf and Mike Darwin. We have two people so that someone will pretty much be available (by pager if necessary) at all times to handle problems. If you have a problem with an item or service from Alcor that you have not been able to get resolved to your satisfaction, you are

encouraged to ask for either Mike or Jerry. If they are not immediately available they can be paged.

We want to continue to offer a high level of service. We are endeavoring to do so under pretty adverse circumstances as normal businesses go. And most of all we want to offer high quality service at the lowest price possible. Please help us by providing the feedback we need to upgrade our operation.

* * * * * * * * * * * * * * * * * * *



To the Editors:

In *Cryonics* vol. 10(3) (March, 1989) I read with interest the article by Dave Kekich on how one might "sell" the idea of cryonics to friends and loved ones in order to hopefully save their lives.

Sadly, I am extremely skeptical of Dave's sales technique. Since becoming both a member of Alcor and also a suspension member a year ago, I have been perplexed as to why "everyone" does not want to attempt to save their own lives from oblivion. I have come to the conclusion that we possess a certain "spark," a certain psychological make-up that once we are aware that cryonic suspension is feasible and is occurring NOW; we are inexplicably drawn to making suspension arrangements for ourselves.

I was made aware of Alcor, ironically, through the bad national press Alcor was receiving regarding the suspension of Dora Kent. I am usually a very skeptical person, always sensing a "rip-off". But I tell you that *nothing but nothing* could have stopped me from enrolling with Alcor as soon as possible.

Like most suspension members, I live with the fact that I will be leaving behind not only my family and friends, but also my significant other of many years. I consider it almost a moral responsibility to tell everyone I care about, even casual acquaintances I talk to, about my cryonic suspension arrangements. I argue the rationale of cryonics over and over again in the hopes that maybe, just maybe, someone I care about will "come with me". My realization is that no one can *ever* be convinced enough to make suspension arrangements for themselves; if they do not have that certain "spark," nothing we can do

will ever convince them. So everyone I know will die beyond recall. The only thing we *can* do is spread the word that an organization such as Alcor exists; any life-saving decisions are then totally the responsibility of the individual.

Scott M. Toth
Miami, Florida

* * *

Dear Editors,

Alcor isn't the only organization saving people from coroners. It seems California doesn't have a an exclusive on incompetent coroners/medical examiners. According to the UPI story below, a Massachusetts medical examiner recently pronounced an 82 year old woman dead and cleared her for autopsy. Nothing unusual there, except for the fact that she was still alive!

Dave Pizer
Phoenix, Arizona

Saturday, April 15, 1989 The Arizona Republic A3

Mortuary finds there's still life in the old girl

United Press International

HOLYOKE, Mass. — An 82-year-old woman pronounced dead by a medical examiner and cleared for an autopsy was later found alive by funeral-home workers and was in fair condition, officials say.

A Holyoke police officer, called by a neighbor Tuesday to the apartment of Helen Francoeur, believed she was dead and alerted the Medical Examiner's Office, authorities said.

"There was no pulse," said Dr. William J. Dean, the Hampden County associate medical examiner.

"She was cool and there was no heartbeat that we could hear. But sometimes you get in there and really shake them up and they come around. It's the first time it has happened to me in my career as a medical examiner."

After viewing the body, Dean pronounced the woman dead and ordered an autopsy.

When the mortuary's employees arrived, Francoeur stirred slightly and paramedics were called to the scene, a police report on the incident said.

The mistake is "a real embarrassment to the medical community," said David Ragazzini, one of the paramedics who brought Francoeur to Holyoke Hospital, adding. "I really wish this had never happened."

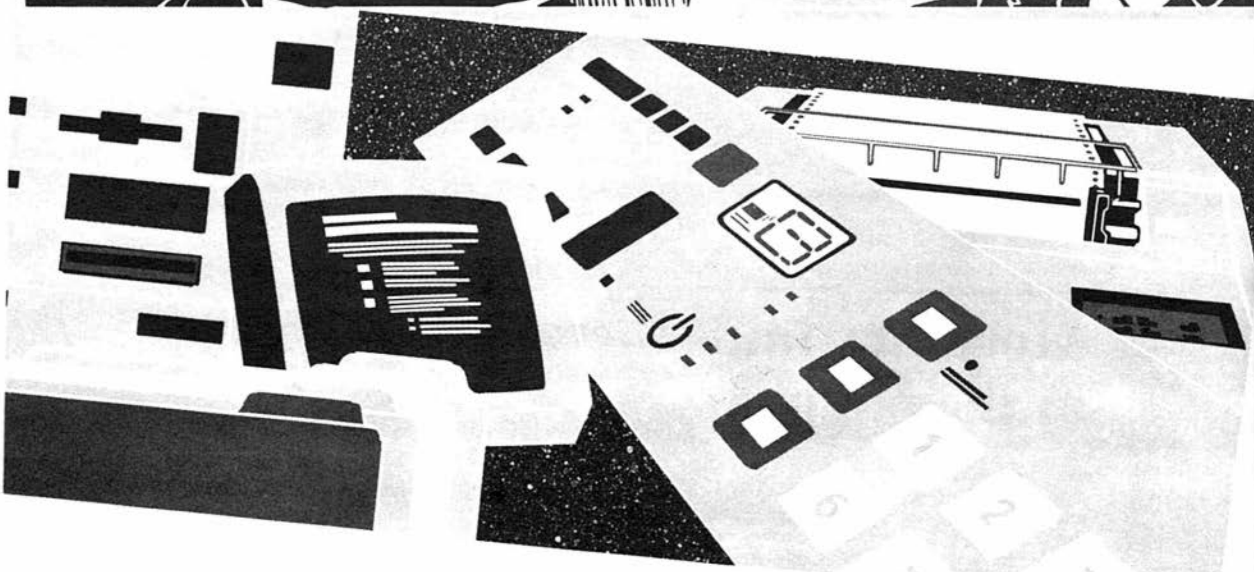
Francoeur was in fair condition late Thursday, suffering from dehydration, hospital officials said.

"I have heard of this happening in other situations. It's, of course, unfortunate and embarrassing to Dr. Dean and to all of us," said Dr. Thomas Smith, associate chief medical examiner for western Massachusetts.

"Fortunately, the lady seems to be doing well. It's something that does happen from time to time in our profession, though rarely."

Nearly six years ago, Karla Woods of Champaign, Ill., suffered hypothermia and was pronounced dead by the county coroner. But Woods later showed signs of life in the morgue and recovered.

Doctors said her body was "in hibernation" when found, resulting from a combination of hypothermia and drug and alcohol abuse.



THE HISTORY OF INFORMATION PROCESSING
The End of an Era Is Within Sight

by Steven B. Harris

Introduction

Once upon a time, I asked a scientific coworker of mine what he thought was the most crucial tool in modern science. His answer, after a moment's thought, was "the cup of coffee." After some protest (I complained that the cup of coffee was not modern, and not strictly a tool), he agreed to try again. Then he named the photocopier.

My irreverent colleague's view is not a difficult one to understand. Science, after all (and indeed most human culture) is about *information*: its production, storage, retrieval, and transfer. The natural result of this fact is that developments in information processing are among the most important developments of all, since they underlie most other progress. In the last analysis, there is little doubt that the photocopier *has* advanced science more than most any specific scientific instrument that one can name.

With that much said, it is a sobering thought that the photocopier itself is but a single step in a quick dash of recent progress in the field. I've lately been reflecting upon my incredible luck to be alive at a time when the completion of one of the great information revolutions is, on the relative timescale of history, just around the corner. By "just around the corner," I mean not only within my own expected lifetime, but within the next twenty years.

We live in an age when manipulation of information in electronic form, unencumbered by bulky storage methods, has at last become possible. We are at the threshold of an era in which instant access to the total knowledge of mankind will become reality for the average citizen of any developed country. We are *almost* there -- painfully, tantalizingly close -- and from our vantage point we can now look back upon the path we have traveled, much as a climber on the final ascent to the summit of Mt. Everest pauses to look out across the Himalayas.

This essay is about civilization's path to the first great information revolution, and about what lies beyond.

Part I. The History of Information
The Stone Age Reaches an End

Modern man, physically and probably intellectually indistinguishable from our present noble selves, has been around for at least 35,000 years. For most of that time, we've lived as tool-using, fire-using, seasonal hunters or hunter-gatherers. Our close cousins the Neanderthal humans, as intelligent as we if not as good-looking, buried their dead with pottery and tools more than 80,000 years ago. Such burials suggest that these people had a complex language capable of expressing abstractions like the idea of life-after-death. It is thus very possible that our own direct ancestors living at the time (late *Homo erectus*) were similarly advanced in the art of speech. But if we had a complex

language, we had no writing --only drawings on cave walls, carvings, and a few stone sculptures. Ideas and abstractions were passed from generation to generation by word-of-mouth, if at all.

The fourth glaciation of the present ice age ended about 12,000 years ago. Not too long after that some of our ancestors, now finding themselves in a warmer climate and perhaps tired of chasing animals, began to settle down and cultivate the land. The resulting geographically stable and better-fed populations soon began to build larger agriculturally based communities-cities. The cities in turn began to support increased specialization of knowledge and labor, and with that specialization the rise of civilization began.

Writing

With greater human occupational specialization came the need for keeping track of more complex types of goods and services. Thus, not long after the development of agriculture, urban peoples began using small clay tokens, and symbols inscribed on bits of clay, to represent inventories of important things -- animals, baskets of wheat, amounts of money. Such tokens have been found in the rubble of Mesopotamia -- markers for a game of Monopoly that was played for real a very long time ago.

By 5,000 years ago, this record-keeping tool had developed into a complex symbolic form of clay-tablet writing in which nearly any idea -- even abstract ideas -- could be expressed if one was skilled and learned enough to know how to do it. Most people, of course, were not. "Cuneiform," as the writing came to be called, was very difficult. It had 3,000 symbols, and many of them weren't very obvious.

Nevertheless, a major hurdle had been passed. By 3000 B.C., man's knowledge base had finally begun to become "extra-somatic." Cultural information could now be stored *outside* of the brain, and thus independently of the mortal limits of any one knowledgeable individual. With this semi-immortality of information, man's cultural evolution, already far more of an influence upon him than the forces of genetic evolution, took another leap ahead. *Homo sapiens*, never much in the way of strength, size, or swiftness, began to dominate the planet anyway. The tool which was to make this possible was not simply man's large brain, for after all, he had had that for a hundred millennia. The key was rather a mass of stored information about how to subdue the world -- a mass of information getting larger all the time.

Books

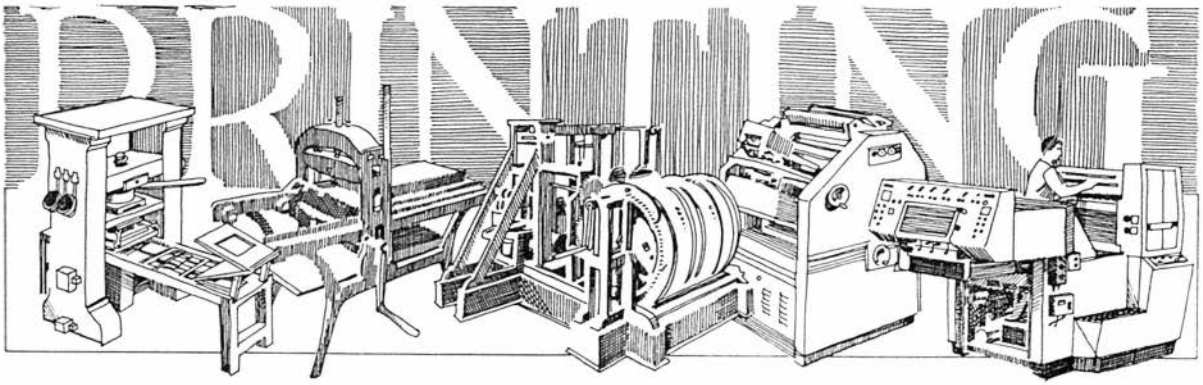
Perhaps 3,500 years ago, a written alphabet was developed. It was an invention that was probably made only once, and from this single ancestral alphabet all later alphabets eventually came (unfortunately, the details and the credit are now lost). The incomparably easier-to-learn phonetic writing made written learning accessible to all upper-class individuals in Western civilizations, whereas such knowledge previously had been the sole province of professional scribes. Wealthy Romans began to amass private papyrus scroll libraries 2,000 years ago, and by the fourth century A.D. Mediterraneans were converting animal skins into parchment leaves, and binding the leaves into rectangular collections. The folio book was born.

Papermaking was invented by the Chinese about 100 A.D., and after the Chinese papermaking art was introduced to the West by Muslims in the 12th century, books became somewhat less rare. Once they had paper to work with, the Chinese had developed the technique of printing from carved wooden blocks almost immediately (skins are too expensive, and papyrus is not strong enough to print on). In the West, however, the difficulty of carving wooden blocks into a typeface limited production of paper books to hand-copying for three hundred years. Books remained tremendously expensive. In the early Middle Ages, a library of 20 books made one a wealthy man. A library of books that one could read made one a scholar.

The Gutenburg Printing Press

The big change that signaled the beginning of the modern world came in the middle of the 15th century A.D., with the development of a cast-metal movable printer's type which made the ancient art of printing practical for the first time. (The invention was characteristically a Western one-only -- the Western phonetic alphabet with its small number of symbols lent itself to movable type). With the new type, a fresh plate did not need to be engraved and cast for each page of a manuscript. The work of making a book now dropped orders of magnitude almost overnight, and the effect on learning was explosive. In Europe, movable type helped fuel a "renaissance" (rebirth) of interest in all aspects of the ancient classical wisdom that had previously been so hard to come by in copied manuscripts. By the year 1500, more than 6000 different written works had been printed. The Middle Ages had come to a close.

The impact of all this information was profound. Social institutions which depended on ignorance crumbled. For instance, among the early printed works were inexpensive Latin Bibles and even common language translations of the Bible -- both of which served to make

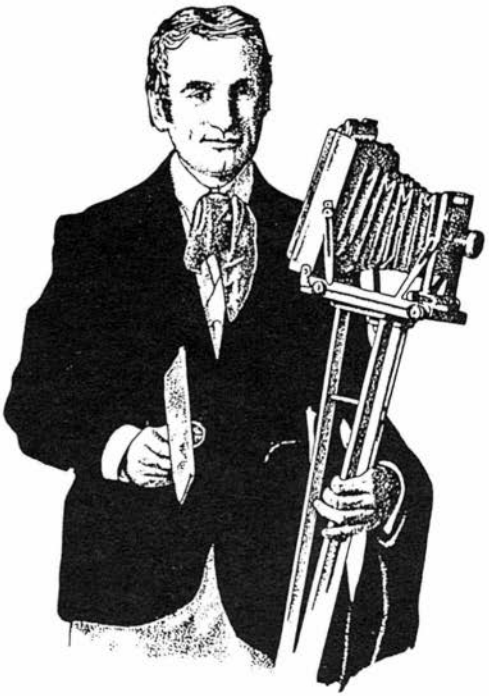


that work accessible to common persons without the necessity for the intercession of a priest. The result, in part, was that the 16th century brought a chain of religious rebellions and schisms, fueled by an unending stream of pamphlets from the new presses, which broke the domination of the Roman Catholic Church in Europe and opened the way to cultural and philosophical reform.

Nor was that all. Following also upon the heels of the practical printing press came the *scientific* revolution -- a sequence of events which again was probably not coincidental. The scientific revolution in turn brought its own changes, an example of which was the population boom. In the year 1650, the population of the world was about 500 million human beings, a number which had been building very slowly since the dawn of man. But now, with the age of science, the rate of population increase took a sharp upward turn, and the number of humans on the planet increased ten times in the next three and a third centuries.

Storage of Picture and Sound Information

The scientific revolution eventually led to many novel methods for information storage, although it was centuries before technology advanced sufficiently to take the next major steps. Advances in chemistry eventually resulted in the invention of practical photography by the 1840's, and further advances in materials science resulted in a flexible nitrate film which made possible motion picture photography beginning in the 1890's. The first high-quality mechanical sound recordings were also made in the late 19th century. The invention of the amplifying vacuum tube ("triode valve") in 1906 ushered in the era of electronics, and the electronic amplifier in turn made possible the practical recording of sound on both motion picture film and magnetic tape after about 1930. In the 1950's, a method was found of recording motion pictures magnetically as well, on a medium called "videotape".



Improved Text Reproduction

Also with the advance of technology came inevitable improvements in the manipulation of written text. Rotary printing methods revolutionized production of books and newspapers. By the last quarter of the 19th century, businesses and private individuals had begun to use recognizably modern typewriters, which transferred writing directly into an easily readable form. With the development of personal rotary printing methods like the mimeograph, typewriter print became easily reproducible. "Scriveners," or hand-copyists, whose jobs had been all but medieval, disappeared a generation after Melville and Dickens wrote about them in the mid 1800's. In their place, a crude sort of desktop publishing was born in the early years of the 20th century.

In 1950, commercial dry photocopying became a reality. During the next two decades,

"xerography" once again utterly transformed the way in which information was transferred within businesses, and removed from libraries. In the Middle Ages, all written works had been hideously expensive because skilled copyists were needed to reproduce them. Later, efficient copying became the province of printers, and still later, was extended to secretarial typists. Now, finally, in the last half of the twentieth century, copying of any document could be done by an unskilled individual, at nominal cost, in a few seconds.

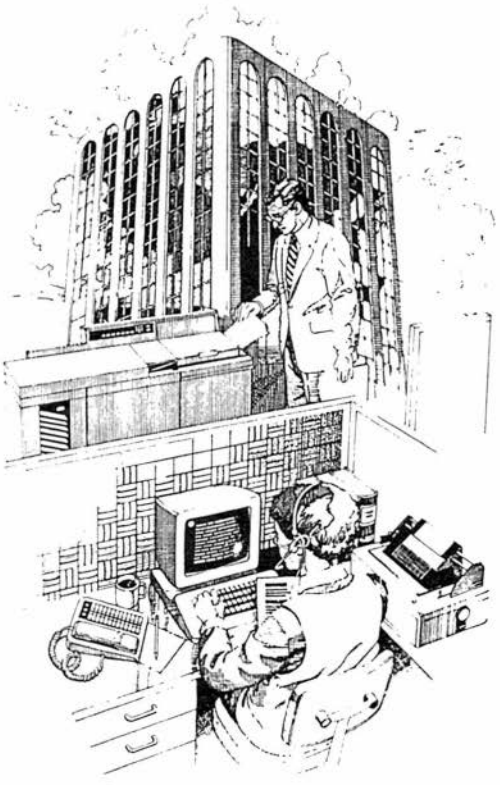
And all of this, of course, was as nothing compared with what was to come. The last half of the twentieth century would bring efficient ways of not only storing information, but also searching it.

Information Processing -- Enter the Computer

Information in the form of holes in a suitable substrate had been read directly by machines since the days of the Jacquard loom in 1801. Many of the principles of an "automatic computer" which would process information fed into it as punched holes on a card, were worked out by Charles Babbage and Augusta Byron (Lady Lovelace) in the second quarter of the 19th century, using mechanical models. But despite clever mechanical advances like the Hollerith punchcard tabulating machines of the 1890s, machines did not become really practical for pure information processing until electronic computers (developed originally with vacuum tube electronics during the Second World War) began to be constructed completely out of transistors after about 1960.

The Early Information Search

Originally, electronic computers were applied to mathematical operations. But text information sorting and retrieval using punched cards had had a history which preceded even that of the electronic computer, and it therefore wasn't long before electronic computers were employed to sort written text in a crude way.

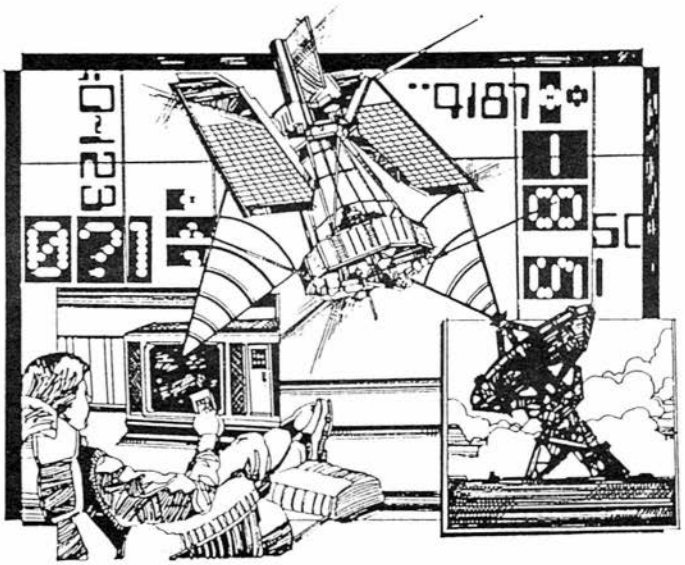


Large scale written text manipulation by computer began with compilation of "verbal indexes" or complete concordances of various written works. To make such a verbal index, the entire work is broken down into individual words and phrases, and then alphabetized -- a massive job when done by hand-sorting of index cards. Prior to the advent of the electronic computer, verbal indexing had only been done for a few pieces of literature. By 1957, however, the hardware was available to do the first complete computer concordance of a large work, and (as in the case of the Gutenburg press), the first target of the new information processing advance was the Bible.

As the magnetic tape memories of the 1950's and 60's gave way to the spinning magnetic-disk memories of the 1970's, the

quantity and quality of information that could be stored and searched by computer improved tremendously. The 1957 indexing of the RSV Bible by a Remington Rand Univac computer, for instance, took 400 hours because the computer had to process 80 miles of magnetic tape. By 1977, however, such a task could be completed on a computer with a disk memory in a few minutes. Comparable search tasks for other kinds of information improved at a rapid rate.

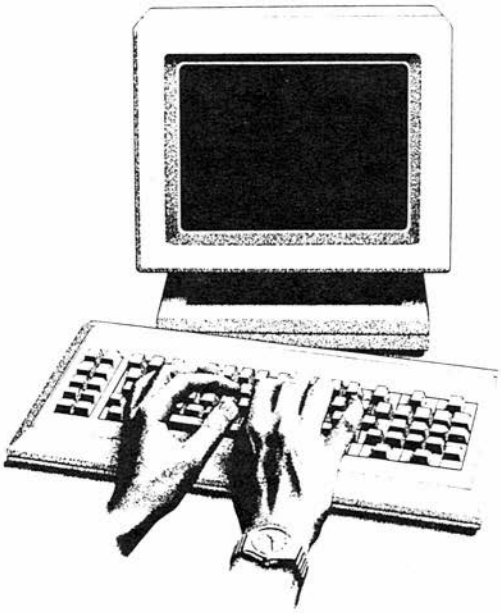
The On-line Era



By the 1970's, the speed with which hard disk memory made data available to computer search had resulted in a new kind of information search -- the so-called "on-line" information search in which the searcher of the database sat before a terminal and interacted with the computer in "realtime." "On-line" computer database search experiments were being carried out at MIT as early as 1964. The first major application was a database search system called RECON, developed by NASA during the years of the Apollo program. The first large scale commercial application of an "on-line" computer data base search system came in 1971, as The National Library of Medicine began offering an interactive medical database search system called MEDLINE. About this time, the first on-line library indexing and cataloging systems also began to be available, again with the National Library of Medicine leading the way.

In the 1970's a further interactive application of the computer was made possible by the continued development of the integrated circuit. The term "wordprocessing" was invented in Germany in 1968 originally to describe editing done on office machines ("automatic typewriters") which "remembered" (via magnetic tape) the documents being edited. In 1971, however, the construction of an entire central processor unit on a single silicon chip ("microprocessor"), made inexpensive small computers theoretically possible. The first such machine ("microcomputer") was offered as a home hobby kit in late 1974, and demand was unprecedented and massive. By the late 1970's, with the beginning of large-scale introduction of microcomputers into businesses and homes, wordprocessing began to be almost exclusively the provence of the microcomputer.

The microcomputer was, of course, also able to act as an excellent terminal for a larger computer, given a telephone modem. More than any other single factor, the introduction of the microcomputer drove the further development of "on-line" databases once they became theoretically possible. MEDLINE, for instance, had less than 200 users in 1975, before the era of the personal computer. By 1989, that number had increased by a factor of a hundred.



The Microcomputer's Chief Limitations.

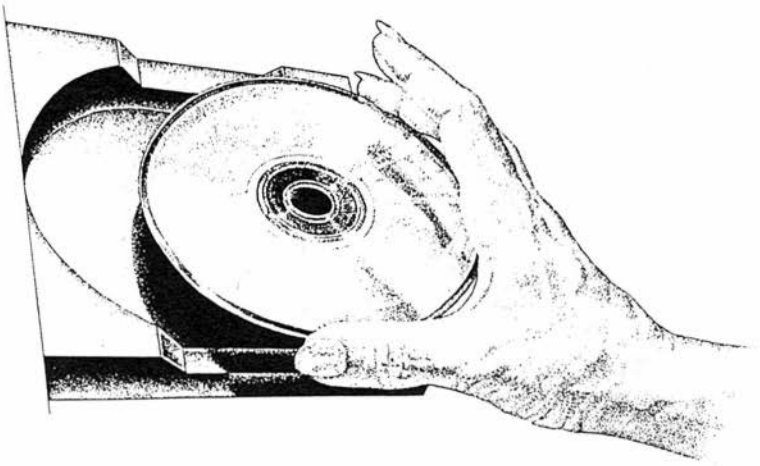
By the middle 1980's it began to become apparent that the data base search limitation of the microcomputer user was not primarily a result of the small user's lack of computational *power*, but rather a result of a lack of microcomputer data *storage* and *transmission* capability. Ordinary telephone lines and computer modems in the mid 1980's transmitted no more than a few thousand words per minute. At these rates, transmitting a large novel would take an hour. The microcomputer magnetic "floppy disks," which could be transferred into a microcomputer by hand, held no more than about a large novel's worth of information apiece. Even the "hard disk" memories of personal computers, which held a hundred times the memory capacity of floppy disks, were severely limited by comparison to the size of the data-bases available commercially. By the late 1980's, then, many a personal computer existed with the power for gigantic searches of databases if left to run overnight -- the problem was that the data was simply unavailable.

The Storage Problem Begins to Crack

In the early 1970's, a breakthrough occurred which was to open the way for massive information processing by microcomputer. Scientists at Philips Corporation in Europe, and the Music Corporation of America (MCA) in the U.S., developed a method of storing an analog video signal as a series of optical defects in the surface of a spinning aluminized plastic disk. These imperfections were read by a laser beam which was far quicker and more precise than magnetic read-heads. The resultant "laserdiscs," first marketed about 1978, were the forerunners of a series of optical disc technologies that was to revolutionize information storage in the 1980s.

The much larger information storage capacity of the new optical discs proved capable of replacing any information medium. For instance, Philips had chosen to store the sound track of their "laserdisc" in a strictly digital fashion, with the information coded in a binary way. One spinoff of this technology was the audio "compact disc" (CD) which was originally developed and marketed jointly by Philips and Sony Corporation. The digital storage method of the CD's technology resulted in easy suppression of background noise, with profound reprecussions. In the six year period between 1982 (when the CD was first introduced in Japan) and the Christmas season of 1988 (the last hurrah of conventional stereo equipment), the phonograph record became obsolete.

Other digital methods of information storage soon followed. For the first time, the optical disk made digital storage of pictures as well as text practical, allowing production of computer "encyclopedias" with both picture and sound entries. Such storage systems became available to educational institutions in the early 1980's as "Compact Disc Read-Only Memories" (CDROMs). A CD-ROM the size of a conventional phonograph record was capable of storing the information content of a thousand novels, or an entire multivolume encyclopedia with picture illustrations.



Optical disk technology developed rapidly. The mid 1980's saw the production of systems in which information could be permanently stored on an optical disk by the *user* of the computer, rather than the disk manufacturer. Such "permanent storage" systems proved useful in certain situations: for instance, they allowed hospitals to store the results of X-ray and magnetic resonance body scans, for rapid later retrieval. When the development of high resolution "film scanners" for the medical industry allowed the digital encoding and storage of film X-ray images, it became possible to store the images from a hundred X-ray films on a single optical disk.

The development of medical scanners to "digitize" photographic information was paralleled by the development of scanners to read text directly from a printed page into digital form. In the late 1980's, such systems (although of low resolution) became available for personal computers. For the first time, it became possible that all of the print information in the libraries of the world could be stored digitally *without* first having to type it into a computer through a keyboard. Further, it began to be apparent that all of the music and pictures on all the records and films of the world could in theory be converted and stored digitally in much the same way.

As the 1980's drew to a close, there remained only a few problems to solve.

Making Data Available to the User At Home

The theoretical capability to store all library information digitally did not mean that the world hurried to get it done. The reason lay in the simple fact that there was insufficient public demand for digitization of information, mainly because two public access problems remained to be solved before digitized information could be made available to the average home user. Although (as noted earlier) large amounts of digitized information were manipulatable at the speed of the fastest generation of personal computers, the key problems of information manipulation involved the questions of how to *transfer* information to the personal computer at home, and how to *store* it there conveniently.

Nevertheless, inroads were being made. By the late 1980's, a number of corporations had announced the commercial development of personal computer optical disk drives which

were not only able to *store* information, but which could also be *erased*. The new drives coded information through the use of precision heating lasers which either heated tiny regions of magnetic film on the optical disk past the Curie point, or which heated tiny spots of rare metal oxides into crystal structures that scattered laser light in a different way.

The earliest such personal computer drives featured several times the storage capacity of conventional magnetic hard disks, as well as relatively inexpensive removable diskettes which allowed access to a much larger volume of information. Moreover, by early 1989 these first-generation figures had already begun to improve rapidly, with at least one California firm marketing an erasable optical "diskette" drive for microcomputers with a capacity of 1000 megabytes per diskette, and an information access time comparable to the current generation of hard disks.

Part II. The Near Future

The history of information storage and processing until now has been a story of exponential advancement, with most of the significant developments coming within a single human lifetime of the present. What may we expect in the near future? What developments may we look forward to with a reasonable amount of assurance?

The Last Bottleneck In Home Information Processing

To start, it is inevitable that the next generation of personal computers in the 1990's will feature optical disk storage of information. This tremendous information storage capacity leaves us with only one remaining problem: How do we get the relevant information *into* the next generation of personal computers? Must it be done manually, by inserting an optical diskette? Our scenario for the early 1990's so far appears frustrating: A generation of personal computers will be in place that will be able to store and search thousands of megabytes of information with ease, yet (if there are no changes), this marvelous machine will be connected to the increasingly digitized libraries and mainframes of the world by the U.S. postal service (!), and by an unreliable long-distance telephone link that passes no more than a megabyte or two an hour, at high cost.

That situation is not likely to improve with the telephone system now in place. The problem with present telephone lines is an intractable one called "low bandwidth." In short, such lines simply do not have the high frequency signal properties that are necessary to transmit information at a rapid rate, such as occurs with a video signal or with a high speed computer data transmission. Engineers have talked of doing something about this for years, but the problem has been that there hasn't been any compelling reason to do anything about it until now. The possibility of "picturephones" simply did not hold enough allure to consider replacing the entire telephone line system with something that had enough information-carrying capacity to do the job. (Who wants to be viewed by the

world when lounging around the house, anyway?)

Coaxial VHF TV cable has the capacity for high speed data transmission, and it was the entertainment value of information (cable TV) which finally got coaxial cables into homes. (In fact, it has been the entertainment value of information -- from books to motion pictures to videos to compact discs -- which has driven much of the technology of the information revolution all along.) Thus, by analogy, it seems likely to be the entertainment value of digitized information which will complete the transition to rapid home data transmission in coming years.

The Payoff When The Problem Is Solved

Let us consider the entertainment and educational possibilities inherent in a digital "total knowledge" base available to a home computer user over coaxial cable.

Digital music, it turns out, can be transmitted over a line without any loss of fidelity whatsoever, if one is sufficiently careful. The reason is that digital information can be subjected to various transmission error detection routines already well worked out by NASA and the military, and which are already successfully put to some use in the current generation of CD players. Shortly, therefore, it should be possible to call up a music library or music store using your computer, and download without flaw a symphony or any other piece of music, directly onto a blank Compact Disk. The same should be possible for digital movies when such things become available in the near future, and the process should be much more convenient than now possible with cable television. Videotape rental operations as we know them will begin to feel the bite of *real* competition in about twenty more years.

Not only should it be possible to download into a personal computer video images taken by other people, but those taken by the home computer user, as well. A completely digital filmless camera has already been demonstrated, and within ten years progress with digital sensing elements and storage elements will allow construction of a digital camera that takes pictures at higher resolution than the standard 35 mm films now available for amateur photography. At that point, most of the photographic film industry will go the way of phonograph record manufacturers and buggy whip makers. Digital videocameras are in the near future as well, and the output of all these devices should be available for manipulation and storage to the user of a personal computer by the year 2000.

It goes without saying that printed materials and their accompanying illustrations are easily subject to "digitization" too if they did not start out in digital form. In thirty years, it ought to be possible for the average home computer user to download, in a few seconds, any book available in the Library of Congress, complete with color illustrations if it has them. Most computer-literate middle class people, of course, will have a library of the most common reference works already on an optical disc. Most magazines, newspapers, and less-common reference works, and also recently printed books, scientific papers, and technical reports, should be available "on-line" by the end of the century. Once downloaded by the home user, the work will be available for reading on a high resolution color screen which will also allow the reader to focus at infinity so that he does not get eyestrain (and his studious children do not grow up to be myopic). In the future, most borrowing from libraries will be done over the "phone."

Paper books, of course, will no more be made obsolete by purely digital books than movies were made obsolete by television. Many people will still prefer the old-fashioned way. Yet even here, change will come. Many, perhaps most, new paper books will eventually be laser-printed on site at a local bookstore as the customer waits -- the

print and illustration information having been stored on an optical disk rather than as expensive inventory. Libraries, too, may one day find it cheaper to keep much of their little-used inventory only on optical disk, ready for printing on demand when the customer wishes to borrow the work in paper format.

Once all print, voice, music, and picture information has been digitized, computer indexing and manipulation of knowledge should begin to open educational and scientific vistas difficult to imagine today. The word "hypertext" was coined in 1965 by Theodor Nelson of Brown University to describe textual information networks that could be traced by computer. Such systems, familiar to many readers from K. Eric Drexler's description in *Engines of Creation*, allow investigators to scan the complex net of factual statements and references in a "knowledge base" both forwards and backwards in time, starting from any piece of information. By extension, such network connections will one day apply not only just to "text," but to all other kinds of information as well. The first steps along this line are already being taken with personal computers, in systems such as the Apple Macintosh. Eventually, digital storage of all forms of information will allow integrated and instant access to all available sound and picture documentation relating to any piece of text in the Library of Congress.

Computer handling of digital information will allow *manipulation* of picture and sound material by personal computers as well, analogous to the way word processors now allow manipulation of text. The next generation of computers will, for instance, easily combine the functions of music instrumental track editors and synthesizers, for those talented enough to make use of such things. The average person will use his PC routinely to touch-up photographs taken by his filmless camera [look for a sudden increase in high quality UFO pictures]. Within the next generation, it will be also possible for the average home user to re-edit movies (both commercial and videocamera home movies) on a personal computer. It will even be possible to combine images from old and new movies: The film buff of tomorrow will be able to see, for instance, how he personally would have looked leaning across the piano listening to Dooley Wilson sing "As Time Goes By." The first steps along the road of digital processing of video images have already been taken with the special "Digital-Video Interactive" (DVI) processing chips now beginning to be introduced into microcomputers.

Manipulation and storage of video material will also be greatly aided in the next few years by the production of larger memory chips, created by X-ray lithography. The present theoretical limit to information storage by current chip production techniques is a few tens of megabits of information per chip -- a limit we are approaching even now. X-ray lithography promises to increase that data limit by a factor of 1000, making it possible for the first time to store whole movies on a single semiconductor chip. If current miniaturization trends continue, this goal should be reached in less than 20 years. Thus, the movie cameras of the near future will have no moving parts, and their size will be determined only by the necessary size of the optical system. The audio recorders of the near future will be even smaller, with most of their bulk present only for convenience in handling.

Communications Advances

Twenty years ago, scientists found that large amounts of information could be efficiently transmitted on a beam of laser light, carried inside an ultrapure glass fiber. The science of "fiberoptics" was born, and has at last begun to mature in our time. At present, glass fiberoptic cables are replacing trunklines in telephone systems in this country at a rapid rate, and the newer telephone companies (which arose in the wake of communications deregulation in the early 80's) use glass fiber trunk lines almost

exclusively. The information carrying capacity of fiberoptic cables is far higher than that of presently used coaxial cables or microwave relays: for instance, even at the present level of technology, a single glass fiber can carry information at the rate equivalent of several entire movies *per second* over city distances.

It seems inevitable then that the digital information revolution will shortly begin driving the routine "wiring" of individual homes with a fiberoptic cable. A single such thin cable would carry high resolution digital "cable" TV, and videotelephone. The cable will also carry digital music for storage and later reproduction. It will carry digital newspapers, magazines, books, articles, and educational information. It will carry FAX and electronic mail -- virtually eliminating any use for paper letters, except as legal documents [many legal documents are now served by FAX - Ed.] and art. (And speaking of art, with FAX, obscene phone calls can now be illustrated.) Cable will also have the capacity for two-way interactive advertising and shopping. Some of these things are available to personal computer users of modem data "nets" today, but their utility is severely limited by the storage capacity of the present generation of microcomputer, and the extremely poor information carrying characteristics of the telephone system. Optical disks and fiberoptics will very shortly change all of this. [Readers looking for obvious long term investment opportunities, take note: companies that work with fiber optics should be a hot item well into the next century].

Portable communications, too, seem slated for vast improvements within a few decades. The burgeoning cellular mobile phone net is only the beginning of a vast cellular network of transmitters, both indoors and out, to come in the near future. Today's mobile businessperson communicates raw information crudely with a "laptop" portable computer/modem and a cellular phone. However, the information processing and storage capacities of the next generation of portable computers will demand infrared or microwave-band transmission of data, since no other line-free communications method will be able to handle the necessary data volume.

Infrared transmission of data by transmitting and receiving diodes may be done efficiently indoors, and it is likely that by the early part of the next century, many buildings and residences will feature "nets" of tiny infrared light transmitters and receivers, and thus will be "wired for information" in much the same way that buildings are wired for electricity today.

Outdoor transmission of data will require a microwave system, to which the portable computer will be able to switch effortlessly and automatically when necessary. Portable microwave communication is presently severely limited by line-of-sight transmission problems, and by the lack of power inherent in battery-powered transmitters. These difficulties, however, are addressable by putting a large enough receiving and transmitting antenna in orbit overhead, and this in turn seems feasible by the early part of the next century. By the year 2025, then, it seems likely that a citizen with a portable computer/microwave link will have access to the entire updated knowledge of mankind at any time -- whether sitting on a boat, or on the beach, or in a cabin high in the mountains. Navigational information, of course, will be available as well, and two-way video communications ability with anyone near a fixed phone, or equipped with a similar portable unit.

Part III. The Far Future: Conclusion

With the near-term development of a global digital knowledgebase, connected by satellite with a cheap and easily portable computer/communicator inexpensive enough to be owned by the average person, the first great peak in the information revolution will have been conquered. Are there other peaks beyond? When will we arrive there? The total amount of information available to mankind currently doubles every eight years, and the amount of information accessible to the average citizen in a short search is also growing exponentially. The average information processing power available for a dollar has increased a trillion times since the turn of the century, and the trend shows no signs of slowing. Will the growth rate continue even after all the knowledge of mankind is continuously available "on-line"?

Here, we can only speculate wildly. It seems likely, however, that the next significant steps beyond the present imminent revolution will take place only when the human brain begins to be well enough understood that information can be fed into it by routes other than the senses. In addition, artificial intelligence aids, both implanted in the brain and functioning outside it, seem likely to play an increasingly important role.

When all of this will begin to happen is a matter of guesswork that can no longer be called "educated." In any case, the arrival of this "second revolution" information technology will certainly depend upon what use we make of the revolution that will come to fruition in the next 20 years. But the prospects are rosy. As Alvin Toffler pointed out a generation ago, the thing about information revolutions is that they drive themselves: the farther along they get, the faster they go. It is very difficult to predict the outcome of mankind having all of scientific and technical knowledge constantly at its fingertips, with all of the cross-referencing and simple associative connections done and kept updated by machine. But doubtless, the effect will be marvelous.

Let the reader be prepared, then. In two generations, children who ask simple informational questions will be referred by teacher or parent to their portable "Cards" -- semi-intelligent flat personal computers controlled by voice, eye movement, and transmitting hand-glove; and linked by infrared and microwave to a central data net. A few generations after that, children may not need to ask adults those sorts of things anymore -- answers to simple "factual" questions will simply come into one's mind via direct data-link, as soon as one can properly frame the question. Not long after that, the intellectual world will become something that would no longer be recognizable to the person of today.

ALICE GOES TO WONDERLAND, OR,

HOW EUROPE TOOK MIKE DARWIN BY STORM

by Mike Darwin
photographs by Luigi Warren

CAVEAT EMPTOR

Many of the impressions and statements I make in the following essay will no doubt be controversial. Some people both inside and outside of Alcor may take issue with them or find them violently disagreeable. I think this likely because I've already encountered a taste of such reactions when I have discussed my opinions. The views expressed herein are my own and do not necessarily represent those of Alcor's. I stand by them. Others may disagree, and the pages of Cryonics *will be open to their responses.*

It was Luigi Warren's idea, and it was a good one. "Come to England and Europe", he said. I'll even buy the ticket if you can manage the rest.

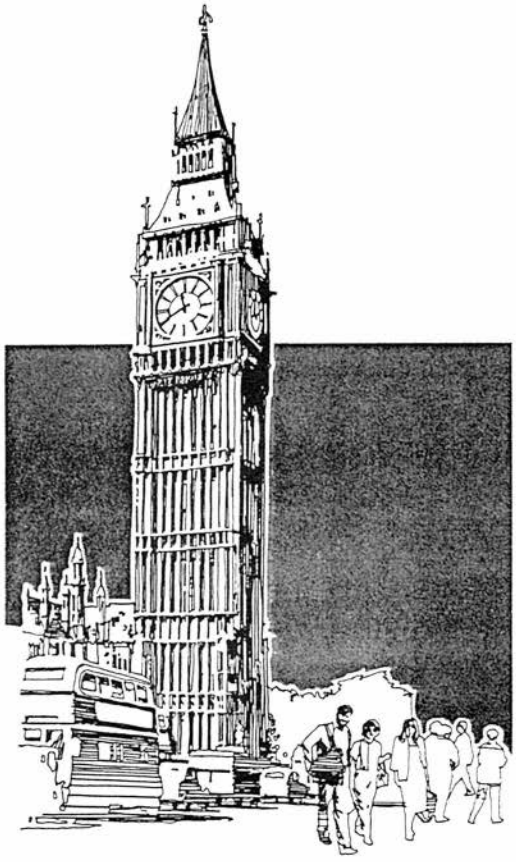
A spinningly short time later I was walking out of a Boeing 747 into London's Heathrow Airport. Alone. After proceeding through customs and making my way out into the London Underground it began to dawn on me: don't make any mistakes here. A miss here *is* as good as a mile.

Only Mike Darwin could travel 6,000 miles, find himself in a new and fascinating city and become immediately preoccupied with, what else?, being away from cryonics. But that, no doubt, is part of the reason why Luigi selected *me* for the trip. He wanted me to *understand*. Understand not just intellectually but emotionally what it was like to be a cryonicist in Europe. I believe he succeeded.

This was my first real trip outside the United States (with the exception of short visits to Mexico, which hardly count) and I was prepared for almost anything. I consider myself well read about global affairs, and anyone who has traveled widely who says so in my presence will find themselves intensively questioned. Thus, I was not altogether uninformed about Europe. But neither was the trip free of surprises and wonderful insights. That is, after all, what traveling is all about. There is no substitute for *being there*.

I realized in my first few hours in London how easy it is to take cryonics for granted. My confidence in Alcor is such that I feel they can bail me out of a fairly broad range of otherwise lethal scrapes. A short time on the streets of London (or Munich or Paris) strips that *away* completely. There, if anything happens, you *are* history. The good intentions and the competence of the locals would probably not count for a lot. The infrastructure simply isn't there.

And European cryonicists know it. *Believe me, they know it,* and they feel it intimately and on a gut level. It did not take long before I felt it too.



The plan was that I would initially spend a week in London; meet with the local crew, try to set up some media engagements and, most importantly, try to establish some professional relationships with paramedical and mortuary personnel as a prelude to deploying a more sophisticated cryonics capability somewhere in Europe. A very important objective was to establish *in detail and with confidence* the mechanics and the practicality of air shipment from the U.K. to the U.S. in an emergency situation (i.e., an unembalmed, ice-refrigerated patient sent as air cargo).

Of these objectives, all were met or approached during the first week. A meeting with a paramedic company went very smoothly and a tentative agreement was worked out. The mortuary air shipping firm provided some useful information by phone. Several media contacts were made and a meeting of London area (and beyond) cryonicists was scheduled. The meeting was a success, with 15 people turning out. Several of the people were in various stages of the sign-up process with Alcor. It was sobering to realize that in a group that was only a few years old there were already seven people signed up or in process -- with others clearly very interested in doing so *if* the situation could be improved.

And that's one of the most important and pervasive impressions I brought away from Europe. The people I met, everywhere I went and without exception, are high quality, motivated, and extremely interested in having cryonics available for themselves. The corollary of this is that they are not stupid. They are not going to be "sold a bill of goods" whereby someone hands them a sheaf of papers and says "sign here and you get to be frozen...." With one or two exceptions the dominant attitude seemed to be that if any of them got stuck dying in England or Germany, cryonic suspension arrangements with Alcor wouldn't count for a hell of a lot. Most people who were signed up were very candid that the reason they had done so was so that they could come to the U.S. to be suspended before ischemia if time, money, and logistics allowed. They all made it clear that they were looking for a lot more. In short, they are looking for what we've got.

At this point it's probably wise to talk a little bit more about *all* the reasons I went to Europe. It wasn't just because of a free flight or the chance at a sightseeing junket at British cryonicists' expense. Nor was it just to feel like St. Paul or Mother Theresa helping the less fortunate and spreading the gospel. It was also in no small measure because of my wonderful capacity for looking on the "bright side". I happen to

The following is from an essay in the May, 1989 Scientific American.

How we can regain our competitive edge.

by Simon Ramo

Every informed American knows that we have lost technological pre-eminence. Rival nations can equal our achievements in space, electronics, biotechnology, and computer hardware. Indeed, there are many fields in which the U.S. has now been surpassed. Entire domestic industries have died, bested by offshore competitors. This is an extremely dangerous development. If we do not excel in technology, our economy will falter and our standard of living will fall.

Is the situation certain to improve? Hardly. We are investing a smaller percentage of our gross national product in civilian research and development and in capital investment than other countries are. Our industrial managers and government officials are preoccupied with short-term concerns.

The education workers and managers alike will need if they are to be effective in an increasingly technological society receives scant attention. Test scores rate our schoolchildren's education in science and mathematics well behind that of virtually all industrial nations. The fraction of our university students studying engineering has fallen to 7 in 1000; The figure for Japan is 40. With technological advance increasingly tied to physics expertise, we have fewer physicists than we did 10 years ago and are producing far fewer Ph.D.'s in engineering and the physical sciences. Such a trend points to disaster. Without technological leadership industry can have no competitive edge. A labor force that lacks enough intellectual flexibility to shift from one product to another is fatally handicapped, given the high obsolescence rate and short lifetime of high-technology goods and services.

Simon Ramo is a founder of *TRW, Inc.*

agree with Simon Ramo, whose *Scientific American* essay is quoted above. I am not impressed with what is happening in America and I think the long-term survival of cryonics in the United States is a very dicey proposition. In short, with my usual pessimism-laced paranoia in tow, I went to Europe to start hedging my bets. Nothing since my return has convinced me that this was a bad decision. On the contrary, as the legal news we have reported attests, it was a very wise decision.

Cryonics needs to be strong in many places. Alcor may be in the lead now -- at least compared to cryonics in Europe. But I have this deep, uneasy feeling in my bones (and other, more delicate, parts of my anatomy) that such will not always, or even very much longer, be the case. If I do not live long enough to be the "huddled masses" kind of refugee, I may well survive (in solid state) long enough to be a refugee of the "chilled masses" variety. We need more cryonics facilities, and we need an international network of people united by mutual respect and obligation. In short, my motives were also very selfish. If Alcor helps Europe now, then maybe Europe will help Alcor when we need it.

And I think the Europeans sense this too. It used to be the way to tell a European cryonicist was by his incessant talk about emigrating to the United States, and in particular to Southern California or San Francisco. No more. There is *no* talk of emigration. The United States has begun to slip as *the* place to be, and not just because of cryonics' legal troubles.

Paris

After the week in London the next stop on the journey was to be Paris. Luigi had arranged to accompany me on the trip through Europe and had done a marvelous job of laying out the itinerary. I did not appreciate this at the time. In particular, I was a little dubious about Paris and the notion of spending three days there, in part because I was a little dubious about *the one* (and in all fairness probably the *only*) Parisian cryonicist: Anatole Dolinoff. Over the years Dolinoff has surfaced and disappeared from the scene and both my and Luigi's impressions were of a man who was simply not very serious (or very effective) in moving cryonics forward.

We were greatly mistaken in our impressions of Monsieur Dolinoff. I would say that of all the remarkable changes in perspective as a result of my trip, none was as profound and unexpected as my altered opinion of M. Dolinoff.

A day or two before I left for Paris, I began to get a bit of a sore throat. Naturally, being away from home and excited, I ignored it. This was a very costly mistake. By the morning of our departure from Victoria station for the Dover Hoverport my sore throat had degenerated into a regular cold. By the time I was on the Hovercraft I had a moderately serious cold. Upon arrival in Paris I was in the terminal stages of The Worst Cold In The Entire History Of The World. If it had been advertised, my snout would attracted more visitors than Niagara. Kleenex, which is a multinational company, must still be trying to rectify the shortfall in the supply of their product that resulted from my (and my cold's) three day stay in Paris. By the time we arrived at the Dolinoffs' magnificent chateau I was barely ambulatory. My affect was so blunted it was all I could do to properly greet the Dolinoffs, let alone undertake the enormous effort required to carry on a conversation wherein the Dolinoffs, who speak little or no English, and Luigi and I who speak virtually no French, attempted to communicate about matters personal, technical, and philosophical. Luigi was visibly irritated with me for my moribund state (his turn would come later) but only because he had no idea how badly I felt.

Madame Dolinoff immediately realized my situation and took me under her wing. With proffered medicine and some truly marvelous pottage I made it through the evening (and an entire box of the Dolinoff family's Kleenex) with some semblance of manners and humanity.

The next day was again spent at the Dolinoff's, and I was feeling scarcely any better. But by then I realized just what an extraordinary and frustrated man M. Dolinoff is. Our hours of conversation convinced me that his efforts have been not only sincere but also herculean. It gave both Luigi and I pause for thought to slowly thumb through his archives and see that there was once a bustle of cryonics activity in France which was destroyed by the French government and internal disagreements amongst the French cryonicists. According to M. Dolinoff, actions by the French medical and legal community in response to talk of introduction of cryonics in the early 1970's have made cryonics virtually impossible in France.

Anatole and Elisabeth Dolinoff

He tells us that French biomedical law *specifically* requires that *brain death* as determined by prolonged electrocerebral silence or prolonged absence of cerebral blood flow be present before suspension could begin.

Anatole Dolinoff himself is a wonderful character. He is kind of a combination of Curtis Henderson* and Joe Cannon*. He has a wonderful, witty, energetic air about him coupled with enormous stamina and manual skill. He built the first European dry ice box (a formidable affair stored in a sad state of disrepair in the basement of chateau Dolinoff). Far more impressive is the chateau in which he and Madame Dolinoff live. It is a mansion of concrete and stone, massive by American standards, and M. Dolinoff built it almost entirely by himself.

We spent a total of three days with the Dolinoff's, partaking of gracious and memorable hospitality. Indeed, it is hard for me to put into words how genuinely good and decent these people were to us. The food they served was incredible both in quantity and quality, and the lovely human warmth they showed us will never be forgotten. Particularly impressive was the relationship between Madame and Monsieur Dolinoff. Their deep love and Madame Dolinoff's gentle tolerance of her husband's eccentricities (in addition to cryonics there are eleven dogs which have run of the house!) was a joy to see.

A fair bit of my time with M. Dolinoff was spent in front of a tape recorder answering a list of prepared questions about cryonics procedures, Alcor, and the state of cryonics in general in the U.S. and U.K. His questions were excellent and more than anything else demonstrated just how deeply and how long he has thought about cryonics. In all of my travels in Europe no one else came close to asking the kind of detailed and thoughtful questions he asked.

Luigi and I left Paris for Rome, Italy with a changed view of M. Dolinoff and more than a little sadness. Here is this marvelous man with such wit and such obvious desire to stay alive, approaching his late sixties in a country that holds him and his undertaking in contempt. A country in which he is utterly alone. Barriers of language and culture would make emigration to the U.S. or England problematic. As Luigi pointed out, the success or failure of an effort to establish a real, working cryonics capability in the U.K. will probably translate to life or death for people like M. Dolinoff.

By the end of our stay in Paris a new plague entered the picture: influenza. My cold, and the circulating interferon it no doubt produced spared me from the flu (for awhile) but Luigi, who had remained smugly well, was not so fortunate. And, being that this trip was so important and so tightly scheduled, it would of course have to be not just the flu but THE FLU.

We're talking about a slightly attenuated version of the Black Death. Sudden projectile vomiting, fever, profound malaise, the works. All with *rapid* onset. Luigi looked a candidate for quick suspension within a matter of hours. *And we were in France!* At first I (we) thought he was getting my cold so treatment consisted of paracetamol (the European version of Tylenol). The progression of the disease quickly turned that diagnosis around.

Then, a miracle occurred. Kind of as an afterthought I had stopped by at a friend's

---

* Curtis Henderson, one of the pioneers of cryonics has both an incredible sense of humor and a wonderful, gnome-like energy. Joe Cannon, another cryonics pioneer, single-handedly built a cryonics storage facility in Appleton, WI in the 1970's. Both men can and still do run circles around us young'uns.

place on the way to the airport when I was leaving the U.S. and picked up a couple of boxes of a Mexican drug called Vilona. It is more commonly known as *Ribavirin* and is used in Mexico to treat everything from AIDS to hepatitis. It is only available in the U.S. as an incredibly high-priced sterile powder for treating respiratory syncyctial virus in newborns.

The thing I knew about Ribavirin (and that very few others know) is that against the flu it is nothing short of a magic bullet (it also apparently works well against hepatitis, although results with AIDS have been poor to equivocal). I had never used it personally, but had in the past recommended it to friends with the flu. I almost didn't make that stop to pick up the Vilona. After all, I thought, what were the chances of getting the flu? I almost *never* get the flu.

Ribavirin was *exactly* what Paul Ehrlich (the 19th century microbiologist and developer of the first synthetic antibiotics) had in mind when he coined the term *magic bullet*. Its effects in treating influenza are nothing short of miraculous in a religious sense. Within an hour of taking a couple of capsules Luigi's acute symptoms were *gone*. A retching, sweating, white-faced man was converted to a relaxed sleeping one in *minutes*. My experience with the miracle drug was to come a few days later.

Rome

The next stop was Rome. It was the only stop which did not have born-again cryonicists in it and I was looking forward to it more than anywhere else on the trip as a *vacation*. Rome, the Eternal City. Crammed with artwork and history and Italians and most of all *Italian food*. While we were waiting for the train to Roma Termini it began. Just a little bit of uneasiness, possibly attributable to the cheese baguette I had purchased and devoured. By the time I laid down to sleep the uneasiness was worse. Within an hour it became apparent that I too had The Flu. Nausea, vomiting, fever.... We had only one remaining box of Ribavirin; not enough for a full course. Stupidly, I decided to tough it out for awhile and save the medicine for when things became unbearable. Within a few hours things were unbearable. I was weak, sleepless and hardly able to get up. I was less than six hours away from what would be less than 48 hours in Rome!

My response to the Ribavirin was no less miraculous than Luigi's. The problem was that I was exhausted and queasy since I had let things progress further than he had before starting therapy. I thus lost half a day of my precious time in Rome to an exhausted but recuperative sleep.

Rome was everything I expected and more. We did meet with a fellow interested in cryonics while there and he showed us lovely hospitality and provided us with an exquisite restaurant meal. At least Luigi told me it was exquisite: I was still too blitzed to eat and confined myself to several helpings of Italian ice cream (the exquisiteness of which I *can* attest to.).

Vienna

Raised from the dead (Luigi) and recovering from the dead (me), we boarded a train

from Rome to Vienna to meet with Dr. Ernst Fasan, the Austrian lawyer and long-time cryonicist who is an American Cryonics Society (ACS) member. Dr. Fasan's hospitality was also remarkable. Since our train did not stop in Neunkirchen where Dr. Fasan lives and works, he came to Vienna to meet us. He also graciously provided hotel rooms for Luigi and I and bought us an expansive breakfast and lunch.

When we arrived at the Vienna station we were met not only by Dr. Fasan and his lovely wife, but by an unexpected and enthusiastic character named Thomas Faes. Thomas is 18 years old and a *fanatical* (eat sleep breathe cryonics) cryonicist. Little did Luigi and I know the adventures that were in store for us after Thomas Faes crossed paths with us.

Dr. Fasan spent a number hours discussing cryonics with us, and made his situation and level of interest clear. He is a thoughtful, highly intelligent and cultured man who speaks English very well and with a wonderfully urbane accent which I greatly envy. At the end of our meeting with Dr. Fasan he translated a request from Thomas Faes: "Could he accompany us on the rest of our trip, out of Austria and into Germany?" After some consultation with Dr. Fasan (since we had only just met Thomas Faes) the answer was "yes".

In Austria. Left to right, Dr. Ernst Fasan, Mike Darwin, Frau Fasan, Thomas Faes.

And how to describe Thomas Faes? Irrepressible? Tireless? Mischievous? A hell of a lot of fun? The answer is "yes", to all of the above. Thomas is a young electrician who speaks scarcely a word of English (and Luigi and I speak scarcely a word of German). Thomas is a kind of human glue who ties the various German speaking cryonicists together. He is highly social, and very hospitable. Our one and only night in Vienna he offered to take us round and see the city on foot. My God, did we see the city. Thomas' idea of a walking tour can be best summarized by envisioning a one-day *walking tour* of Los Angeles wherein every major sight must be seen. His stamina was incredible. I am a runner and think nothing of knocking out five to six miles at a stretch. I also am an inveterate walker. Thomas Faes managed to reduce Luigi and I to the verge of tears. We would ask, pointing to our watches, how much more time, how much further??? And Thomas would smilingly communicate "little bit". For those hardy enough to travel with Thomas Faes I offer this translation of "little bit" : "day hike up Kilmanjaro".

But he did show us a wonderful time. And he is a wonderful person and an incomparable traveling companion. Thomas' antics and his humor provoked some seizures of laughter so intense that I will never forget them. It had been a long, long time since I had laughed so hard or so carelessly and it was much needed. Both Luigi and I considered ourselves very fortunate to have had Thomas accompany us. Our trip through Germany would have been a mere shadow of what it was if it had not been for Thomas' presence.

Munich

Peter Bucur-Volk and Thomas Faes at McDonald's restaurant in Ingolstadt.

From Vienna it was on to Munich to meet with Peter Bucur-Volk. Both Peter and Thomas became interested in cryonics not as a result of American efforts, but rather from a book by a German author named Klaus Rheinhard, entitled *Wie Der Mensch Den Tod Besiegt* (How Man Overcomes Death).

Rheinhard has interested several others in Germany and they have a very small and very informal network consisting of about eight people (Personal message to Thomas Faes: *people*). Peter is the Munich contact for the group. He is a very bright electrical engineer who put us up for several days in Munich. Cryonicists are pretty much the same everywhere: the same kind of people with the same kind of interests and even the same kinds of personalities and careers. No exception, Peter is the technophilic, highly educated, eclectic, and egoistic mix that comprises the typical cryonicist. He is also something of a mini-celebrity in Germany, having won the top-rated intellectual game show on two occasions. (One is allowed to be on the show only three times, I gather Peter is saving his third time for later.)

Here it is wise to pause and provide a little cultural perspective. This achievement in Germany is *not* a trivial matter. Germany is very much like the United States in some ways. But it is also very much different. From my perspective that translates as "very much better". Note: I said *from my perspective* because such judgment calls are also, more than anything, a matter of taste.

One big difference is that the German people are very serious, methodical, and intellectual. Their cities were a joy to be in. They are clean (unbelievably so by American standards), prosperous, well-ordered, and aesthetically pleasing to one who loves technology. In looking at German cities I was struck with the impression "this looks like an American city done *right*". Looking at a German city is rather like looking at the key to one of those "What's wrong with this picture" pictures. I found myself saying "Ahh, so that's what's wrong with Chicago, or New York or..." Most of the unpleasant things about American cities are missing.

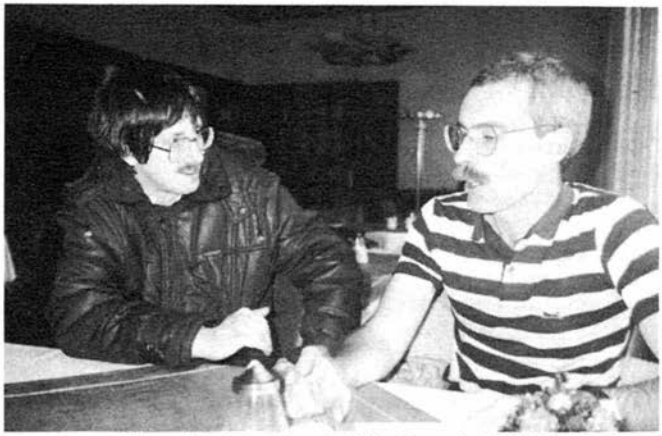
Similarly the German people are different. The ratio of bookstores to churches is reversed in Germany. Everyone reads, and reads all the time. People are constantly reading, and it's not the *National Enquirer*. Thus intellectual game shows are held in very high esteem. Peter has an amazing stack of clippings which document his celebrity.

Our time in Munich was so enjoyable that we decided to spend an extra day there. One side trip was a visit to Ingolstadt to meet with an interested physician (a meeting which sadly did not occur due to a communications foul-up). Ingolstadt is the place in Mary Shelley's novel where Victor Frankenstein goes to study, work, and create his "monster". Peter Bucur-Volk is an ethnic German who was born and raised in Rumania, specifically in *Transylvania.* Thus, I, an American body freezer, was being conducted around Ingolstadt by a Transylvanian cryonicist.... The humor of this situation did not escape me (or my

companions when this insight was shared with them). Unfortunately darkness fell in Ingolstadt and the hour became late before I was able to see the University where the fictional young Frankenstein went to medical school (the German University remains, but the Medical School is no longer in Ingolstadt), or the medical museum (which is still in Ingolstadt today).

Kiel

From Munich we traveled on to Kiel, which is an industrial and port city on the North Sea coast of West Germany. Kiel is where Klaus Rheinhard lives and we were anxious to meet the German Robert Ettinger. Rheinhard proved an interesting person. He lives very quietly and very ascetically, in spare quarters surrounded by masses of books. He is an utterly serious man, not given to humor and very focused on the problem of staying alive.



Klaus Rheinhard and Mike Darwin in Kiel.

I have not read *Wie Der Mensch Den Tod Beseigt* so I must rely on a perusal of the references in the back of the book, on my impressions of Rheinhard, and on what he told me about the book. His technical references are impressive. He cites virtually every quality paper relevant to brain cryobiology which existed at the time of his writing. His list of references largely overlaps those that Alcor maintains in its reprint bank. I cannot comment on the philosophical first half of the book, and Rheinhard and I did not spend much time on that area.

Klaus' perspective on technical matters and on his history of getting involved with "cryonics" I will try to comment on and hopefully I will do him justice. The first thing I had to realize was that all Klaus' efforts to find out about American cryonics in detail were unsuccessful prior to his writing the book. His impressions of American cryonics, such as he was able to get were shaped by the modest media coverage cryonics has had to date in Germany. These impressions can be summarized as follows:

1) American cryonics was a commercial venture designed to get people's money.

2) American cryonics had let people thaw out and they were not very serious about the whole thing.

3) They were freezing whole bodies, which seemed irrational and not very serious.

Klaus' book deals with the preservation of the brain in isolation. Since this is how cryonics has largely been articulated in Germany, all the German cryonicists we met with were "neuros." Much of Klaus' argument concerns reducing people to information content. Indeed, Klaus is personally very interested in approaches to storing back-up identity information in the form of tissue samples (for DNA) and biographical information (video tapes, diaries, and so on).

Klaus is very interested in the brass tacks of providing for cryonics capability in Europe. He is also highly motivated. It was apparent to me that most if not all of his waking time is focused on preparing for his cryonic suspension or otherwise contriving to get from here to infinity.

We spent a fair amount of our time with Klaus discussing the details and logistics of getting a capability deployed in Europe and getting things arranged so West German nationals can join Alcor as suspension members.

From Kiel, Luigi and Thomas went onto Berlin. Alas, I was getting sick yet again with yet another cold and decided to head back to London before becoming the first "test case" of a cryonic suspension in Europe.

London, Again

The last two weeks in London were busy ones from a cryonics perspective. Our first major engagement was an appearance on the *Kilroy Show*, a morning chat show which is similar in format to America's *Donahue!* show. Robert Kilroy-Silk is a former Member of Parliment who is as suave as the last half of his surname suggests. The audience for this show was to be made up of a "death side" and a "life side". The show's producer was an articulate and cerebral Hindu by the name of Subniv Babuta.

I was to be the featured pro-lifer with help and support from a crew of British cryonicists including Mike Price, Luigi Warren, and Alan Sinclair (among others too numerous to mention). My principal antagonists were to be Dr. David Pegg of the British Medical Research Council (MRC)(and one of the foremost organ cryopreservationists in the world), the Rev. Hugh Montefiore of the Church of England, and the television presenter of BBC's *Tomorrow's World*, Judith Hann. The British media shame their American counterparts on detail work, professionalism, and overall competence. The care and thought Mr. Babuta put into producing his *Kilroy* cryonics segment was astounding. Space does not permit me to describe it: suffice it to say it was First-Class compared to any American experiences I've had. Indeed, even the British tabloids are more professional and thorough in carrying out their sleazy horror. They even lie with more style!

It was quite a show. Quite a show. Naturally, I think our side won. But then I'm prejudiced on that score. Alan Sinclair in particular did a wonderful job of calmly showing the rationality of our position. Mike and Luigi got their licks in too.

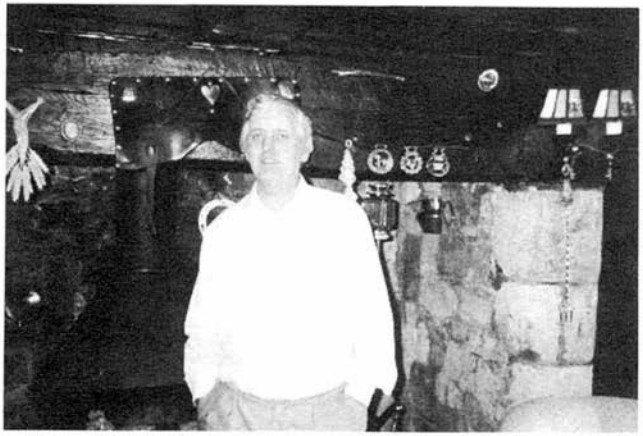
Whether we "won" or not may be up in the air. But whether we had the better time of it is not. After the show, I approached Subniv to ask about going back to the Green Room. I overheard a heated-up David Pegg bitterly complaining about how unfair the show had been to him and how he was doing all this wonderfully interesting and really exciting work which no one wanted to hear about.... As I approached Pegg he turned to me and said, anger flaring in his eyes, "you really are an unprincipled bastard." I must admit that for once, I was at a loss for words. I simply stated that I didn't agree and then walked away. His outburst was all the more surprising since we greeted each other and spoke civilly, even pleasantly, before the program began.

The fallout from Kilroy began *immediately*. When we got to the Green Room, Mike Price phoned up the paramedic company to confirm our appointment with them for finalizing an agreement. The owner of the firm had seen the show and the meeting was *off*, in no uncertain terms. He wasn't about to get involved with anything the MRC didn't approve of.... This despite our in-depth, no-holds-barred honesty with the firm about the status of cryonics when we started negotiations with them three weeks before!

Mike looked crestfallen. I was, if not elated, at least not morose. As I explained to Mike, Luigi, and Garret such an event is fortuitous because it happened when it did. Imagine the situation if they backed out during a suspension!

In short order we found another firm, met with the owner and concluded a verbal agreement to be followed up with a written one. We also met with the largest mortuary repatriation firm in London. This firm specializes in overseas shipment of human remains and they handle the shipment home of foreign nationals who die in the UK. An agreement was worked out with them and the details of arranging for shipping were explored with the U.S. Embassy in London.

Meeting at Alan Sinclair's home in Brighton: After a sumptuous feast Alan Sinclair (back to camera), Mike Darwin (r foreground) Steve Whitrow (r background), Garret Smyth (left foreground) and Mike Price (left rear) discuss the future of cryonics in Europe.



Alan Sinclair in the parlor of the "Thatched Cottage".

Big Problems, Big Solutions

Unfortunately, what we found out about shipping into the U.S. *did not* encourage us. A major problem is that the U.S. embassy and consulates will not process shipping paperwork on weekends or holidays. If you "go down" after Friday noon you will not even be able to be started on the trip out of Britain until Monday at the earliest! This is a serious and unacceptable problem and we intend to address this problem by putting the capability for cryoprotective perfusion and cooling to dry ice temperature in England sometime within the next 12 to 24 months.

To this end, the British group is working hard to purchase a facility and thus provide a working environment where the equipment can be deployed. At the time of this writing negotiations for property and applications for zoning approval are well underway. We will provide more details as we are able to do so.

Impressions and Discussion

I did not go to Europe expecting to find the cryonics equivalent of Gulliver's land of Lilliput. And I did not find giants either. But I did find people who were larger

than life. One of the most surprising things I found was the amazing consistency of the "cryonics personality". Cryonics filters out a certain set of personality "types". Even across language and cultural barriers the "types" that made it through came across loud and clear. I *am* awe-struck by how easy it was to communicate about *important* things across incredible gulfs of language and considerable differences in culture. I quickly felt that most of the people I met were friends, good friends, and that I was one with their predicament.

Nor do I think this feeling was superficial or illusory -- or brought on by the euphoria of the trip. European cryonicists are very much like their American counterparts. And the flavor of the situation in Europe is very much the same as it was in the U.S. during the early days of cryonics here.

I am not excessively optimistic about things in Europe. I think there are enormous opportunities there. But it will not be an easy or straightforward thing to exploit those opportunities.

Opportunities and Problems

One advantage that Europe has is that it is free of many of the extremes that plague the United States and Canada. The U.S. may *seem* a very good market, with 240 million or so people available. But you have to remember that roughly a third of those people are religious maniacs of one kind or another (at least this is how the *Europeans* see our fundamentalists and political extremists). There are, per capita, far fewer churchgoers in Europe than in the U.S. Germany, England, and the Netherlands are far more secular than the U.S.

The other side of that coin is that most Europeans are more consensus-oriented than are Americans. People are far more clustered about the middle and mind each others' business a bit more. However, and this is an important caveat here, the U.S. seems to be moving in the direction of greater socialization and bureaucracy, and England in particular, seems to be moving in the opposite direction.

Britain has few laws governing the disposal of human remains, very open zoning laws governing mortuaries and cemeteries, and virtually no licensing or regulation of the funeral trade. If you want to be a funeral director in the U.K., you simply rent a High Street shop (The main street in a community, which has very few zoning restrictions. You might well share a common wall with a fried chicken shop if you like.) and hang out your shingle. It is a different world.

Oddly enough, contrasting the mountain of small business regulation we are confronted with here in the U.S. with what I found in Britain, I felt like Gulliver *returning* to the land of Lilliput when I returned to the U.S.

Leaving these somewhat hard to assess differences aside, there is one major, overwhelming and *incredibly important* difference between the U.S. on the one hand, and England and Germany on the other. That difference is the absence of "tort madness". People just don't sue each other as often. Indeed, by comparison, people don't sue each other at all in Europe. I think there are a number of reasons for this, but chief among them is that the British courts did not decide to set aside the sanctity of the contract. Thus, disclaimers and limitations of liability are *upheld* in European courts.

I think this one difference will be pivotal for cryonics in Europe. I observed it first and foremost in the willingness of healthcare and other mortuary professionals to

deal with us. When I questioned these people about what their concerns were *not one of them mentioned the possibility of being sued.* The contrast with the situation in the U.S. was astonishing!

Another critical advantage the Europeans have over us is that, on average, they are far better educated. The quality of British and German television, the quality of the people I met, the distribution and character of bookstores and the observations of the citizens' reading behavior I made during my extensive use of public transportation in Europe convinced me of this. I think that the U.S. is in very serious trouble and likely to have its tender parts severely roughed up in the coming decades because of the poverty of American education. I think it inevitable that Americans will pay a terrible price just for the damage done already to its citizenry.

It is true that Europe has it share of problems. It certainly has its share of uneducated and unrealistic people and its share of naysayers. But it also has something the U.S. has largely lost: an emerging sense of *can do* and optimism about the future. This was palpable in London and very obvious in Germany, the most technophilic and future-looking country I encountered in Europe.

I Pledge Allegiance

One of the cryonicists now in Germany was here in the United States for a few months. His name is Markus Lindeman. One chilly evening Markus and I stood outside a Mexican Restaurant in the San Fernando Valley discussing my upcoming trip. Markus was saying that he wanted to go back Germany and was anxious to see cryonics grow there. He was not very impressed with life in the United States and a question he often asked when here was "where are the books in everyone's homes? You have no books in your homes...." Markus seemed to have a strong sense of positive nationalism: I commended him on this sentiment, but I also cautioned him: in a very real sense cryonicists have no country. This does not mean we cannot be patriots or that we cannot or should not fight for justice or our lives when no other alternative exists. But it is wise to remember that the business of the state *is* the business of the state: It will take our individual lives without a moment's hesitation to support something called the "common good". *But there is no such thing as the common good.* There is no *common*, there are only individuals with individual minds, and dreams and desires and lives to lose. States have a history of only grudging acknowledgment of that *fact*.

I was born an American. As a child, on one of those wonderfully secure, sunny, endless, summer childhood days I sat on the curb a little way down from my house on Lincoln Street in Indianapolis, Indiana. I sat in the sun and I *laughed at the words "Made in Japan"* that were stamped on the back of a cheap turquoise blue plastic transistor radio. "Made In Japan" was a joke. I could laugh because I grew up in a land of total self confidence, a land which was the richest, most powerful country in the world. A land that had the best of everything and offered it all to me if only I would work hard enough and smart enough and long enough. Christopher Columbus must have felt that way about Genoa as a boy.

Well, no more. The U.S. is hardly a backwater, and I am still, on balance, happy to be here. But my travels in Europe only confirmed what I already sensed in my bones: we are no longer the richest or the best or even the most "powerful" country in the world.

While things here are very very good by global standards, they are not in some important ways as good as they were. And the little boy who sat on the curb on a golden summer day over 20 years ago senses that. And it puts him on his guard.

Cryonicists must be, above all *flexible*. To live forever, as Curtis Henderson pointed out to me when I was but a lad, you must be prepared for *anything*. Thomas Donaldson, another seminal cryonics thinker, has pointed out that a scant 500 years ago anyone who wanted to be anything simply had to learn Spanish. There was a time when Portuguese and French were languages important to know. Today the French struggle and chafe and moan and cry and carry on about the incursion into their language and national identity represented by words like *le microprocessor* and *le computer*. And how many people agonize over learning Portuguese today? French? France *has* become a backwater, a victim of many of the illnesses the United States is now in the early stages of. As I write, the French (and French-Canadians) have worked themselves into a froth because the prestigious *Institut Pasteur* has decided to publish three of its scientific journals in English. *Sic Transit*!

The point of all this is that we cryonicists here in the United States must not become complacent or myopic. The growth of cryonics elsewhere is not of merely academic concern. It is, if history holds any lessons for us, likely to be crucial to our survival.

Above all, we must be prepared to do as Klaus Rheinhard, Peter Bucur-Volk, and others in Europe have done: learn new languages and be prepared to move *if we have that luxury, if and when the need should arise.*

A few hours ago, just before I sat down to finish this piece, my phone rang at home. It was an unfamiliar voice on a staticky, distant, transatlantic connection. It was Thomas Faes. The particulars of why he called are not important. What was important was that Thomas is now speaking English well enough to make such a call and be understood. Klaus Rheinhard learned English alone, with nothing but a dictionary, a textbook and some American TV. He did this in six months and when Luigi and I arrived in Kiel he could speak English passably well and write it with moderate fluency.

That is indicative of the strength and the motivation of the Europeans. Consider that there is a cryonics group only a few years old in England and that they are negotiating for the purchase of a building. Consider that Europe represents a continent of people weeded by centuries of extremist wars; people who are well educated, surprisingly affluent, and often less hamstrung by nettlesome regulations than Americans.

It may be too much to say that the future of cryonics lies in Europe. But it is not too much to say that it does not lie exclusively in the United States.

My final advice: Brush up on your German. Keep a traveling bag to hand. Cultivate a taste for warm beer and steak and kidney pie. And always remember, a cryonicist's national border is marked by his epidermis.

Keep you passport current and your options open.

Cheers!

SCIENCE UPDATES

by Thomas Donaldson

HUMAN TEST OF GENETICALLY ALTERED CELLS

We all know how many people grow quite paranoid at the thought of altering the genetics of our own cells for any medical purpose. Of course cryonicists don't share these feelings at all, but still we must contend with a world which tries to forbid this (actually quite innocent) conduct. Many cryonicists, again, will know that eventually all of these prohibitions will break down. They must, since fundamentally there is no reason for them and great benefit attainable by abandoning them. Still, they cause a delay and complicate our lives.

But slowly genetic modification seeps through. Recently in *Science*, (241, 419 (1988)) Leslie Roberts, one of *Science's* reporters, tells the story of how two NIH researchers have finally come down to proposing to insert a genetically altered cell into human beings (shock! horror! dismay!). The scientists involved are W. French Anderson of the Heart Institute and Steven A. Rosenberg of the Cancer Institute. To insert this gene Anderson and Rosenberg must go through a long series of requests and applications. The entire process will take over a year, so we'll all be able to watch.

Unfortunately the procedure won't really help treat any illness. Its aim is to keep watch on how well another therapy for cancer is working.

This therapy is one of the new immune therapies. Cancer cells are removed from the patient. The patient's own white blood cells, which are fighting the tumor, are then multiplied in vitro by factors of billions. We then inject them into the patient.

So far, only very advanced, essentially terminal patients receive this kind of therapy. Sometimes this method works. The tumor shrinks and the patient lives far longer. Unfortunately, though, this only happens in about 50% of cases. Rosenberg and Anderson want to know why.

Up to now they have used one simple method, radioactive labelling of the white blood cells, to follow what happens to them. But the labelling wears off quickly. They aim to permanently alter the white blood cells by putting into them a gene for resistance to neomycin, the antibiotic. They can then see if treatment fails because the white blood cells disappear or for some other reason.

Since regulations and law are matters of precedent, the most important fact about this application isn't its purpose but the fact that it is being done at all. A successful application would open the doors to other genetic modifications much more directly therapeutic.

Rosenberg and Anderson made their initial application to the NIH Institutional Biosafety Committee, which approved it on 13 July 1988. It has now proceeded to the Human Gene Therapy Subcommittee of the NIH Recombinant DNA Advisory Committee (or RAC). On 29 July the RAC decided that it wanted some more data, asking for some mouse experiments to be done. According to the account in *Science*, the RAC didn't actually feel that these experiments would give any new data. The RAC felt they were needed for "procedural" reasons.

Of course someday all of these hesitations and fears will seem very silly. They may be the real reason why medical progress creeps along so slowly. And from reading Paul deKruif (*The Microbe Hunters*) it's clear that medicine and science have lost a lot of courage over the last 100 years. It is an important trend too little remarked. Especially as cryonicists we need to know why this has happened.

PROTEIN SYNTHESIZED

Ordinarily the synthesis of proteins would hardly make news, since we all do it constantly, together with all the plants and animals we see. What is noteworthy is that *this* protein was synthesised to a *planned design* by human beings. That means, of course, a new stage in our ability to manipulate matter on a small scale.

The article in *Science*, (241, 976-978 (1988)) doesn't really discuss the methods used in design in much detail. What its authors do is to describe how their synthesised protein successfully passed all their tests for fitting their design (since we operate on a molecular scale here, just exactly how we find out if our design worked isn't simple at all). The scientists involved, L. Regan and W.F. Degrado, both work for Du Pont Nemours.

Briefly, Regan and Degrado worked out a sequence of amino acids which should produce a tightly packed helical shape. Their choice of helical shape was determined more by the ease of verifying it than by any fault of their design methods. It turns out that the spectrum of the protein, once made, will leave the most characteristic traces when it is helical. Since this was after all a first effort, they didn't want to get involved in debates about whether or not they had actually made what they said they made.

This was a synthesis entirely from first principles. The authors worked out the entire amino acid sequence of the planned protein. They then made a gene which would produce that amino acid sequence. They inserted this gene into the bacteria *Escherischia coli*, right near a promoter sequence in one on the *E. coli* plasmids (plasmids are circular rings of DNA. We don't have them but bacteria do. They are very useful for genetic engineering and transmission of drug resistance).

The treated *E. coli* expressed the gene easily. Regan and Degrado could therefore make large amounts of this helical protein to analyze and study.

Most of their article is a description of the technical steps they used to verify that their method did indeed work: that is, that the protein they made did have the structure they planned for it.

The composition of the protein was exactly as planned. Its molecular weight was as planned. Their chemical tests also indicated that it adopted the very compact helical shape in water solution, just exactly the one designed. Finally, it was stable against denaturation by the chemical guanidine hydrochloride, again as planned.

This work is only a start, of course. But if we seriously expect to manipulate matter on a molecular scale, we need to know how to put it together so that it will adopt the proper shape. Many years ago Feynmann pointed out (in *There's Plenty Of Room At The Bottom*) that operating on molecular scales will force us to learn a new physics between the quantum and the macroscopic realm. That is exactly what Regan and Degrado have done with this work: made a step toward learning the required new physics. It's likely, in fact, that the road to nanotechnology will have far more twists, turns, and complications than many of its exponents yet imagine. That there is a road, and where it is going, is very clear.

CLUES TO UNDERSTANDING BRAIN MEMORY

As we come closer and closer to understanding nerve memory (that is, how individual nerves learn), we also need to understand brain memory (that is, how the brain learns). Since our conscious memories stem not from memory in some particular neuron but from memory in many neurons spread in a network throughout our brain, it's important to understand this type of memory too. Indeed, it's even more important. Ischemia may destroy individual neurons without destroying the brain memory. It's brain memory, not neuron memory, which lies underneath our individuality.

To understand brain memory we need experiments which tie events in single neurons up to learning at the scale of the brain. A recent experiment reported in *Nature* (**335**, 817-820 (1988)) by Yasushi Miyashita at the University of Tokyo may give us the beginnings of a way to do this.

Many experimenters have shown that particular nerve cells are sensitive to special kinds of objects. For instance, some cells respond especially to faces (E.T. Rolls and G.C. Baylis, *Brain Research*, **65**, 38-48 (1986)). But these responses aren't directly correlated to learning. What Miyashita has done is important because he studies particular brain cells for their direct connection to learning.

He looked at particular neurons in the temporal cortex of monkeys. First, he recorded the normal activity of the neuron. Then he systematically trained his monkeys to recognize 97 different randomly generated color patterns. (He used fractals to generate these patterns, so they had a similar overall "appearance"). Then, he presented the monkeys with 97 new color patterns, and also the original 97 they had learned. The idea here, of course, was to see if the neuron could learn to react to these patterns, and afterwards clearly distinguish them from 97 other new ones.

Since our brain does not carry memories in single neurons, we wouldn't expect that the monkey's neurons would individually learn to respond to all 97 patterns. But Miyashita did find that a particular individual neuron would acquire a response to a few of the 97 patterns. It would not repeat this response when presented with other patterns which were different, but similar. That is, the direct brain memory for the patterns corresponded to the response of the neurons. This response was also a clearly learned response, not just a generalized "reflex" response to shapes of the same general sort.

Particularly in the computer science community, tremendous interest has blown up recently about neural nets. These are computers, but designed in a way which vaguely resembles nervous systems rather than normal computers. They can learn to recognize faces, for instance, in much the same way people do. That ability is very striking because efforts to teach ordinary computers to recognize anything have failed badly.

This work is worthwhile, but needs to be tied to the actual working of real brains. Miyashita has begun to do this.

* * * * * * * * * * * * * * * * * * *

PERSONALS

The Alcor Life Extension Foundation *and* Cryonics *reserve the right to accept, reject, or edit ads at our own discretion, and assume no responsibility for their content or the consequences of answering these advertisements. The rate is $5.00 per line per month (our lines are 90 columns wide).*

Looking for other cryonicists nearby: Eric Klien, 1 Sinai Circle B10, Chelmsford, MA 01824. Phones: (508) 663-5480 (home); (508) 250-0820 (work).

Radio conversations with *The Venturists* -- An audio tape is available for $3.00 + $1.00 P&H. The Venturists, 1355 E. Peoria Ave., Phoenix, AZ 85020.

Business opportunities: Dave Pizer is willing to train and finance people who would be interested in starting a small business in Arizona. David S. Pizer, 1355 E. Peoria Ave., Phoenix, AZ 85020.

Cabin in Sidona, Arizona available on weekends for *Alcor* members to hold meetings on cryonics, nanotechnology, and related subjects. Contact Dave Pizer, address as above.

Meeting Schedules

Alcor business meetings are usually held on the first Sunday of the month. Guests are welcome. Unless otherwise noted, meetings start at 1 PM. For meeting directions, or if you get lost, call Alcor at (714) 736-1703 and page the technician on call.

ALCOR

Due to Alcor's participation at the Lake Tahoe *Cryofest* and the Space Development Conference in Chicago, there will not be a business meeting in June.

The JULY meeting will be held at the home of:

(SUN, 9 JUL, 1989)
(SECOND SUNDAY)

Diane Alexander
5100 Longfellow St.*
Los Angeles, CA

*Take the Avenue 52 off-ramp off the Pasadena Freeway. Go left at Longfellow.

---

* * *

Alcor members in the San Francisco Bay area have formed an Alcor chapter, and are aggressively pursuing an improved rescue and suspension capability in that area. Meetings are generally held on the second Sunday of the month, at 4 PM. Meeting locations can be obtained by calling the chapter's Secretary-Treasurer, Thomas Donaldson, at (408) 732-4234 (home), or at work, (415) 593-3200 (ask for Thomas Donaldson).

* * *

The New York Cryonics Discussion Group of Alcor meets on the the third Saturday of each month at 6:30 PM, at the **El Paso** restaurant, in Manhattan's Greenwich Village. The address is 134 West Houston St., between McDougal and Sullivan. Telephone (212) 673-0828. Ask for the Alcor group at the rear of the restaurant. Subway stops: Houston St. on the 1 train; Spring St. on the C, E, or K trains.

The meeting dates are as follows:

JUNE 17 JULY 15 AUGUST 19 SEPTEMBER 16

If you live in the New York, Philadelphia, New Jersey, or Boston areas and would like to participate in the rebirth of New York cryonics please contact one or more of the following people:

Gerard Arthus	(516) 273-3201
Al Roca	(201) 352-5268
Curtis Henderson	(516) 589-4256

ALCOR LIFE EXTENSION FOUNDATION
12327 Doherty Street
Riverside, CA 92503

FORWARDING AND RETURN POSTAGE GUARANTEED
ADDRESS CORRECTION REQUESTED

For information on cryonics call Alcor toll-free 1(800) 367-2228