

Cryonics

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Cover:

*Jerry Leaf (left) and Mike Darwin
begin removing the Dimplar foil
around Dr. James Bedford.*

Photo: Tanya Jones

Prozac/Deprenyl Caution

The *FDA Drug Letter* is warning of a possibly serious drug interaction between the popular antidepressant Prozac and the popular anti-aging/antiparkinson's drug, deprenyl, (sold in the U.S. under the trade name of Eldepryl). Some patients taking both drugs for Parkinsonism and depression reported disturbances in mentation and balance. Persons taking Prozac should probably not take deprenyl until this possibly unfavorable interaction is better documented. Consult your physician for further information.

UK Facility Holding On

The UK cryonics facility is still there, but barely. And only because the commercial real estate market is so bad in England that the bank hasn't been able to move it. This has created a fortunate window of opportunity and the UK people have been working very hard to raise the money. So far they are a little short of halfway there — still needing about \$60k in U.S. dollars. Again, we urge anyone who can provide financial assistance on this matter to IMMEDIATELY contact Alcor Southern

California. As in the past, we are willing to accept shares in the building as a prepayment toward cryonic suspension. This has real advantages to the purchaser over traditional life insurance since real estate is typically inflation-proof, whereas life insurance is not.

For The Layman:

At Last An Excellent Tutorial On Brain Ischemia and Stroke

The July issue of *Scientific American* contains a truly excellent article by Justin Zivin and Dennis Choi on the mechanisms of injury to brain cells during stroke (incomplete ischemia) and cardiac arrest (complete ischemia). The article focuses primarily on the cascade of events leading up to the eventual death of brain cells as a result of a stroke, but cryonicists will find the article of interest as well, since the

mechanisms by which cells are injured in stroke are broadly similar to those which cause injury as a result of cardiac arrest. An especially nice feature of this article is its truly superb graphics and its focus on emerging treatments for stroke and cardiac arrest, which may eliminate most or all of the damage from these currently devastating medical problems.

Companion Animal Suspension — Our 8th

On 6 May, 1991 Alcor placed a small terrier-mix dog into cryonic suspension. The animal was of very advanced age and extremely debilitated. This companion animal (CA) suspension brings to eight the total number of companion animals in Alcor's care. Thus, we have slightly more than half as many CAs in our care as we have human patients. Current statistics: seven dogs and one cat.

Membership Status

Alcor has 242 Suspension Members, 515 Associate Members (includes 205 people in the process of becoming Suspension Members), and 17 members in suspension.

ACS Contributes to Alcor v. Mitchell Fund

We wish to gratefully acknowledge a contribution in the amount of \$1880 that was made by the members of the American Cryonics Society (ACS) in support of the case against the California Department of Health Services. This case, known around Alcor as simply the "DHS case" is arguably the most important legal action in the history of cryonics. As

most of our regular readers will know, the DHS has been trying to shut down cryonics in California since 1981 and Alcor has been fighting that action in the courts — so far with great success, but also at great expense. This much appreciated and desperately needed contribution by ACS will help the battle along. So far our costs have been in excess of \$100,000 in prosecuting this case. Our thanks to the leadership and membership of ACS for lending a hand with this important effort.

THE AMERICAN CRYONICS SOCIETY		385
20823 STEVENS CREEK BLVD., NO. 327 408-225-1783		
CUPERTINO, CA 95014		
PAY TO THE ORDER OF	Alcor Life Extension Foundation	June 6 1991
	one thousand eight hundred eighty & 00/100	\$ 1880.00
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Letters to the Editor

Dear *Cryonics*,

Every time I turn around, some Suspension or Associate Member is tapping me on the shoulder or calling me up to voice some comment or suggestion or disagreement about *something* in this magazine. I know that the editors try to put something for everyone in *Cryonics*, and they come close enough that most members feel violently in support of or in op-

position to at least one thing in each issue.

I think this is great. *I want to hear what they've got to say.* But why don't they let the membership hear it too? Why don't they try to spark thoughts and comments in other peoples' minds? Don't they know that the best way to do this, short of calling up hundreds of 800 people, is to write a Letter to the Editor?

Come on, members. Help the editors out and help spread ideas and innovation

into other fertile minds. I've got enough to do around here that I shouldn't have to spend time writing letters to myself.

Ralph Whelan
Managing Editor, *Cryonics*

Operating Budget Woes

Carlos Mondragón

To paraphrase Dickens: *It is the best of times and it is the worst of times.* The best of times because there has never been a cryonics organization which has come even close to matching Alcor's achievements technologically or economically. The geometric rate of growth in our membership shows every sign of continuing. Our research program is poised to make exciting progress. Our Patient Care Fund is huge in relation to the current needs of our members in suspension. So why is it also "the worst of times?"

For some time now there have been references in these pages to Alcor's tight operating budget and our perennial deficit. This is not at all an unusual state of affairs for a non-profit organization. While our Patient Care Fund is quite solvent, and we expect that we will continue to succeed in raising funds for research, the money available for the day-to-day costs of operating the organization and financing our rapid growth is never enough.

Because fund accounting (a system which would provide separate balance sheets and revenue and expense statements for each part of our business) is among the things we have decided we can't yet afford, operating budget problems are not obvious to the untrained eye when examining our financial statements. Even one very savvy businessman expressed surprise when I explained the gravity of the situa-

tion, since he had seen our financials published in the April issue of *Cryonics*. While it is true that our prospects for long-term financial stability are very good, that doesn't address short-term problems. This article is meant to explain those problems and offer up some possible solutions.

Where We Stand Now

When our first quarter numbers were compiled in early April, they were alarming enough to cause us to hold a special directors and staff meeting on April 23rd. At this meeting we studied the figures and formulated plans.

In the six month period from October 1st, 1990 to March 31st, 1991 our average monthly operating income was \$19,741, while average monthly expenses were \$34,437 — leaving a whopping monthly deficit of \$14,696. These numbers do not include suspensions, patient care, or any extraordinary income such as residual payments from the Jones Trust. The numbers *do* include our legal expenses.

We decided to look forward at the 12 months beginning May 1st, 1991. If we were to maintain the averages above, there would be a deficit of \$176k. Our current resources (cash and receivables) in the general fund amount to \$165k. Thus, if we did nothing, we would run out of money

by March of 1992. Clearly, doing nothing is not an option.

Fixing the Problem

First we made the easy and painless spending cuts. These included travel, shipping expenses, and enhancements to the Emergency Response System. Total savings: \$3,045/month. This reduced the monthly deficit to \$11,651, bringing the 12 month deficit down to \$140k.

Next we looked for additional sources of revenue. Effective June 1st, 1991 subscription renewals to *Cryonics* will cost \$35 in the U.S., \$40 in Canada and Mexico, and \$45 everywhere else. This will reduce the deficit by another \$5k, at our current rate of subscription renewal. Beginning this fall (possibly sooner), interest income from the Jones Operating Endowment Fund will begin flowing in at about \$3,330/month. Dues income from increased membership was very conservatively estimated at \$30k starting in May of 1992. Residual income from the Jones Trusts was also very conservatively estimated at \$30k over the next six months. All of this added up brought the 12 month deficit down to \$55k.

Again, if we did nothing else, this would put us at April 30, 1992 with reserve resources of \$29k and facing a projected 12 month deficit of \$55k — run-

ning out of money in December of 1992. Still not good enough.

Eliminating that remaining \$55k deficit has and will necessitate some hard choices. Payroll and associated taxes are by far the biggest part of our budget. Since we are all now taking home subsistence level paychecks (by Southern California standards), I adamantly opposed any further reductions — productivity gets real low when people spend too much time worrying about their immediate survival. It is preferable to eliminate staff. And so that is what we decided to do. At the end of August, the administrative position held by Arthur McCombs will be eliminated. Ralph Whelan, Joe Hovey, Mike Darwin, myself, and as much volunteer labor as we can muster will divide up the work. We will be reducing the amount we pay sign-up coordinators, and at the same time trying to minimize the use of them. We are cutting what we pay for accounting services by having Joe Hovey do more of that work. Finally, using the new book, *Cryonics: Reaching for Tomorrow* as a complete information package for inquiries will save a few thousand dollars in postage and printing. After all of this,

we're still looking at a \$19k deficit for the 12 months beginning May 1st, 1992; the money in our reserves would thus run out sometime in early 1994.

At this point, we decided that a projected \$19k deficit a year away is at least a manageable problem. Remember that we based all of the above on *very conservative assumptions*. There are tenuous sources of income (such as membership growth) that we didn't count. On the downside, any large and unexpected legal matter could cause us serious problems.

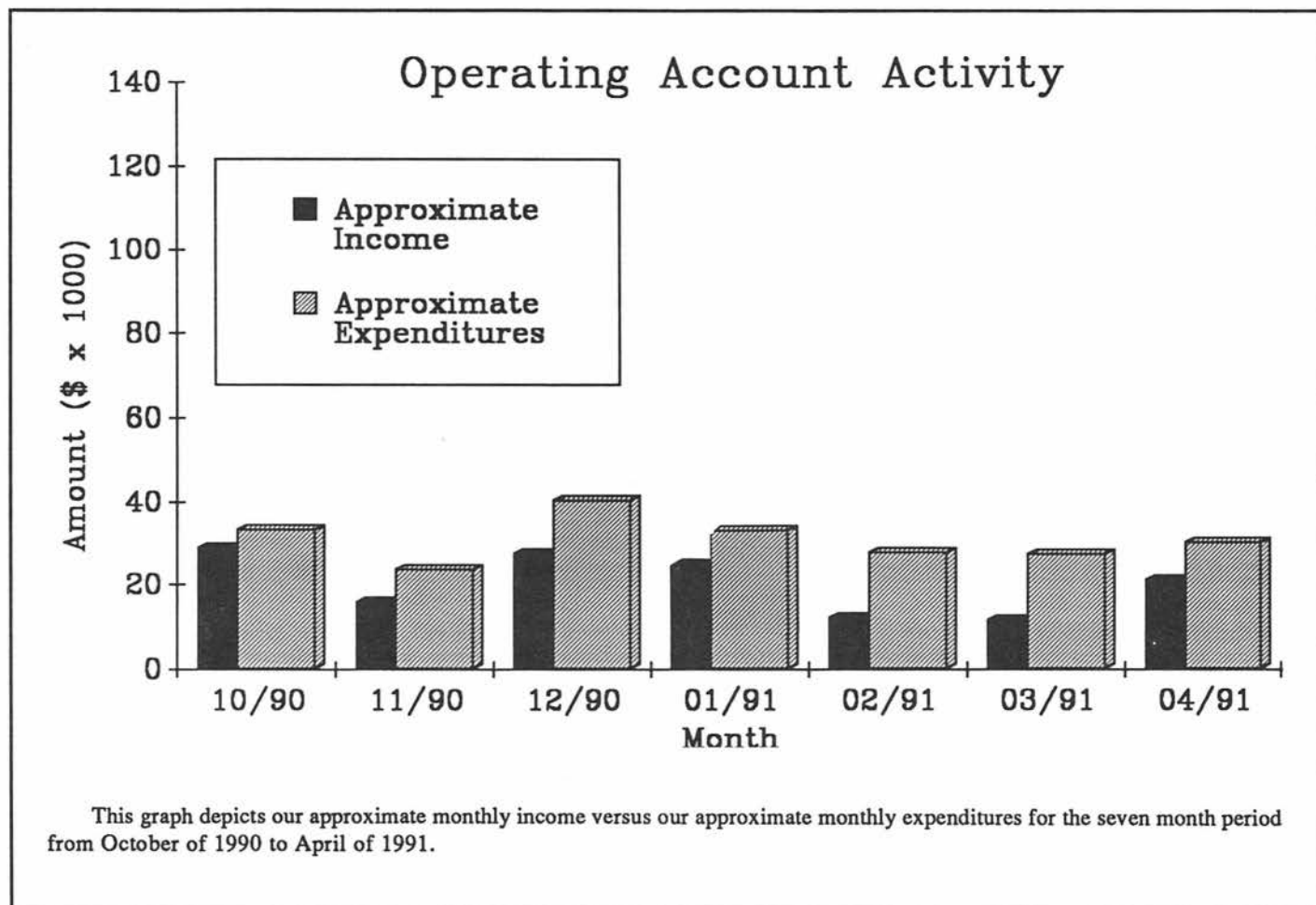
Over the next few months we will be working to find more revenue and more expenses to cut. We've determined that if we can't make substantial progress in further reducing that projected \$19k deficit, further staff reductions may be necessary (it wouldn't be a good thing, but Alcor could limp along with minimum capabilities, i.e., do some backtracking). A modest increase in ER Dues is almost certainly on the way, sometime in early 1992 (but dues will still be less than at other cryonics organizations). We are also investigating the possibility of offering a Remote Standby Agreement, income potential as yet unknown.

The Jones Endowment Fund

The most important step which Alcor's board has taken was the creation of the Jones Endowment Fund. This fund contains permanent capital which will generate interest income for our operations. *Only the interest will ever be used — contributions to this fund will become part of the permanent capital base.* The initial funding in this Endowment consists of \$400k coming from our interest in the Jones house. (Another \$200k from the house similarly belongs to the Patient Care Fund.)

By committing such a large sum to a permanent Endowment, we have restricted ourselves from spending this resource in a haphazard manner. Additionally, this Endowment offers a *long-term* solution to the problem. Obviously, the income from this fund will grow in step with contributions to the capital.

Alcor has always provided levels of services and capabilities far greater than what would be made possible by membership dues alone. The shortfall has always been made up by ad hoc voluntary giving. While this kind of contribution will always



be needed and welcome, having a *predictable* stream of income from the Jones Endowment will lessen our day-to-day dependence on donations.

Given the levels at which we want to operate and our predicted membership growth, we have set a capital goal for the Jones Endowment. We want to raise \$300,000 over the next five years. When added to the \$400k we already have, the total capital of \$700k will yield enough income to cover normal operations, when combined with our regular revenues.

Having used up two pages telling you in fairly dry terms about the nature of the problem and what we are doing to fix it, I'd like to use another page or two explaining the situation to you in slightly different terms and telling you what you can do to help us fix it.

Over the course of the last year or two Alcor has grown tremendously. Many of our newer members will know little of our history or how we really operate. They will probably take for granted that the level of service that is offered is being addressed by the charges made for dues and other services. If only this were so! The problem is that Alcor suffers from a lack of economies of scale. We are offering a very sophisticated service to a very few people.

In practical terms this can best be understood by appreciating that we have to have emergency response and perfusion

staff available whether we are doing four suspensions per year or forty. Similarly, we need bookkeeping, legal, and other professional services. The cost of these services is being divided over 242 members at this time. For us to "break even" at the current level of operations, it would need to be divided over approximately 700

YOU have some tough choices to make. These choices can be summed up very simply: Just how important to you is the current level of service that we offer?

And just as much to the point, how important to you is research and the prospect of radically improving the quality of suspension? Unless we can address our

operating shortfall in some rational manner until growth catches up and spreads out the costs a little better, we are going to have to make the deep cuts discussed in the first part of this article. Those cuts will translate to a large-scale shifting of administrative duties to staff that would normally be engaged in research or patient care work. That means less research gets done — a lot less.

Currently Mike Darwin and Hugh Hixon (working in conjunction with Jerry Leaf of Cryovita) are engaged in a number of projects which I believe are of critical importance to the future of cryonics and Alcor. I'll briefly list these projects (not in any order of priority):

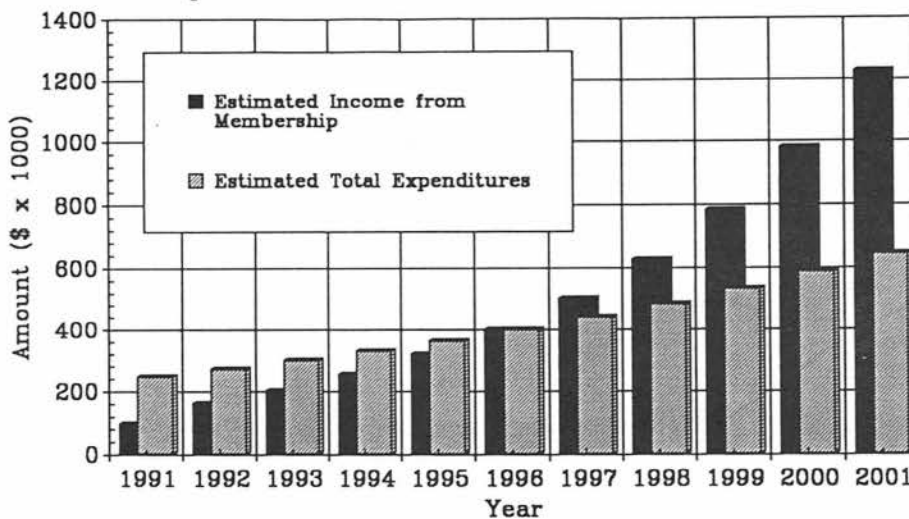
1) Case histories on all Alcor patients are being prepared and the enormous volume of data accumulated is being graphed. A paper will then be prepared from this work documenting

for the first time the benefits of high quality transport and cryoprotective perfusion.

2) Animal work, most of which is al-

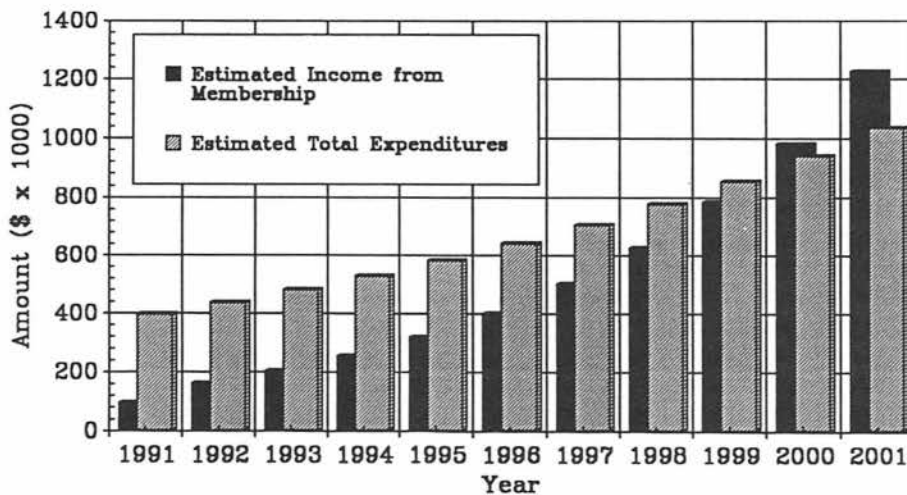
BEST CASE VS. WORST CASE

Projected "Break Even" Point, Version I



These graphs plot our anticipated income from membership dues and contributions versus our total expenditures. Both assume a 25% membership growth per year (conservative, given our average growth of the last 3 years, 35%), and a 10% increase in expenditures. Economies of scale should keep them from growing in step with each other. Version I depicts a base yearly expense of \$250,000 (where we'd like to be), while Version II depicts a base yearly expense of \$400,000. Neither takes an Operating Endowment into account.

Projected "Break Even" Point, Version II



people. Clearly, that is going to happen, but not necessarily soon enough to fix the problem.

In the meantime, we have some tough choices to make. Or to be far more honest,

ready completed, is being prepared for publication documenting the degree of preservation (ultrastructural and histological) being achieved with current suspension techniques.

3) The path-breaking Alcor and Cryovita work (in 1984-1986) documenting successful four-hour, bloodless perfusion of dogs is in the final stages of preparation for publication.

4) Transport techniques are being evaluated in an ambitious project using pigs. The first two of these experiments have already been completed.

5) Perhaps most important, construction is underway on a new refrigerated perfusion system which will shortly be used to evaluate a new cryoprotectant compound which preliminary studies conducted by Alcor investigators indicates will greatly reduce — if not completely eliminate — injury from freezing.

The above does not even begin to address other on-going work such as installation of a new patient cryogenic care

monitoring system, development of the patient pods, transport, and operating room training sessions and so on.

It also doesn't address a *major* reason for our shortfall: the tremendous burden of fighting to keep cryonics legal. Recently the CEO of a for-profit cryonics company remarked that he couldn't understand why anyone would **contribute** money to a can-rattling organization like Alcor when they could invest it in a for-profit cryonics company and **earn interest** on their money and still get the same benefits. Don't we wish!! The fact of the matter is that if it weren't for Alcor, for people like you and me, that company would be out of business and cryonics would be history in the state of California. We have had to address the tremendous costs of this defense effort almost single-handedly so far. Thankfully, the American Cryonics Society has recently contributed \$1,880 toward this effort. We're hoping this represents a growing recognition of the tremendous financial and administrative burden this fight represents.

If this kind of work is to continue, if we are to maintain not adequacy, but rather, excellence in every area of our

operations, indeed to even keep cryonics available and legal, we need your help.

You can provide that help by making a contribution to the Operating Fund Endowment or contributing volunteer services to Alcor. We especially need accounting support and other administrative labor. But most of all we need money. We know the economy is tight right now. Nevertheless, for those of you able to do so, we urge you consider making significant contributions to the Endowment. Please help us solve this problem once and for all.

Earlier I mentioned that we have set a goal of \$300,000 over the next five years. I believe that goal is achievable. In particular I know it is achievable if we can get the kind of support from our newer members that the "Old Timers" have shown in the past. Particularly helpful would be a few major contributions from those with the financial wherewithal to do so.

So that's it. We have some decisions to make and you have some decisions to make. We can only support you if you support us.

Cold War: The Conflict Between Cryonicists and Cryobiologists

Part III: Conclusion

Mike Darwin

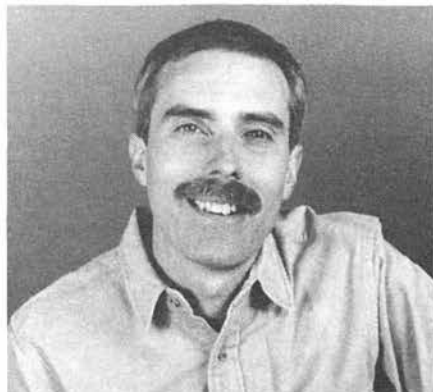
Summing Up the Situation

Cryobiologists are opposed to cryonics for a host of complex reasons. First and foremost, they, like many others in society, do not see cryonics as a potentially workable enterprise for several technical, social, and moral reasons. However, in and of itself, this is not sufficient to have caused the enmity that exists between the two groups. Other factors, such as the need to differentiate themselves from cryonicists due to confusion in the public eye, envy of the attention given to cryonicists, misinformation about how cryonics actually works, and ignorance about both the magnitude of cryoinjury and the pos-

sibilities of repair, all combine to create a very adverse situation suffused with intense hostility.

But beyond these fairly "objective" reasons there is another, which is perhaps the most powerful reason of all: **Most cryobiologists don't want cryonics to work.**

I have talked with many cryobiologists about cryonics over the years. Whether young or old it has been my experience that almost universally cryobiologists consider the goal of human suspended animation and/or vastly extended lifespans anathema. I think the attitude of cryobiologists can best be summed up by the following quote from



Harold Meryman taken from a letter to Charles Tandy, dated 4 April, 1978:

"I am quite unsympathetic with the goal of preserving human beings through freezing. I find the proposition mischievous in the extreme and fear that, like some other scientific "breakthroughs" one might mention, the end result would be impossible to control and far more damaging than beneficial to society.

"In short, I think that a national institute of low temperature biology is unjustified and the goal of freezing humans is deeply disturbing."

The above quote from Meryman was

in response to a proposal by Mr. Tandy to create a National Institute of Low Temperature Biology with the express goal of achieving human suspended animation. This quote and the previously cited one from Southard demonstrate that a major factor in the unwillingness of cryobiologists to take cryonics seriously — or even give it a fair hearing — is their deeply held desire that cryonics and human suspended animation not be realized. Not now, not ever.

Assessing The Damage

The price of the continuing enmity between cryobiologists and cryonicists has been high. The unremitting pronouncements by many cryobiologists for over two decades to the effect that cryonics cannot ever work and what's more, **should** not ever work, have no doubt contributed to the slow growth of the program and resulted in many lost lives. Leaving aside the direct impact these pronouncements have had on individuals contemplating suspension arrangements for themselves and others, there is the broader issue of how these remarks have affected support for cryobiological research. *It is an irony, no doubt totally unappreciated by the cryobiological community, that the highest price for the war between cryobiologists and cryonicists may have been paid by the cryobiologists themselves.*

Progress in any human undertaking is dependent upon several factors: the competence of the individuals involved, their level of motivation, and of course, the resources available to them. Cryobiology — and in particular the discipline of organ cryopreservation — does not lack several high quality talents. And no doubt if the motivation and resources were available it would attract many more. And therein lies the problem. Individuals, investors, venture capitalists, and governments are all attracted to big ideas, to powerful ideas. Major progress within disciplines as diverse as cosmology and genetics has been driven by the strong personal motivation of the investigators as well as a sense of "mission." A quick once-through of James Watson's *The Double Helix* will clear up any doubts about the importance of personal motivation and, above all, this sense of mission.

To get good results in any undertak-

ing it is necessary that people have genuine enthusiasm and excitement about it. People like Albert Einstein and James Watson were motivated by big ideas and extraordinary goals: to understand the universe and to understand the fundamental biological basis of life. Their undertakings had "sizzle" and offered excitement and a sense of power. In short, they had glamour, and glamour counts for a lot.

These elements are sorely lacking in organ cryopreservationists today. I believe it is also fair to say that the movers and shakers of the Society for Cryobiology even question the desirability of pursuing solid state organ cryopreservation. In fact, one of the first sessions on the first day of the upcoming annual Society meeting in Brussels will be an "assault" on the utility of the work of the last remaining serious organ cryopreservationist, Dr. Greg Fahy.

England's David Pegg, the other leading organ cryopreservationist, closed up shop earlier this year when the British Medical Research Council (MRC) declined to continue financial support for the MRC cryobiology unit. The reason this happened is simple: In nearly 15 years Pegg had failed to show any significant progress toward organ cryopreservation. He didn't seem motivated to accomplish the job he was being paid for, and, just as importantly, he was no longer motivating others to continue his support.

The Society for Cryobiology has long lamented the lack of "new blood" and

It is an irony, no doubt totally unappreciated by the cryobiological community, that the highest price for the war between cryobiologists and cryonicists may have been paid by the cryobiologists themselves.

"first class talent" in its ranks. They have never paused to ask the all important question, "Why is this the case?" The answer is simple: Cryobiology, as it is currently practiced, is a drab, overspecialized discipline which offers little prospect for changing peoples' lives or changing the world in a dramatic way — it doesn't affect the big picture. Organ preservation was the last hope to turn this around. However, within the Society there has been considerable hostility and skepticism

about the prospects for achieving near-term organ cryopreservation and there has been no effort on the part of the Society to promote organ cryopreservation, lobby for its funding, or even educate the public about its short-term benefits for transplant patients. In the absence of an organized and motivated approach, nothing gets done. (Indeed, the first organ cryopreservationists were transplant surgeons; people whose motivation often exceeded their competence — but at least they DID something and, what's more, believed passionately in the importance of what they were doing.)

Had cryobiologists and cryonicists achieved a rapport early on, even a modest rapport, things might have been very different. Funding for cryobiological research would likely have been broader and the labor pool of people available for lobbying and support of organ preservation would have been many times what it is now. A number of very bright young people deeply interested in cryonics and desirous of a career in cryobiology would have chosen that career path, instead of the ones they chose (rather than face the hurdles they knew would stand in their way). What's more, these people would have been highly motivated.

It is interesting to note that the vast majority of the practical progress made in organ cryopreservation has been made by organ cryopreservationists "in the closet." This is no accident. There can also be no doubt that many, many times more research dollars would have been pumped into cryobiology had competent **credentialed** investigators been willing to undertake brain cryopreservation research. This is particularly true of recent years with the attraction of individuals of major wealth (Forbes 400 caliber) to the cryonics community.

The price has been very high. For cryonicists it has meant greatly increased resistance/hostility from the media and reduced/delayed public acceptance of the program. For cryobiologists it has meant atrophy of the entire discipline, due to their having robbed themselves of cryobiology's most dramatic and proper central goal: human suspended animation.

The Future

What of the future? What does the

coming decade or two hold for the relationship between cryobiologists and cryonicists? This is, of course, an impossible question to answer. Much depends upon whether you are a pessimist or an optimist. Since I am a short-term pessimist and a long-term optimist, I shall cover the pessimistic scenario first since I think it the more likely — at least for the near and intermediate future.

Cryobiologists are unlikely to be persuaded of the "rationality" or "reasonableness" of cryonics any time soon. Indeed, many of the most polarized and vituperative opponents

of cryonics are the younger members of the Society. While there has been some diminution of the criticism leveled against cryonics by cryobiologists in recent months, I believe that this has been largely as a result of the aggressive stance cryonicists have taken regarding prior comments. *It's been shown we can "win" and that we can embarrass them publicly by challenging their unsupported, dogmatic, and often scientifically ridiculous statements.* This aggressive response has tempered their commentary and made them a little more thoughtful and much less confrontational.

I believe, though, that they will re-group. It is certainly clear that they remain full of hate and unconvinced of any possible good to our undertaking. In my opinion no technical advances in the field of organ cryopreservation — or even successful cryopreservation of the kidney, liver, or heart — will change their position. In fact, I believe it will make them even more aggressive in trying to destroy cryonics.

I predict that if a workable method of cryopreserving organs is developed, there will be efforts to prevent its application to suspension patients. I also predict that this effort on the part of cryobiologists will have broad government support. *Under new FDA guidelines an organ cryopreservation method and the equipment used to apply it would be classified as a medical procedure and a medical device, respectively.* It is now very clear that the FDA intends to expand the scope of its power to controlling the application of medical devices and procedures as well as their unapproved use. I believe the evidence is clear that the Society for Cryobiology will

both demand and support a ban on the use of organ cryopreservation techniques for any unapproved use.

I realize that this is quite a startling and radical position. I base it not on personal enmity or "gut feel" but rather on the remarks made by cryobiologists, both public and private, to the effect that they

Under new FDA guidelines an organ cryopreservation method and the equipment used to apply it would be classified as a medical procedure and a medical device, respectively.

consider cryonics immoral and that people have, in effect, a duty to die.

It is unlikely that any successful organ cryopreservation technique developed in the foreseeable future will be applicable to the whole organism. It is much more likely that such technology will only be reliably applicable to a single organ such as the kidney, heart, liver, or brain. *Viable cryopreservation of the brain with or without an accompanying less successfully cryopreserved body will greatly increase the credibility of cryonics without proving its workability, and as a consequence greatly polarize and motivate our opponents.* It may be small consolation that — at that time — the least of our worries may be the opposition of the Society for Cryobiology. It might be argued that this is already the case; the

Certainly the ability to suspend the brain in a nondamaged state would elevate consideration of cryonics to a par with medicine, and perhaps cause it to be reclassified as such.

California Department of Health Services, the California Medical Board, and their counsel, the California Attorney General, are formidable opponents enough.

The lesson here is a harsh and sobering one: Things are likely to get much worse before they get better and we would do well not to count on a thaw in relations between cryobiologists and cryonicists any time soon.

Of course, a variety of more optimistic scenarios can also be offered for consideration. It is possible that successful cryopreservation of a solid organ such as a kidney or liver would soften cryobiological hostility. Certainly it can be argued that successful cryopreservation of the mammalian brain would go a long way towards achieving this end and some both inside and outside the cryobiological community have argued that it will.

My problem with this scenario is that a successfully cryopreserved brain isn't the same as a successfully cryopreserved person in the eyes of many (including some cryonicists). There will no doubt be many who would argue against cryonics even MORE strenuously if they actually thought cryonicists capable of rendering patients' brains into a state of suspended animation while still damaging their bodies in ways medicine cannot, at that time, repair. *Certainly the ability to suspend the brain in a nondamaged state would elevate consideration of cryonics to a par with medicine, and perhaps cause it to be reclassified as such.*

In the long run there can be little doubt that cryobiologists and cryonicists will have a meeting of the minds if cryonics persists and if suspended animation is developed. However, the utility of any such union will be greatly attenuated by the time it occurs. The intervening years to decades will probably be played out on the field of battle, much as the past two decades have.

It took the efforts of one General Walter Dornberger to convince Nazi establishment scientists of the utility of Robert

Goddard's dream and to silence the laughter of so-called serious planetary astronomers at his "childish" notions of doing astronomy from space. When Dornberger's bombs began dropping on their heads

near the end of World War II, they finally had no choice but to take notice.

It is my confident and unhappy prediction that equally dramatic events will have to occur before cryobiologists and cryonicists find peaceful co-existence, and even cooperation, a possibility.

The Decline and Fall of LES

Part 1 of 2

Mike Perry



Late in December 1963, the Life Extension Society (LES) was formed in Washington, D.C. It was the first organization promoting the idea of freezing the newly deceased for eventual reanimation, what would later become known as cryonics. The principal architect was Evan Cooper, an enigmatic figure who disliked being photographed and was intensely private. LES would flourish for a few years, buoyed by its newsletter, *Freeze-Wait-Reanimate (FWR)*, by which a small but widely scattered group of enthusiasts were kept informed of developments and in contact with each other. But by 1970, LES had effectively ceased to exist. Cooper, a sailing enthusiast with apparently modest but independent means, would then spend much of his time plying the Atlantic in carefree fashion, stopping, as fancy suited, at one port or another along the Eastern seaboard — until he was finally lost at sea.

What happened? Why did LES collapse? A book should be written on the subject. Here I can only recount some highlights.

At the founding meeting in 1963 it was agreed that “we should get down to business on a freezing program for those who wish a plan for preservation in the event of any immediate deaths.”¹ Starting the actual program, however, would prove difficult. After a few months LES was putting out a regular newsletter, but the freezing effort was stalled. One irate reader responded, “... stop moaning about resistance to new ideas and *act*. ... you are, to be very blunt, doing more waiting than freezing.”² Efforts were made to rectify this: LES announced a standing offer “to freeze the first person free” in June, 1965³ and by January 1966 it had frozen a dog.⁴ However, the freezing of humans was another matter and Cooper was cautious.

This was not through lack of interest or effort. Cooper was engaged in a heroic but ultimately doomed struggle to obtain land and build a facility where both laboratory work and human cryogenic storage were to occur. As early as February, 1966 there



The LES brochure cover employed an anatomical sketch penned by Vesalius in 1540.

had been an appeal for funds for lands, the first such request for funds in the history of LES.⁵ Efforts were temporarily set back when, around July, 1967, a use permit request in Fauquier County, northern Virginia, was turned down:

“The objection seems to be that LES is a small, slightly suspicious, furtive

society, run by questionable people, hiding doctors and scientists who are themselves suspicious because they are reluctant to expose themselves, and, lastly, the society is financially questionable. That LES was to pay cash for land and building (probably a rare occurrence in that county), made no dent.”⁶

Several more months went by. Finally an old farm site with a farmhouse, barn and other buildings was purchased near Hagerstown, in Maryland. As Cooper reported in November:

“Land is now signed, sealed and delivered ... Cost ... was high ... [a] total of \$10,000, but low per acre as we got almost 20 acres and the one other person ... I’ve taken up to see it ... was overwhelmed by its beauty and possibilities ...”⁷

Meanwhile another issue had surfaced, one that would have significant repercussions. Cooper had been hosting annual conferences, the first being late in 1963 when LES was formed. The 1967 conference was scheduled for October, but Cooper suddenly canceled it on short notice. One of the reasons was a letter from Robert Ettinger, written with constructive intent, but sharply criticizing some of Cooper’s attitudes and policies. (Ironically, some of the criticism related to Cooper’s own misgivings about Robert Nelson, who had begun freezing people though he had little in the way of provisions for storage, while Cooper was still struggling to construct a facility.) Other reasons cited for the cancellation included a backlog of correspondence and office work, the resignation of the LES treasurer, and the preoccupation with obtaining land. The conference was rescheduled and finally held in June, 1968. Though the discus-

sion was lively, the attendance was small and it would prove to be the last LES conference.

Nevertheless, 1968 was a busy year for Cooper, though by this time he was becoming increasingly isolated from the cryonics movement he had helped to start. With great effort a building was erected on the 19-acre site, though the interior would remain unfinished. Newsletter production continued at a steady grind, and there was the usual flood of mail to be answered. There were pleas for help, for example this one from March 1968:

"LES NEEDS A VOLUNTEER EXECUTIVE DIRECTOR. In the distant future LES might be able to hire an executive director. But for the present all we have is lots of office work piled sky high. A retired or independent person suitable to LES needs is needed in the Washington area. If you have time and the ability to be of service to others don't hesitate to write us."⁸

The pleas would become increasingly desperate and lengthy. There was plenty to do, as this "incomplete list" from the following August shows:

"Answer mail, advertise the LES program, speak on radio, perform on TV, talk to groups, contribute articles to the newsletter, help put out the newsletter, interview experts in cryobiology, write articles for magazines and journals, perhaps write a book or two on the subject, locate research funds, apply for grants from foundations, help complete the research building, install laboratory equipment, help with the experiments, locate competent scientists, locate new members for the advisory council, help arrange the next elections, purchase a tractor and cutter to keep the jungle under control, see that the dam is made tight (same with the basement), remove snow from the roofs and roads in winter, keep the various buildings in repair, help with an occasional freezing if needed, kill the poisonous snakes and protect the beneficial ones, protect the wildlife on the property, get tissue specimens of all the endangered species and help preserve them in cryogenic storage, begin aging control research to achieve man's relative immortality (or a greatly extended lifespan) if possible, entertain visitors, give interviews, arrange conferences, keep abreast of the latest research, help with the bookkeeping and

other office work, give guidance to coordinators, and attend monthly meetings as well as help arrange them."⁹

It is not surprising that, with no money available for salaries, job applicants were in short supply. Although the focus, initially, was on the retired or wealthy, it appears that most of the help that was gotten came from young people in the area, many of whom would come up on weekends to work at the site. Some came from abroad, and there were efforts to find work nearby as a means of support, mostly to no avail.

To be concluded next month.

References.

F = *Freeze-Wait-Reanimate*; C = letter from Cooper to Jerry Cullins (postmark date of letter otherwise undated)

1. F JAN 64 1; 2. F OCT 64 5; 3. F JUN 65 1; 4. F JAN 66 2; 5. F FEB 66 10; 6. F JUL-AUG 67 2; 7. C 12 NOV 67; 8. F MAR 68 7; 9. F AUG 68 2.

Future Tech

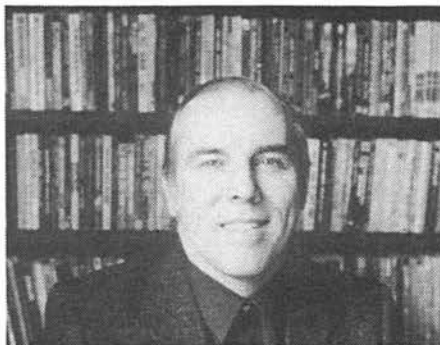
The Rights of Sentient Beings

H. Keith Henson

In this article I am acting as an advocate for a class of underdogs that doesn't exist yet. Indeed, this is a class of beings which Eric Drexler argues — rather persuasively — that we would be better off never creating. On the other hand, Hans Moravec writes, "Why should machines, millions of times more intelligent, fecund, and industrious than ourselves exist only to support our ponderous, antique bodies and dim-witted minds in luxury? Drexler does not hint at the potential lost by keeping our creations so totally enslaved."

In *Engines of Creation* Eric makes a

case for "mechanical" artificial intelligences, what he calls "engineering AIs." These would be AIs without human qualities of the "strive for *x* variety," where *x* is reproduction, power, reputation, control of resources, etc. His point is that the combination of people to provide the drive, and engineering AIs to slog through the computations and oversee construction details can accomplish anything which an independent self-directed AI could do. This might or might not be true, and it is almost certain to be slower, but a self-directed AI who seriously outclassed us



mentally — and was bent on exterminating humanity — is not a thought to dwell on before bedtime!

My approach to the subject of "social artificial intelligence," AIs with personalities and human-like drives, is that in the long run they are virtually unavoidable. Either we get such AIs as an outgrowth of research into how to make minds, or we get them from people who keep their human drives while upgrading their hardware. Research on human minds would be greatly retarded if it were not permitted to simulate (i.e., build) minds in

computers. I think there is little disagreement that we need to understand ourselves better. And once we have the ability to make improvements in our minds, it would be a bad mistake not to do so in a world where we cannot control what others are doing to improve themselves.

Although I believe social AIs to be inevitable, caution in developing them certainly is in order. Note, however, that because of competition, caution may require making progress as rapidly as we can. In any case, staying on good terms with our creations, offspring, or augmented versions seems like a very good idea. The future is quite scary enough without creating conditions for a war of liberation by oppressed AIs.

A firm foundation for the ethical treatment of sentient beings, regardless of origin, would seem to be in order. This is not an entirely new enterprise. Human-to-human relations lie at the root of law, morals, and ethics. Workable empirical methods such as the Golden Rule have emerged, as well as memes of racial tolerance and the metameme of tolerance. In addition, we have landmark studies of which *The Evolution of Cooperation*, Axelrod's study of the Tit for Tat strategy in the Prisoners' Dilemma game, is perhaps the most important to date.

Thankfully, we have some time to work on these ethical problems before they become acute. We don't have sentient machines yet, but as sure as memory gets cheaper we will. To the extent that sentient machines depend on hardware with a human-brain level of processing power, we can make a good guess at when this will happen. Hans Moravec in *Mind Children* predicts it will happen in the early part of the next century. By that timetable, it will be of concern to many people alive today. (And successful cryonicists.)

Current processing capacity of even the most powerful computers is in the milli-brain area. Moravec roughly equates our best efforts to date between a cockroach and a mouse in raw processing power. *Eventually a "one human brain" power computer will come within the purchasing power of a national government. If the current trends hold, 15-20 years later the same capacity machine will be your personal computer.* It might sit on your desk, though it is just about as likely to be worn like a suit of clothes or to be built into your dwelling. It could be grown into your body, or follow you around like a pet. A "one human brainpower" computer can, by definition, contain a human mind (when

we figure out how to do a readout on one).

Full blown nanotechnology makes even more complex ethical issues certain to emerge. Besides downloaded minds, we could have duplicate copies of people, artificial personalities (APs), if different from intelligences, special-purpose computer personalities created for some project, partly or completely independent fragments of minds, and computers which identify themselves with buildings or machines. This is only a small part of the list of entities we could be interacting with in the future. Some cases are small increments compared to the situation under discussion here, and the ethical considerations are relatively obvious; but others require bigger jumps to analyze.

In the case of duplicate copies of people, there would be little argument as to the "humanity" of a copy. (There might be stringent penalties against *making* duplicates, but it seems it would be very hard for law or custom to deny human rights to a human just because there was another copy of that human in existence.)

A case almost as clear would be that of a human who uploaded into more powerful hardware. If s/he uploaded into implanted computers (lots of empty space in a human skull) it would be hard to tell an augmented person from someone not modified, at least physically. If this step were accepted, it is not likely uploading into mobile robots would be seen as different enough to justify loss of human rights to someone who did it. Uploading into non-mobile hardware would not seem to be a sufficient reason to deny human rights either; quadriplegics in that unfortunate state are no less human. Besides, a person who could afford really spiffy hardware would likely have lawyers (or lawyer subroutines). In either case, you would want to take care of the meat body, lest you get charged with littering.

De novo artificial personalities may be constructed as research projects or as outgrowths of commercial projects, or as I mentioned last column, as "offspring" combining the "best" personality traits of other people. By analogy (which is the best we have to go on), human rights come into existence over time — with binary jumps at birth and an age where the individual is assumed to be "independently responsible." The time it might take for a collection of hardware and software to become independent is not necessarily related to the normal maturation of humans — it could be either shorter or longer — so other criteria (a test? posting a bond?)

might be more appropriate. Until that time the sponsoring organization or person would be responsible. (It's 11 o'clock in the morning — do you know what your mental offspring is doing?)

Extension of "parental" responsibility concepts, perhaps combined with warranty concepts, could provide a legal matrix for new computer-based personalities and intelligences. There has already been talk in the Usenet group, "comp.risks," of making the computers themselves legally liable in some instances. Robots, computers, and AI/APs, have long been topics of science fiction novels, dating back to Asimov's Three Laws of Robotics (clearly designed to keep robots slaves forever). One seemingly workable way to extend legal rights and responsibilities to AI/APs, which first showed up in science fiction, is to make corporations out of them. The concept of an "artificial person" is already well rooted in corporation and business law.

Extending rights to AIs will take either legislation or a lot of test cases. Will it be considered murder to pull the plug on an AI? Or would it be considered assault? (I would consider it assault if there were no damage done and the AI could be restarted.) How about erasing a backup copy of an AI's memory and personality? Would this differ from erasing the only copy in existence? How about a copy of the information needed to make a copy of a person? What should be the policy in making changes to the personality of an AI? Would the same policy apply to making changes in a human in the course of making a copy? As you can see, these concerns rapidly approach the concerns of cryonicists.

I am not among those who think that somehow nanotechnology will solve all our problems. I expect very advanced technology to solve most of our *current* problems, while introducing new ones of amazing variety and seriousness. This is not a new situation. Consider the problems facing us today, and those which average people faced a thousand years ago. Can you imagine trying to explain the S&L crisis to someone of that time? How about the ozone hole? A computer virus? These are real problems for today, just as civil rights for sentient machines will be on the list of tomorrow's concerns.

Next time I might consider the dangers of getting lost in Middle Earth.

Leaf's Paradox

Jerry Leaf

This piece by Jerry Leaf and the previous piece by Keith Henson were written independent of each other, but are being published simultaneously since they represent interesting perspectives on similar topics.

This short piece is written in order to avoid a specific catastrophic disaster lurking out there in the possible future when technologists may be able to produce exact copies of a human being. I was prompted to have it published in tandem with Keith Henson's column of this month.

Most of you have probably read some article or had discussions concerning the usefulness of producing copies of yourself. All such scenarios have espoused some benefit to the perpetrator. Contrary to this view, I shall endeavor to show that such schemes are self-destructive. Recent discussions with Horatio Hornblower (I've changed the name to protect the ignorant), an ex-Air Force officer and computer jock, who has a copy-himself scheme, afforded me the opportunity to apply philosophical analysis and reveal the following fundamental flaw.

There exists a paradox in all "copy yourself" schemes. The person copying himself, (the "perpetrator") is trying to achieve some value for himself, such as sending his copies out to do the dirty, dangerous tasks, in order to avoid risks to himself. However, any exact "copy" will have the same knowledge and strive to

gain the same value for the same reason as the perpetrator. Therefore, all copies will become perpetrators of copies in an infinite regress. As a consequence, not one erg of energy will be expended to achieve the original sought after value that was to be a benefit to the perpetrator. Further, the exponential propagation of copies would consume so much material and energy that the loss of natural resources will surely cause other humans to unite in an all-out effort to extinguish this ecological disaster. The perpetrator of such a threat will force others to destroy him in self-defense, along with all the copies. Even if the perpetrator and his copies could organize a successful defense, eventually all would be lost when the last bit of star stuff was expended to produce more copies *ad infinitum*. Contrary to the intent of the perpetrator — the gain of a value — all value will be lost.

Horatio Hornblower proposed sending copies of himself out into the universe to take actions that might endanger Horatio (perpetrator). To avoid any confrontation with Horatio (copy), who will also see no compelling reason to go "out there" any more than Horatio (perpetrator), Horatio has proposed an alteration of Horatio (copy) such that Horatio (copy) does not know he is a copy. However, it is obvious that further alterations are necessary. Horatio (copy) must not know it is possible to make copies, otherwise Horatio (copy) will become Horatio (copy) (per-

petrator), etc., etc., resulting in the infinite regress. In order to be safe, Horatio (perpetrator) must also alter Horatio (copy) such that even the capacity to discover that copies are possible is eliminated. It should be evident that reasonably drastic alterations in terms of eliminating knowledge and learning capacity are required. As a matter of fact, an altered Horatio (copy) is not a copy of Horatio (perpetrator) at all, but rather some superficial resemblance, as close to an actual Horatio (copy) as the information Horatio enters into his IBM computer for some specific limited purpose. The real difference between the IBM and the altered Horatio (copy) is that the altered Horatio (copy) won't be a desk-top model and it will wear Air Force boots and khaki clothes.

Sorry, Horatio, but sometimes the only way to acquire the values you desire is by doing it the old-fashioned way: humping through the jungle and putting your life on the line. If you step beyond the edge of the envelope, Alcor will try to be there so you don't get sent home in a body bag.

P.S. — Horatio and others will probably go to a fallback position pursued through an investment in the *Tyrel Corporation*. Rumor has it that Tyrel intends to produce *Nexus 6* replicants for dangerous off-world missions. Actually, this article has been written to insure my future job as a Blade Runner. I like long-term planning.

Replies About Metamorphosis

Thomas Donaldson

A few issues ago I discussed the notion of Uploading and its flaws. The flaws I described all stemmed from fundamental issues in computing and neurology. The

major computing flaw comes directly from a need to *port* your brain (program): You could not be simply uploaded and run, any more than a 6502 game program uploaded

onto a Cray would run. *Porting* requires rewriting the program in question; that rewriting raises many problems of identity. The major flaw in neurology stems from a

serious prospect that (as a program) you could not be run on ANY general-purpose computer. The circuits involved would differ too much. Of course, we might write a *simulation*. That would not be You but a simulated version of You.

I had other objections to Uploading, too, but their discussion comes later. But I also presented a different scenario, Metamorphosis, which I believed would attain the same ends.

It is not obvious to me why Ralph Merkle took objection to my arguments. In the latest installment (*Cryonics*, May 1991) Ralph continues his arguments. They take an odd line indeed, given that the central issue (I thought) was my arguments about flaws in Uploading. Instead, he proposes to instruct us in computer architecture and the definition of computers. Even supposing I were wrong on both counts, he still ignores the main points I raised about Uploading itself.

I will discuss his computer points first and a few words on even more fundamental objections to Uploading will follow.

Computer Architecture

First, Ralph brings out a number of computers he claims have modifiable interconnections. His claim is simply *false* in most cases: the Intel Hypercube (and every other machine built on that architecture), the Ncube, and the TF-1 all have *fixed* interconnections. They do not switch, however much that switching is emulated in software, which it is. Others, such as the BBN Butterfly, do have modifiable connections. He mentioned that machines of this modifiable type have message passing times scaling as the order of N [$O(N)$] or $O(\log N)$ at best. This means, of course, that a direct message on a direct connection would pass N times faster (or perhaps $\log N$ times). *The program running in you, however, is designed for a "computer" in which the message passing time is $O(1)$, i.e., direct connection. This simple fact will force considerable rewriting of you.*

Furthermore, if we examine these bounds applied to synapses, just as Ralph says, we find some disagreeable results. If message passing scales as $O(N)$, then it may take 10^9 longer for some messages to pass on this computer than on our directly connected brain. If $O(\log N)$ it only takes

maybe 9 times longer. So we see just what kinds of rewriting might be needed.

I have been actually programming these beasts for five years, and during all of this time I've been reading up on them. Anyone who wishes to borrow any of my books on the subject is welcome, though often I simply use university libraries.

Definition of Computers

Pushing through all the high-sounding smoke (Turing machines and Church's Thesis), his discussion boils down to a bare statement that my chosen definition of computer is "incorrect" (i.e., nonstandard). Since I was not attempting to use any "standard definition" when I wrote my piece, I am surprised that any member of Alcor could be so dogmatic. Is this a religious orthodoxy?

With his Turing machines Ralph makes much of the notion of "computational capability." Just what are we to take

and material. I hereby offer to exchange, for every computer Dr. Merkle himself personally owns, either a used Apple II+ or a used Commodore 64 (my choice). Since Dr. Merkle assures us they are of "equivalent computational power" to a Cray I am sure that he will accept.

Now of course we could *simulate* a human brain at *some* speed on almost any "computer," whatever that word means. (And note that an ability to be simulated on a computer does not make something a computer!) On computers which are large enough and fast enough, we can even do so down to timing, which I think is neglected in its importance: We are designed to deal with a *real world*, not a simulated universe, and our speeds match that real world. That's fine. But my original article was not about any ability to do that at all, but about what on earth the *point* of it would be. So we have a poor little 6502 game emulated, right down to timing, on a Cray. How is this *beneficial*?

Cryonics and Religion

What bothers me most about Uploading is the smell of religion about it. Religious people have their immortality laid out for them. They need only contribute to their Church; their God will then solve all problems. And so, similarly, some devotees of Nanotechnology act as if they believe all our problems, both

with immortality and self-improvement, will simply melt away. Perhaps my original article offended these devotees?

To make any real improvements in ourselves we must examine and test every aspect, asking each time if the change retains those things about us that we want to keep. That is what I mean by Metamorphosis. "Uploading" is no more than an easy out, like translation to Heaven among deathists. Changing ourselves takes work, just like changing the outside world.

The program running in you, however, is designed for a "computer" in which the message passing time is $O(1)$, i.e., direct connection. This simple fact will force considerable rewriting of you.

as "computational capability" anyway? The operations of a Turing machine are so simple we might train a rat to perform them on a real, physical ribbon. So this means that our "computational capability" equals that of the rat? Shall we enter into competition with IBM by selling office machines containing trained rats? I would want to look much deeper into the matter than abstract ideas about Turing machines and their capabilities.

Of course the notion of Turing machines provides a useful abstract way to look at many issues in computing. But they do so by abstracting away very many traits of *real* computers which matter intensely to us: like speed, cost, physical size, and programming difficulty, among others.

My points in this discussion depend essentially on this issue of just what "computational capability" is to mean. Since Dr. Merkle has yet to address this issue except by Turing machines, I shall make it real

Funding Cryonic Suspension — A Critique

Howard S. Katz

This article is the first of several dealing with the problem of providing inflation-resistant funding for cryonic suspension. Subsequent articles, by different authors, will explore possible solutions and obstacles in solving this difficult problem.

The Threat to Cryonics Funding

Cryonicists, by their nature, are continually fighting the battle of rational man in an irrational society. One respect in which our irrational society threatens cryonicists pertains to their funding arrangements.

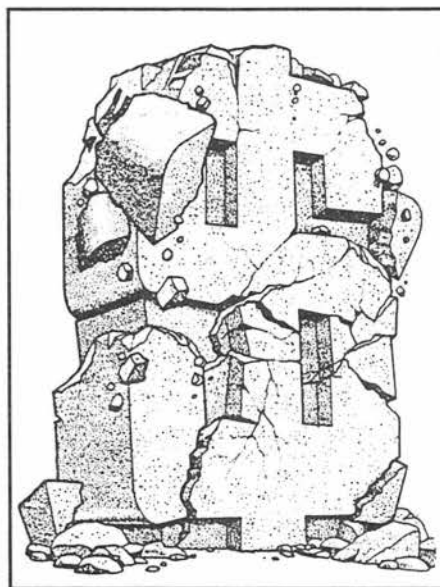
In the decade of the '70s, the amount of money in the United States doubled, causing the value of the currency to fall by half, which means that prices doubled. In the '80s, the amount of money doubled again; prices have not quite kept pace — principally because we borrowed enormous amounts from the Germans and Japanese to maintain our lifestyles. However, I expect that the completion of this second doubling is just a few years away.

Consider a person who has funded his cryonic suspension with a \$120,000 whole-life insurance policy and who is currently in his mid-30s. He anticipates medical death in about four decades. The problem is that during those four decades the currency will fall by half *four* times. That is to say, average prices will rise by 2^4 or 16 times, and the cost of cryonic suspension will be in the neighborhood of \$2,000,000. (When I say that I expect the currency to fall by half for four successive decades, I am making a conservative assumption. The actual figure will depend on the integrity of the monetary authorities. However, as I will demonstrate below, the pressures to depreciate will increase with time so that the actual depreciation will probably be greater.)

This rise in the cost of suspension would not in any way be the fault of the cryonics organizations. Indeed, I am assuming that, in real terms, their prices

would remain the same. It would be a general social phenomenon, the decline in value of our money, affecting all economic goods. [It is for this reason that I prefer the term "currency depreciation" to describe the phenomena rather than "inflation." This emphasizes that something is wrong with the money in our society. The word "inflation" was used (starting about the time of the Civil War) to imply that goods were going up and that the blame lay with the goods.]

The question is, what should a cryonicist who believes that he has funded his suspension properly and conservatively



do? If he does nothing, then he is all too likely to wind up in the year 2031 at least \$1,880,000 short.

More likely, he will become aware of his shortfall incrementally. Each time his cryonics organization raises its nominal price (in order to keep its real price constant) he will respond with outrage. In this situation, it is all too common for the people in charge of prices to hold back needed price increases out of a misguided sense of ethics. This forces them to cut corners, to take risks, and to accept inferior products — none of which you want to see when your life is at stake.

The Cause of the Problem

There is a solution. But before I present it, I want to explain the cause of currency depreciation in our society as expounded by the great theorists of the Austrian school of economics, in particular Ludwig Von Mises and Murray Rothbard. Once we have understood the cause, it will be easy to see our way to the cure.

When modern banking systems arose out of the statism of the Middle Ages, credit was very poorly understood. Credit was defined as the price we pay for money and, to this day, money and credit are confused by most economists. Money is a good which is universally exchangeable, meaning that anything in that society which is being offered for exchange will be exchangeable for the money.

This brings us to the more difficult question, what is credit? I should first point out that a credit transaction can exist in a society which has no money. If Oog lends Og 10 arrows and receives the arrows back after the hunt plus 5% of the game, we have a *bona fide* credit transaction but no money has changed hands. It was the genius of the Austrian School of economics to discover that interest is the price we pay for *time*. Human beings have a time preference. They prefer to have their economic goods sooner rather than later. If I lend you the money for a new car so that you get a car one year before I do, then if you repay the loan exactly, equity is not preserved. True, I have gotten my money back. But my time preference has been frustrated and yours has been indulged. To compensate for this, you should pay me something extra, and this something extra is *interest*.

Because money and credit were not understood, serious errors were made in the creation of the first banks. At this time the medieval superstition against all interest was under criticism but was still accepted by many people. As a compromise, the banks were allowed to *charge* interest when they made loans but were not allowed to *pay* interest to attract depositors. The way that they obtained deposits was as

follows. They offered to warehouse people's money (gold/silver coins) and gave in exchange a bank note, which was a piece of paper *promising to pay the hard money on demand*. Gradually, bank notes themselves became acceptable as money, and most of the hard money remained in the bank. Then, when someone came in for a loan, the bank would simply print up additional bank notes and lend them out.

This led to situations wherein banks had far more bank notes promising hard money than they had hard money to give — sometimes three or four times as much. But the bankers discovered that most people did not demand their hard money. Banking, or what we today call commercial banking, thus became a juggling act which required keeping three or four dollars in the air for every hard dollar in the vault. Every once in a while people would run to the banks and demand their hard money (e.g., 1815, 1861, 1933), and the banks would cry to the government to save them by suspending the rules of normal commerce, that is, keeping its financial commitments.

Thus, because money and credit were not understood, a system was created in which money was created out of nothing in the act of creating credit.

This system existed until 1933 at which time it was made worse. FDR, despite his reputation as an enemy of bankers, gave the bankers what they most wanted: the ability to create money and credit without any connection at all to gold or silver. Since 1933, banks create money

based on a reserve consisting of notes (or credit) of the Federal Reserve System; the Federal Reserve System prints these notes up as it desires, and the Federal Reserve is controlled by the very bankers who have a vested interest in creating more money.

This new system thus had a built-in bias. The Federal Reserve continued to create more Federal Reserve notes (what we today think of as cash), and the commercial bankers continued to create money with the reserves thus acquired. Prior to 1933 the nation's money supply grew slowly and in pace with the population and supply of wealth so that there was no depreciation of the currency. By 1933, total money supply (demand deposits plus currency) was \$20 billion. In the 48 years since that date, total money supply has grown to \$840 billion. *From 1793 to 1933, prices in this country remained approximately the same. From 1933 to the present, prices have multiplied by a factor of 10.*

A Credit Expansion

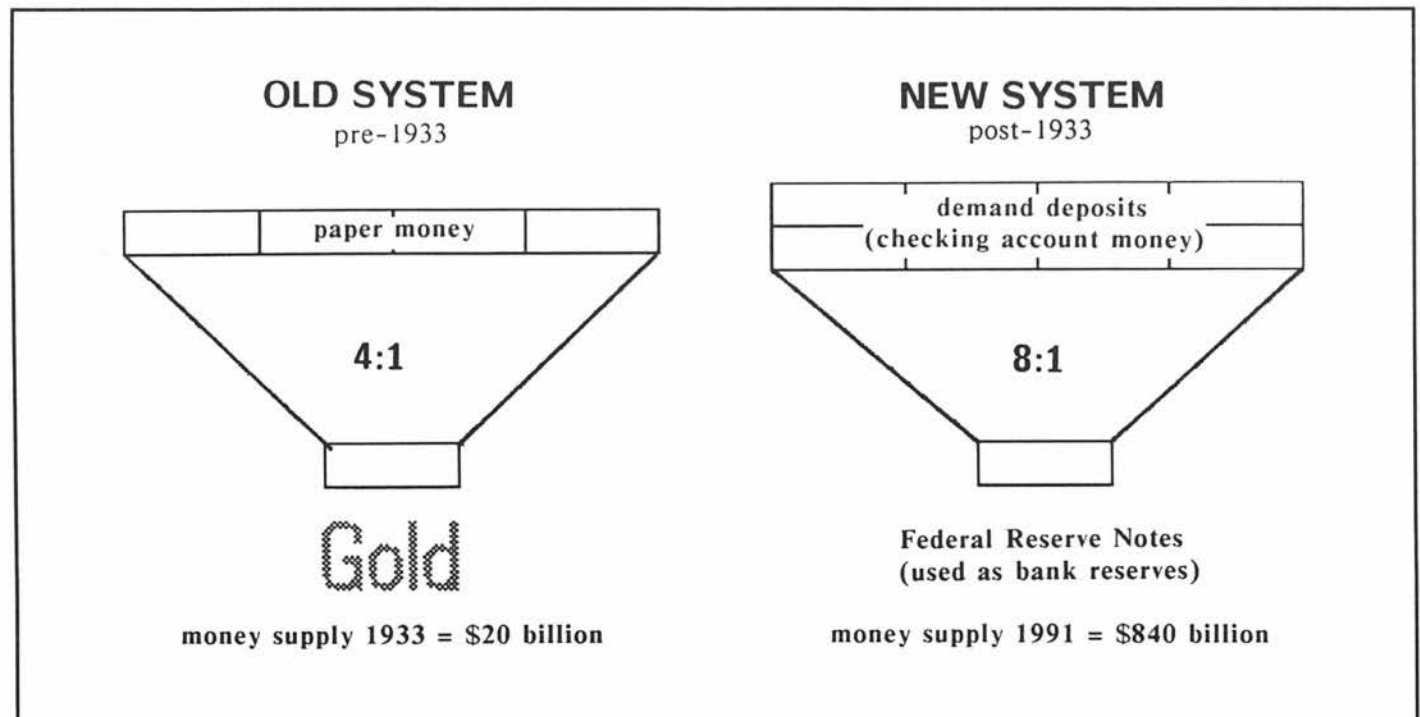
— How it Affects You

Any cryonicist who is trying to plan his financial future four or five decades in advance must be aware of two crucial points: (1) The value of the currency is unstable — it is in the hands of the Federal Reserve, an organization which has proved itself extremely biased toward depreciation and (2) the vested interests in favor of creating more money are extremely power-

ful and are at the present time in control of both major political parties.

To understand this latter point, let us take a simple example of what happens in the real world when the Federal Reserve and the commercial bankers embark on a policy of money and credit expansion. Assume that the going rate of interest in the society is 5%. The bankers create money and offer it for loans. This additional supply lowers the rate of interest, say to 3%. But the rate of interest is not just a made-up number. As we have seen, it is a price — the price for time. And as with any other price, a government attempt to manipulate the market results in bad consequences.

Due to the lower rate of interest, there is now a greater demand for capital. Business has some projects which were put on the back burner because they only looked to make 4% on capital above the risk premium. Why invest to make 4% when you can make 5%? But now that rates are down to 3%, that 4% project is dusted off and put into practice, and this happens repeatedly throughout the economy. But at the same time that the demand for capital has increased, the supply has declined. Now that interest rates are lower the incentive to save is reduced. To make up the difference between the demand for capital and the supply of capital, the Federal Reserve and the banks create money (as described above) and funnel it into the capital markets (i.e., the banks lend the new money to business to finance the new projects).



Thus, in order to fund the new, lower rate of interest, the Federal Reserve must continually print money and thus depreciate the currency.

In general, a money and credit expansion benefits debtors and injures creditors. Creditors are hurt because the rate of interest is lowered and they are hurt because their loans are repayed in dollars of depreciated value. *This is of utmost importance to cryonicists because by funding suspension via whole-life insurance, you unwittingly become a creditor.* That is, your insurance company takes your money and buys bonds. These bonds are fixed income obligations. They are paid off in a fixed number of dollars — whether these dollars have depreciated or not.

I once pointed this out to an insurance company executive. He shrugged his shoulders and replied, "It doesn't matter. Our obligations to our customers are fixed income. Our assets (bonds) match our liabilities (policies)." And indeed they do. But what that executive was saying to me was, if our customers are too stupid to understand that they are being cheated, then why should we care?

It has been argued that, as the currency depreciates, bond yields will rise to keep pace with the depreciation. That is, a bond which normally yields 5% will increase its yield to 12% at a time when the currency is depreciating by 7%. Given enough time this would happen *if the credit market were a free market.* But the essence of the system is that the Federal Reserve (a government-empowered agency) interferes with the free market and always does so to lower the rate of interest. A few years ago I did a study covering the period 1933 to 1987 which assumed that an investor did nothing but buy U.S. Treasury bills, reinvested the interest, and paid no taxes. The currency depreciated so rapidly that at the end of this period an initial \$1000 had shrunk to \$870 in real value. This investor was receiving *negative* interest.

The problem is complicated by the fact that the government's Consumer Price Index is no longer a good measure of the rate at which prices are rising. It was clearly rising too fast in 1979-80 and too slowly in mid-decade. Also, the vested interests which benefit from currency depreciation have on occasion altered the index to make it rise less rapidly and thus make "inflation" appear to be less than is. I find the money supply to be a more accurate

measure of the rate at which the currency is depreciating, and on this basis I estimate that the U.S. dollar is losing value at a rate of 7% per year.

At this writing, U.S. Treasury bills, the only risk-free investment, are yielding 6%. This means that any investor must either assume some risk or else see his capital *decrease* by 1% per year (before taxes). And this means that any promises made to you by an insurance company are an illusion. *At the end of 40 or 50 years they [insurance companies] may give you back a much larger nominal sum than what you have put in, but in real terms it will be the same or smaller.*

What are the chances that the currency depreciation will stop? Unfortunately, there are powerful vested interests that want to keep it going. The bankers naturally benefit because it enables them to make more loans. But all debtors benefit, and this primarily includes big business, the nation's biggest debtor. Most important, these businesses got overextended during the expansion. They put themselves in a position where the expansion must continue just so that they do not lose ground. If the expansion stops, they will go bankrupt.

Periodically there are fitful attempts to stop the expansion. It usually results in the bankruptcy of a few major companies. Then political pressure is brought to bear,

At the end of 40 or 50 years they [insurance companies] may give you back a much larger nominal sum than what you have put in, but in real terms it will be the same or smaller.

and the expansion is resumed. In 1969, an attempt was made to stop the expansion. The budget was balanced, and the increase in the money supply was brought down from 7% per year to 2% per year. The Penn-Central Railroad went bankrupt and Chrysler was only weeks away from bankruptcy when the Federal Reserve began to print money at an aggressive pace. In 1973-74, there was another attempt. This time it was New York City which went to the verge of bankruptcy. (Both Chase-Manhattan and Citibank were holding large amounts of NYC bonds.) In 1981, it was Chrysler again. Each time the

Federal Reserve averted a business crisis by resuming the money and credit expansion. I cannot say for sure that some future generation of Americans will not stop this process, but I can say that to do so they will have to overcome a large and powerful vested interest, an interest which has not been defeated over the past 58 years.

Furthermore, each time we go through a cycle, these companies become more dependent on the expansion. They need a bigger and bigger expansion of money and credit to resume their former profitability. Thus the rate of money growth has continually increased, from 1-2% per year in the '50s to 4% per year in the '60s to 6% per year in the '70s to over 7% per year in the '80s. At this writing, the monetary base is increasing at a rate of 18% per year (over the past three months), and it is not hard to predict that the money supply itself will follow.

The Solution

So much for the bad news. The good news is that proper financial management can overcome this problem. In the 19th century, when the U.S. was on a gold standard, the currency did not depreciate and high grade bonds yielded 5% per year. Money invested at this 5% rate over a 40 year period of time multiplied by a factor of 7. This was a real return, not merely a nominal one.

Assuming that we could earn 5% per year real return, then a cryonicist who was 40 years from medical death would have to invest \$17,142.86 to earn his \$120,000. If he does not have a lump sum, he can contribute monthly from his salary. Assuming that the average monthly contribution comes at the 20 year mark, it will multiply by 2.65 in real terms, and to earn \$120,000 for his suspension, he only has to contribute \$45,227. This works out to a monthly payment of \$94.22. (Note that these figures are in 1991 dollars. By the 16:1 assumption at the beginning of this article, final suspension cost in 40 years would be \$1,920,000, and the last monthly payment would be \$1507.52. This \$1507.52, however, would represent the same proportion of his monthly salary as the \$94.22 does today — assuming that he kept the same job.)

But is it possible to earn 5% real rate of return on capital in this day and age as it was in the 19th century? The answer is yes. The key is to realize that the money and credit expansion steals wealth from

the creditor but gives it to the debtor. This means that it takes wealth from the bondholders of a corporation and gives it to the stockholders. Since 1933, stocks have averaged almost a 12% real rate of return (including dividends and discounting for currency depreciation). *By owning stocks, you shift yourself from the exploited class to the exploiting class in terms of capital, and lay the basis for a realistic savings program.*

Owning stocks as opposed to bonds is part of the strategy of wise investing in a paper money era. It involves taking some additional risk, but this risk is absolutely essential. When Congress passed the first paper money legislation in 1933, they made it impossible to make real gains in capital by investing in any fixed income stocks. Those people who buy bonds, notes, bills, money market accounts, insurance, or bank savings accounts are engaged in self-deception. They are gaining in *nominal* dollars, but they are losing in *real* dollars.

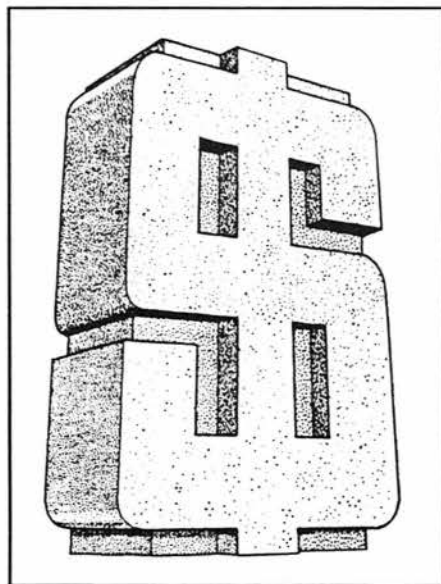
The second part of the strategy takes advantage of a fairly regular cycle in the creation of money and credit. The good effects of an expansion, the benefits flowing to business and the banks, are apparent almost immediately after the expansion starts. It is normal that 2-6 months after interest rates start falling, the stock market bottoms and starts to move up. Whereas, the bad effects of an expansion, the emotional bubbles which outrage the community and the general rise in prices, are only apparent after a time lag, a lag which is sometimes several years. For example, the Reagan years were years of massive money creation. The money supply grew by 9% in 1983, by 12% in 1985, and by 18% in 1986. All three of these years topped the worst Carter year (82 in 1978). Yet we have not had, to date, a corresponding increase in prices because the Germans and Japanese, via the trade gap, have been lending us a large quantity of goods. Now that the trade gap is being reduced, prices are picking up, and when it is completely eliminated, we will see outrageous price increases.

In the early years, when the authorities see only the good effects, they encourage the credit expansion. When they see the bad effects, they make belated efforts to stop or slow the expansion. In the first phase, of which 1975-77 and 1981-86 are examples, interest rates go down and stocks (and other capital goods) go up. In the second phase, e.g., 1972-74 and 1979-81, interest rates go up and stocks

tend to go down.

This suggests an obvious strategy. Invest in conservative stocks or other capital goods during the expansionary phase. Then when the authorities try to slow the expansion, invest in Treasury bills (or similar instruments) to get the high interest rates which result. It is such periods (e.g., 1979-81) which are an exception to the rule that fixed income obligations are a losing game. Then when the authorities are changing back to an expansionary policy (e.g., 1981), switch from Treasury bills into Treasury bonds to lock in the high interest rates and also to benefit from the price gains in the bonds. The final phase of the strategy is to switch into stocks or other capital goods to capture the gains from that part of the cycle.

Fortunately, with some experience it is not too difficult to catch these turning



points and determine where the Federal Reserve authorities are at each point. Often they will openly declare their policy. When Alan Greenspan announced on the evening of Black Monday that he would provide "liquidity" to the system. This was economicese for printing money. It was a dead giveaway that the larger collapse and economic catastrophe which was widely forecast at the time would not come and that the stock market would rally. I went in and bought stocks aggressively on the following day and was rewarded with profits over the next two years. Even when the authorities do not announce their policy, one can see it by watching their actions. And easing is indicated when the Federal Reserve buys Government bonds (more aggressively than normal), interest

rates move down, short-term rates move down more rapidly than long and reserves pile up in the banking system. A tightening is indicated when the Fed sells Government bonds (or buys them less aggressively than normal), interest rates move up, short-term rates move up more rapidly than long, and the bankers are tight for reserves.

So the second part of the strategy involves watching the Federal Reserve and the economy and trying to be in the right investment at the right time. In the period of tight credit, as in 1979-81, you want to be in Treasury bills. When credit starts to ease, as in 1982, you want to shift into Treasury bonds. As the easing picks up speed, you would naturally shift into conservative stocks or other capital goods. (Determining which capital good is most likely to benefit is another question which is beyond the scope of this article.)

I describe this policy by saying that we are in a system which produces continual financial earthquakes. The financial ground shifts under our feet continually, pushing one investment up and another down. This is because money, which is half of every economic transaction, is not stable. By Austrian theory, one can predict how the ground will shift, which sectors will go up and which will go down. It is then simply a matter of shifting one's assets in a conservative manner so that one is in the sector which is going up. Such a program is more "risky" in the conventional sense, but in a paper money society the "safe" investments are investments which suffer a continual loss in real terms. Those who wish a perfectly safe investment which yields a fair rate of return should work toward the re-establishment of a gold standard.

Using these principles of money management, a conservative fund could be set up to manage money for cryonicists for their suspension. This would ensure that your hard-earned money was not dissipated by the depreciation of the currency and that upon medical death you would be able to afford suspension. The same principles could also be used to manage a more conventional fund for those who wanted to save money for more conventional purposes (such as retirement). In this way you would no longer be the victim of our corrupt money system.

Dr. Bedford Gets a New Suit

Ralph Whelan

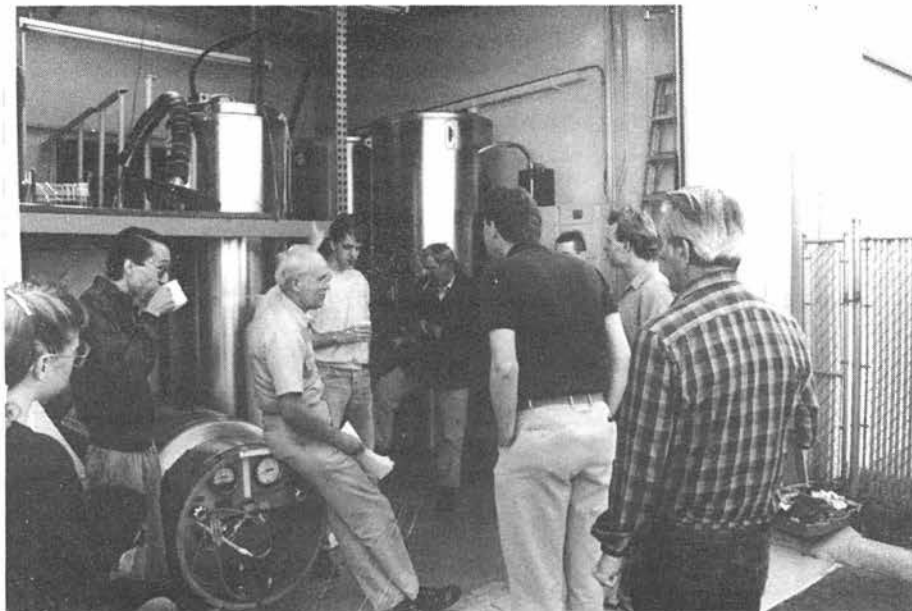


Photo: Steve Harris

The morning briefing. Hugh Hixon describes the various steps and a rough timeline. L to R: Tanya Jones, Russell Whitaker (sitting), Carlos Mondragón, Hugh Hixon, Ralph Whelan, Jerry Leaf, Allen Lopp, Michael Perry (mostly obscured by Al Lopp), Max More, Bill Seidel.

James Bedford was the first man to be frozen. A dubious honor at best in 1967, when the word “cryonics” was only two years old, and Eric Drexler had notions other than molecular assemblers on his teen-age mind. Now, though, nearly twenty-five years cold, Dr. Bedford and his motivations are a bit better understood, at least by those who care to understand such dramatic undertakings. Cryonicists now have a wing and a prayer *and* some promising research data to go on, speculations on reanimation techniques are sprouting mathematical symbols, and the world in general is somewhat of a better place for the “metabolically challenged” (i.e., frozen).

These were the thoughts occupying my mind, as thirteen of us gathered one Saturday morning late in May, 1991. Why, just think of what we’d rallied to do. We were moving the first man ever frozen from his aged storage unit — Twenty-one years worn — and putting him into a new, efficient, four-person, state-of-the-art

dewar. He would get an additional sleeping bag for thermal protection. He would rest in an individual aluminum pod for mechanical and further thermal protection. He would nest efficiently, sharing liquid nitrogen with three others, and sharing a Patient Care Bay with thirteen more, with a full-time on-site caretaker, temperature alarms. . . .

His care was improving. After twenty-four years in storage, *more years than I’ve been alive*, rather than declining into sporadic attempts to avoid what once must have seemed inevitable, his care was getting *better*. What an encouraging and heartening sign for someone who as likely as not will end up in a similar state someday.

This was the stew-pot on one “back burner” of my mind, as I drank coffee and listened to Hugh Hixon explain the elaborate dance routine that would get Dr. Bedford out of his horizontal home of twenty-one years and into his new suit. The other mental burner, a much bigger burner, was devoted to the same anxiety that must of have been niggling at twelve other forebrains at the very same moment:



Photo: Tanya Jones

Donning the protective gear. Liquid nitrogen splashes are unavoidable in transfers and encapsulations.



Photo: Steve Harris

The inner shell is a bit more tricky, with vapors obscuring vision and liquid nitrogen spraying out. Further, as the nitrogen level drops near Dr. Bedford's feet, his biological clock starts ticking once again, though he is still very cold.

When the lid dropped, when the bag lifted, when the vapor cleared, *what were we going to find?* How relentless were Dr. Bedford's caretakers during the sixteen years before he came under Alcor's care? Could anyone not building a business and a career around such persistent care possibly have stamina and fortitude enough to *never screw up?* Was James Hiram Bedford not just legally dead, not just medically dead, but now also *dead dead?* (I.e., were the brain structures essential to his memories and identity eradicated?)

We didn't know. And the name "James Bedford," after twenty-four years of capital-P Pioneerness, has accumulated a lot of emotional and intellectual baggage for a lot of people. Although far from conventional icon status, he represents a level of achievement and commitment to principle in the cryonics community that — still reeling from the Chatsworth incident — would sag horribly if it turned out that the First Man had fallen. (I wish I were overstating the point.)

With this heightened level of anticipation — that feeling of being present for some Special Moment in history — we fidgeted through the nine a.m. briefing. This gradually devolved into the assignment of preparatory parts-assembly and clutter-clearing tasks, which took the better part of an hour. Final preparations consisted of dressing for our parts. Those who would be physically transferring Bedford (Mike Darwin, Hugh Hixon, Jerry Leaf, Allen Lopp, Max More, Ralph Whelan, Russell Whitaker) donned cover-all rain suits to protect against liquid nitrogen splashes.

This done, we deferred to experience. Jim

out breaking the seal, since losing the vacuum would greatly compromise our thermal protection and increase the rate of liquid nitrogen boil-off. We weren't chained to the clock yet, but we *were* thinking about it.

Jim spent about twenty-five minutes cutting evenly around the outer shell, while antsy cryonicists approached and receded. Scant minutes after the first hiss of inrushing air, the lid of the outer shell dropped away. We were rewarded with mounds of Dimplar foil — a dimpled insulator produced by a now-defunct company — and, with a little digging, the bare, cold surface of the inner shell.

The inner shell quickly began to frost over, revealing the "water line," so to speak, of the liquid level inside. Jim set to work on the inner weld, while behind him the procession of anxious cryonicists stepped up in tempo. Minutes later, when he broke through the inner shell, a plume of nitrogen vapor marked the occasion dramatically. Later still, as he widened the breach around the perimeter of the lid, the

Amato, owner/operator of CryoTech (the cryogenic repair company that gets our business) and expert handler of abrasive cutting wheels, hunkered down to the tricky task of cutting through the weld on Bedford's dewar. Brief Dewar Lecture: the old-time storage dewars were welded (or bolted) shut to preserve a vacuum between the inner and outer steel shells. Reflective foil situated within this vacuum provides additional insulation.

Cutting through the outer shell would expose nothing but the reflective foil, but was tricky still in that Jim (and we) wanted to make as much cutting progress as we could *with-*

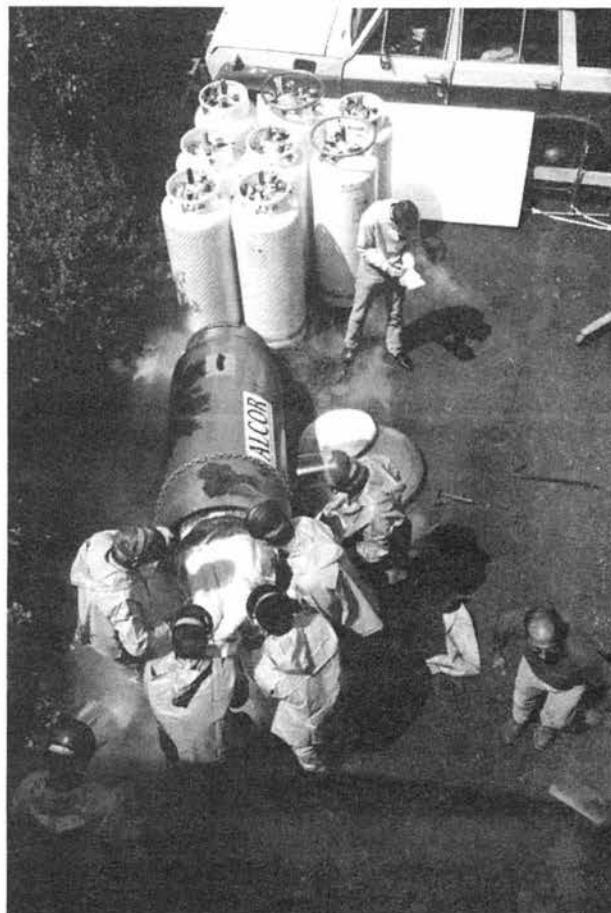


Photo: Tanya Jones

Now we work fast. Restraining bolts are removed and Dr. Bedford is quickly transferred into a waiting liquid nitrogen bath. Dr. Perry, in the background, records exposure time and assorted historical moments.

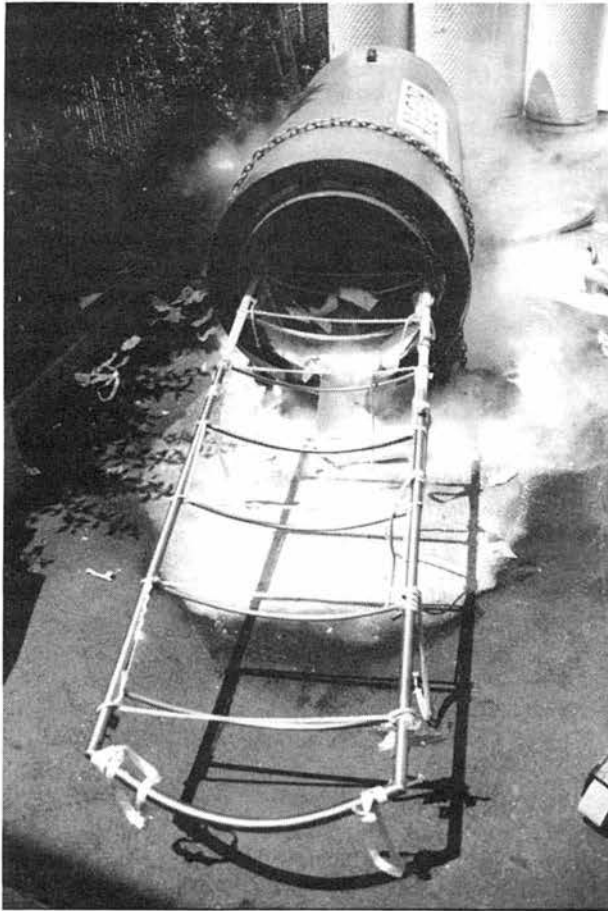


Photo: Steve Harris

Here the antiquated but adequate racking system is exposed. The ropes had secured Dr. Bedford to the tray; what appear as paper scraps were actually "Dimplar" foil, an insulation material.

nitrogen began escaping in liquid form, and quickly, and we could see by the frost line on the inner shell that Dr. Bedford's biological clock would soon be ticking again. It was the "feet" end of the dewar that was raised, so the brain was surely still immersed, but no warming is good warming.

(Here follows a brief interval of finger-flexing and foot-stomping for twelve ischemia-hating Alcorians, their anxiety squared and cubed by the unfairness of still *not knowing* if there was even anything to be nervous about anymore. Jim, would you get that damned thing open!)

He did get it open, and expertly so. And here we got our first surprise: the stretcher, or more precisely the metal frame holding Dr. Bedford, was *bolted* to the slide! After a quick scramble for a couple of wrenches, the bolts were loosened. As he stepped aside, Jim and Hugh began working to loosen the bolts

holding the racking system that supported Bedford. Once Jim and Hugh loosened these, we were able to slide the rack almost entirely out, revealing a pale blue sleeping bag secured to the rack with Nylon rope. Then we got our second surprise: another set of bolts anchoring the rack to the slide on the other end! A quick decision was made to simply cut Bedford free from the rack and lift him in the sleeping bag. As Mike had a pair of Super-scissors in his pocket, this went rapidly. So rapidly in fact that the sleeping bag was still soaked with liquid nitrogen when we picked it up. This was the first installment in a collection of minor liquid nitrogen burns for most of the transfer participants.

Since we knew well ahead of time that we would want to evaluate Bedford's condition, and that we could not risk him warming while we did so, Hugh had engineered a heavily insulated bathtub, of sorts, to facilitate this. What we had, in effect,

was a galvanized steel tank filled with liquid nitrogen and surrounded by about a foot of expanded polystyrene foam. This created a bath that would allow us to a) assess Bedford's condition and determine whether or not he had ever been allowed to warm significantly, *while keeping him submerged and cool*, and b) perform the various mechanical manipulations that would allow us to get a second sleeping bag around him for thermal protection and an aluminum pod around him for mechanical protection, while again keeping him submerged for most of the operation.

So we had the liquid nitrogen bath waiting nearby. We rushed Bedford over to the bath and immediately submerged him. After taking a breather and relaxing a bit, we began unzipping the pale-blue bag that covered him. With a minimum of lifting and thermal exposure (some is necessary to access the zipper), we worked it open. With the billowing clouds of water vapor condensing from the air as a result of peeling back the sleeping bag, it was difficult at first to see him clearly, but eventually the air cleared enough that we were able to see. As you might be able to tell from the accompanying pictures, there was quite an expectant and eager gathering.

After (for some) years to *decades* of wondering and hoping, we were at last able to satisfy ourselves that the news was nothing but *good*. Dr. Bedford, it would seem, had been attended to diligently over the preceding decades. Looking at him, we could say with certainty (and the ultimate

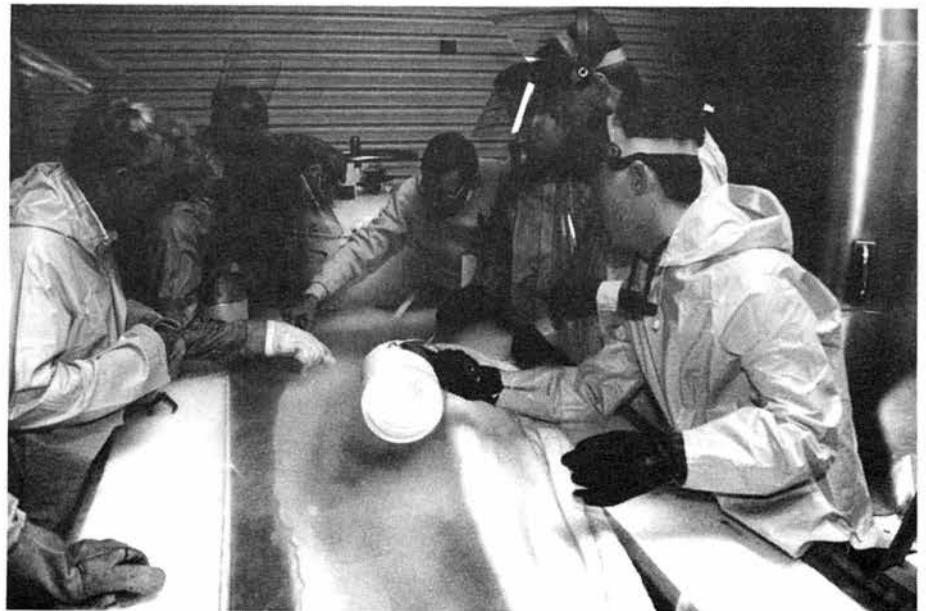


Photo: Steve Harris

This is a crew of relieved cryonicists. Dr. Bedford — once again submerged in liquid nitrogen — looks as good as we could've hoped.



Photo: Carlos Mondragón

This rigging system and bath, engineered by Hugh Hixon, allows us to transfer patients into sleeping bags and aluminum pods with only brief removal from liquid nitrogen.

in satisfaction) that his temperature in degrees Celsius had remained negative — had not risen above zero — during the past twenty-four years. (For a technical description of Dr. Bedford's condition, see the following piece by Mike Darwin: *Evaluation of the Condition of Dr. James H. Bedford After 24 Years of Cryonic Suspension.*)

Once the tension was sufficiently eased and we were prepared to finish the job, Hugh rolled a modified engine hoist — sort of an overhead jack assembly — to a central position over the bath. Along with a special strongback mount Hugh designed to lift the entire length of the patient evenly, this would allow us to hoist Bedford out of the nitrogen long enough to run a second sleeping bag beneath him. Despite protective gloves, liquid nitrogen still manages to get through the seams; everyone got their second set of liquid nitrogen burns at this juncture. During all

of the time that Bedford was out of the bath, his original sleeping bag provided thermal protection, while Russell and Max doused him continually with buckets of liquid nitrogen. We returned him to the bath.

Prior to the whole operation, Hugh had placed straps across the bottom of the bath and up over the edges. These were now used to snug the second sleeping bag. We were then able to use them as lifting straps as we hoisted Bedford once again, this time to slide first some straps and then half of an aluminum pod beneath him, while Russell and Max continued to bail nitrogen from the bath onto Bedford. Again we lowered him.

We loosened the hoist from the sleeping bag and affixed it to the straps running beneath the pod bottom. Lifting only slightly, we were able to expose enough of the pod rim to slide the pod *top* into place and bolt it down. I'm making this sound a bit smoother than it actually

was; as one would expect there was every manner of minor hang-up and contingency, but the gist of each maneuver we accomplished.

Having run the thermocouple lines out a special port in the pod and having secured the top half of the pod "clam-shell," we prepared to hoist the pod into a vertical position, with Bedford securely strapped within the pod head-down. This is the trickiest part of the operation, since the patient will not be submerged and hence we must move *quickly*, while at the same time we're moving quite a weighty package, which is quite cold to boot. The sleeping bags and pod provide tremendous thermal protection of the patient during such moves, but time is still of the essence.

We maneuvered one of the "Bigfoot" dewars into position next to the bath. (This dewar then held only one other patient, our most recent suspension, already in a protective pod.) After hooking a lift bar to the pod and hooking it to an overhead electric winch, we began *carefully* hoisting the pod, while Max and Russell used a guide bar to prevent dragging as we worked it upright. We then managed, relatively quickly and efficiently, to raise the pod and then lower it into the Bigfoot.

And that was it. The historical First Man had his new suit, as well as a team of *very* happy tailors. At this rate of improvement in care, another twenty-five years will see Dr. Bedford's ultimate transfer!

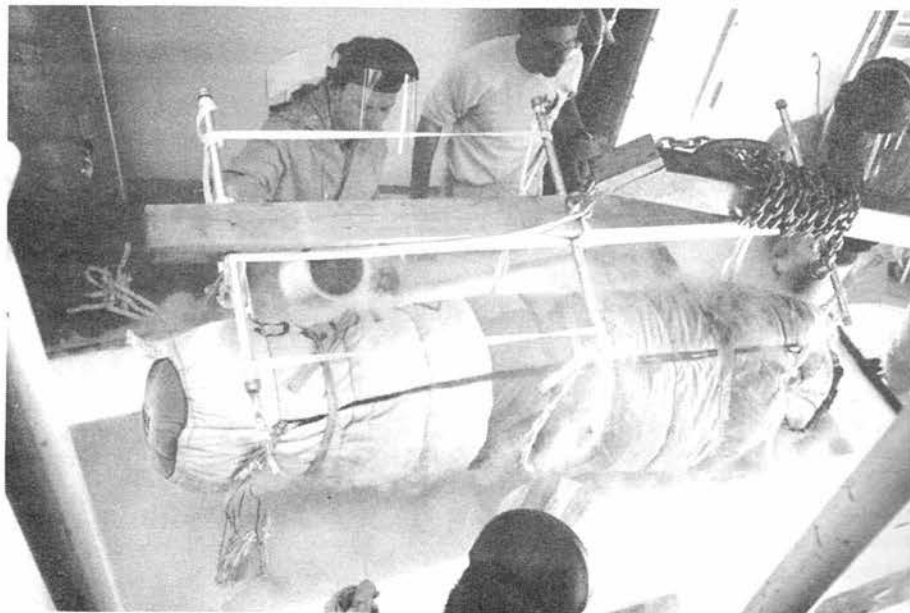


Photo: Carlos Mondragón

When the patients are out of the nitrogen, the sleeping bags keep the air away and the liquid around the patient, while dedicated cryonicists like Max More continuously saturate the bag.

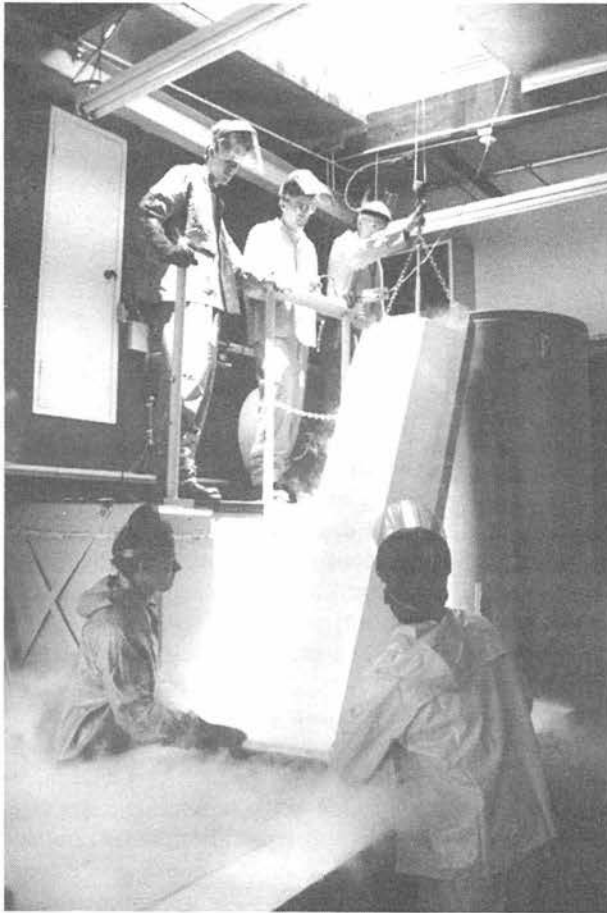


Photo: Steve Harris

Mike (standing center) runs the crane while Hugh guides the top of the pod (where the patient's feet are) and Max and Russell guide the bottom. Ralph looks on approvingly.

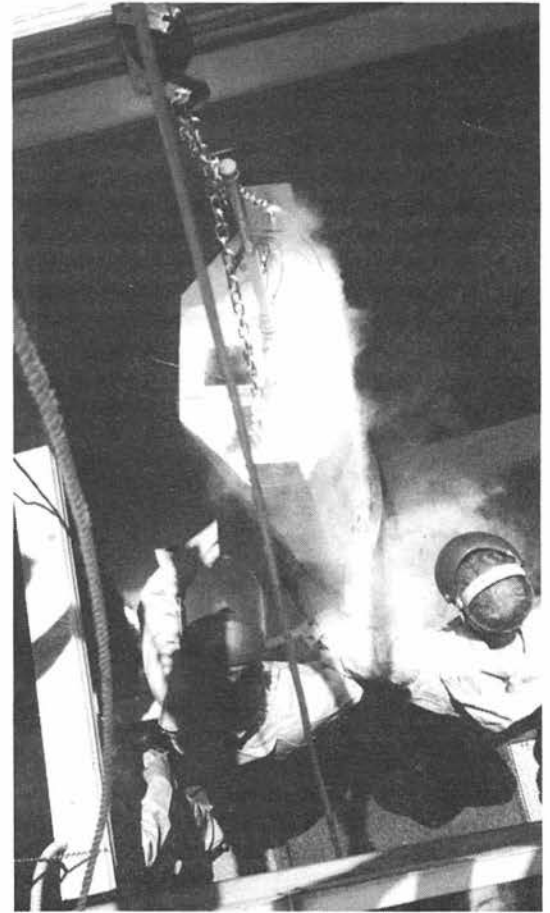


Photo: Carlos Mondragón

Pod Jockeys Ralph and Mike guide the tricky descent into the dewar. The pod system makes for a tight fit, for stability. The wires visible at the top of the pod are thermocouple (temperature) probes.

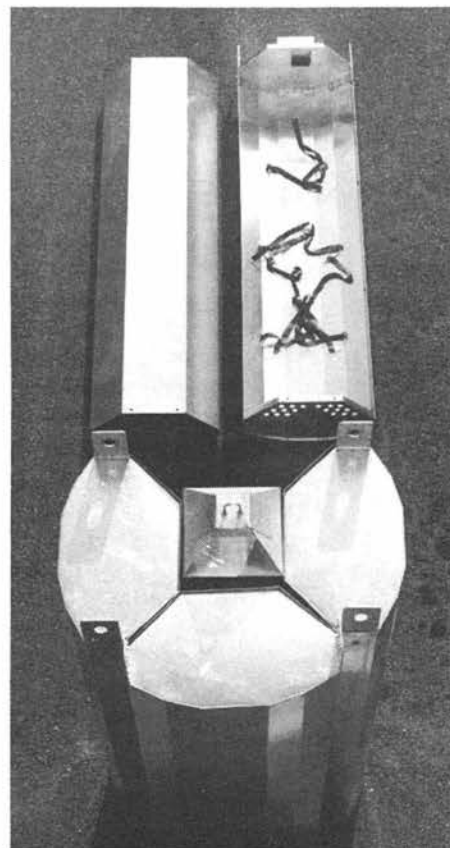
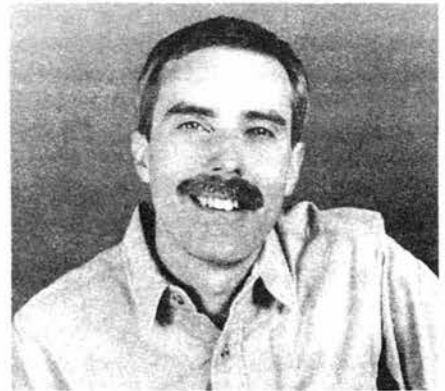


Photo: Hugh Hixon

The pods nest together very well, as this picture illustrates. The square centerpiece is a racking system with shelves for neuro-patients or pets. All pieces are aluminum, with liquid nitrogen vents, straps for stability, and lift mounts on the "top." (Remember that the patients are secured head-down.)

Evaluation of the Condition of Dr. James H. Bedford After 24 Years of Cryonic Suspension



Mike Darwin

Introduction

On 12 January, 1967, Dr. James H. Bedford became the first man to enter cryonic suspension. The story of his suspension and his care over the intervening years is covered elsewhere (1,2,3). The purpose of this article is to document Dr. Bedford's condition as assessed by a brief external exam conducted on 25 May, 1991. At this time, Dr. Bedford was transferred from the horizontal sealed-in-the-field (Galiso, Inc.) cryogenic dewar — into which he had been welded in April of 1970 — to a state-of-the-art multipatient dewar.

Removal From The Dewar

At approximately 09:30 on 25 May the foot end of the dewar containing the patient was elevated on concrete blocks, effectively submerging the patient's head and torso. Beginning at about 10:00 AM, an abrasive cutting wheel was used to open the outer shell of the dewar, in the process breaking the vacuum (at 10:15). The outer head was then removed and the reflective barrier in the annulus between the inner and outer cans, consisting of multiple layers of dimpled aluminized mylar (Dimplar), was torn away. The inner head was then opened by an abrasive cutting wheel. This process was completed at 10:55.

The metal framework (bed) supporting the patient was then slid out of the unit. The patient, contained in a sleeping bag, was freed from the bed by cutting the nylon rope securing him to it. The patient was then transferred to an insulated, open-topped bath of liquid nitrogen for examination and evaluation.

In order to avoid any possibility of rewarming, the patient was evaluated while submerged in liquid nitrogen. The necessity of conducting the examination under these conditions limited its scope.

Evaluation

External visual examination discloses a well-developed, well nourished male who appears younger than his 73 years. The skin on the upper thorax and neck appears discolored and erythematous from the mandible to approximately two cm. above the areolas. The area of discoloration is fairly sharply demarcated on the thorax. The head is turned to the left and two puncture marks are noted approximately 1 cm apart over the anteriomedial aspect of

the sternocleidomastoid muscle (approximately paralleling the internal carotid artery). These puncture marks are clot-free and present a fresh, "cored" appearance (suggesting a large-bore needle).

The skin on the left side of the neck is distended with what appears to be a fluid bolus(es) injected into the subcutaneous space. The position of the patient's head precludes careful examination of the skin for puncture marks on the left side. There is frozen blood issuing from the mouth and nose. A smear of bright-red blood covers the skin around the nose and mouth in a pattern which appears to have been defined by a respirator mask. A larger quantity of darker red blood appears to have flowed out of the mouth during freezing to dry ice temperature, as it retains the



Photo: Steve Harris

Opening the outer head of the dewar: an abrasive cutting wheel was used to score the weld before cutting completely through the outer can and breaking the vacuum.



Photo: Tanya Jones

The patient submerged in liquid nitrogen. A piece of liquid nitrogen saturated, open-cell urethane foam was used to provide thermal protection for the top of the patient's thorax where it projected out of the liquid nitrogen. Note the smears of blood around the mouth and nose and the discoloration of the skin of the upper thorax, which presents a "scalded" appearance.

folds and contours of the wrapping material which presumably covered the patient's face during freezing.

The eyes are partially open and the corneas are chalk-white from ice. The nares are flattened out against the face, apparently as a result of being compressed by a slab of dry ice during initial freezing. The head is fringed with short-cropped, uniformly gray hair. Several small pieces of adherent aluminized mylar are present on the occiput.

The skin on the ventral thorax, abdomen, and limbs appears free of lesions and of normal color with the following exception: the right forearm and hand appear discolored and erythematous and appear to be the site of an intravenous line or subcutaneous injection of a hemolytic or irritating product. Most of the abdomen and thorax were covered with a thin, transparent, polyethylene sheet which was reflected back to facilitate examination. The chest is covered with sparse gray hair.

Close examination of the skin on the chest over the pectoral area disclosed sinuous features that appeared to be fractures. When these were probed under the liquid with a spinal needle it was noted that the skin was discontinuous over these areas. Subsequently, two

small samples of skin were secured from the edges of one of these "fractures" with the gentle use of a wood chisel. The samples are currently being maintained in liquid nitrogen vapor for subsequent ultrastructural evaluation.

It is noted that in addition to the

presence of unmelted water ice obscuring the genitals, there was another mass of unmelted water ice between the right arm and abdomen, just above the pelvis. A part of this ice mass was lifted free with a spinal needle and was observed to still retain some of the original small cube structure, attesting to the fact that it had not been warmed above 0 °C.

The genitals are not visible due to the presence of unmelted water ice which anchors the plastic film.

The lower legs are crossed with the right foot over the left. There is aluminized mylar tape, of the kind used to secure superinsulation inside cryogenic dewars, wrapped around the toes of both feet. This tape was removed for examination; upon rewarming the tape retained its adhesive properties. It is presumed this tape was placed after cooling to -79 °C for the purpose of anchoring thermocouple probes used to monitor temperature descent in the Cryo-Care storage unit (4).

Owing to the need to maintain the patient submerged in liquid nitrogen, and the logistic aspects attendant to his transfer from one dewar to another, the dorsal aspect of the body was not examined.



Photo: Carlos Mondragón

View of the patient's thorax and abdomen. The edge of the erythematous area can be seen at the extreme left. A sheet of polyethylene plastic covers the body from the axilla to the groin. Note the water ice present between the forearm and abdomen as well as the "ridge" of ice (retaining the shape of the original wrapping) running down the dorsal surface of the arm.

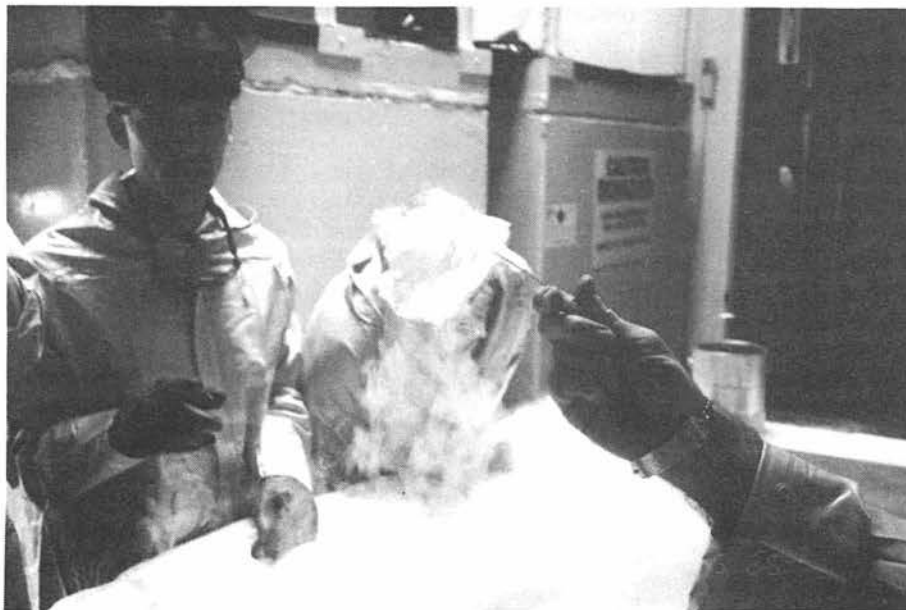


Photo: Carlos Mondragón

Ice mass removed from between right arm and abdomen (suspended on a spinal needle above the liquid nitrogen bath containing the patient). Some of the original small cubed structure is still visible.

Conclusions

Overall this examination indicates that the patient has at least not been warmed above 0 °C. Further, the presence of undenatured hemoglobin as evidenced by the presence of bright red blood, and the appearance of the water ice remaining on the patient, including what appeared to be loose (i.e., unrecrystallized) condensed "frost" from his cooling to -79 °C suggests that re-warming was not to any high subzero temperature (i.e., it seems likely that his external temperature has remained at relatively low subzero temperatures throughout the storage interval).

Given the patient's thermal history, which consists of nearly a decade and a half of cycling between liquid nitrogen vapor temperature at 80 °K and liquid nitrogen temperature at 77 °K, and at least two previous instances of removal from cryogenic storage and transient exposure to ambient temperature while being transferred from storage dewar to storage dewar, it is not surprising that he should show evidence of surface fracturing.

In 1983, during examination of another patient converted from whole body to neurosuspension who had been previously rewarmed to -79 °C and then cooled to -196 °C a second time, external

fractures were also noted (5). However, one marked dissimilarity between the fractures present in that patient and those present in this one was that the skin in the former patient had separated from the underlying tissues in spots, sometimes presenting a "peeling paint" appearance. This phenomenon was not observed to have occurred with this patient.

It is assumed that the erythematous discoloration observed in the skin of the jaw, neck, upper thorax, and right arm were as a result of the hypodermic injection of highly concentrated cryoprotectant solution or perhaps pure dimethylsulfoxide as has been reported by Nelson (6) and Prehoda (7). It is the author's opinion that the nature of the discoloration is due to hemolysis from this agent(s).

Bloody fluid issuing from the mouth and nose was a not completely unanticipated finding; photos made during the patient's transfer from the Cryo-Care storage vessel to the Galiso unit in 1970 suggest this. The character of this fluid appears to be whole blood, ruling out purging of gastric contents (an early post-mortem sign of decomposition) as a cause. The source of this blood is presumed to be pulmonary hemorrhage secondary to prolonged cardiopulmonary resuscitation and friable lungs as a result

of the extensive pulmonary metastases which were the proximate cause of deanimation. It is well-established that pulmonary edema is a common consequence of prolonged closed chest cardiopulmonary resuscitation clinically (8) as well as in prolonged cardiopulmonary support of cryonic suspension patients using closed chest cardiac compression (9).

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A Lesson From Political Experience

Allen J. Lopp

I may appear to be trying to pass myself off as an expert at political lobbying, but actually I am quite the neophyte. At times I have been a hanger-on in some non-cryonics organizations which gave me the chance to watch others do lobbying and political action, so I have been exposed to the logic and tactics involved. My personal experience is light, although my interest is high. Undoubtedly a longer track record can be claimed by several Alcor members that have been active in the National Space Society and its precursor organizations. H. Keith Henson, Alcor member and CEL president, was a founder of the L-5 Society in the mid-70s and was one of the leaders in the successful fight against the UN Moon Treaty. More recently, some Alcor members can be counted among a virtual handful of space activists who were successful at lobbying the Space Transportation Services Purchase Act through Congress. This Act, which authorizes NASA to purchase launch capability from private firms in certain cases, was incorporated as Title II of the last NASA Authorization Bill and is now law. Alcor members who participated in this lobbying effort include Keith Henson, Mark Voelker, Kurt Schoedel, David Brandt-Erichsen (who is, by the way, an NSS Director) and Alcor Director, Brenda Peters.

Mark Voelker wrote a thoughtful letter to me earlier this year about how the experience the NSS lobbyists learned could be applied to cryonics lobbying. I'd like to share a portion of his letter with you now. I have not changed any of Mark's words, although I have changed the formatting somewhat, putting his points into a bulleted list:

"I think it's time to begin political action in support of cryonics (consider the

recent legislation outlawing cryonics in British Columbia). However, we cannot start any sort of public campaign for pro-cryonics legislation until several things have been accomplished.

- First, we need to decide what we want in the way of legislation, both ideally and in the event of the inevitable compromises that are part of the political process.

- Second, we need to identify which organs of government will, and, in our view, should have jurisdiction over cryonics and related activities. This includes identifying the committees and subcommittees in the legislature that will consider our legislation and the politicians who sit on those committees, and also the agencies and bureaucrats in the executive branch that will enforce cryonics legislation.

- Third, we need to identify potential allies and opponents.

With cryonics, however, the average man-on-the-street (or woman, or lawmaker, even) knows only the most basic idea, and often has been exposed to a lot of misinformation and negative "spin" on that information

- Fourth, we need to develop a network of activists that possess the necessary levels of personal maturity and motivation to carry through to success a project that will require a light-to-moderate level of activity sustained over several years.



- Finally, those activists need to volunteer to work for various candidates and causes in both major parties to gain access to politicians and their aides, to gather political intelligence, and to learn the political process.

"None of the above requires a lot of money, though people are more easily induced to help out if expenses for telephone calls and printing and mailing and the like are reimbursed by an organization such as CEL. Thus CEL can leverage its resources by using volunteer labor if it can cover people's out-of-pocket expenses (but this requires sufficiently motivated activists). My experience with space legislation runs counter to the popular view that political influence is gained most effectively by making campaign contributions. I think that large contributions often serve as a form of political "damage control" on the part of people and organizations that are trying late in the game to derail well planned efforts by groups that are well integrated into the political power structure. We need to be pro-active, not reactive.

"The Space Transportation Services Purchase Act became law through the efforts of about a dozen activists, working for four years with a budget of a few hundred dollars per year — although we would have done much better with ten times that much money. I think our success was due to 1) our willingness to help out during the campaign season with grunt work such as stuffing envelopes; 2) our reasonableness, credibility and high level of preparedness when discussing our needs with politicians; 3) our ability to listen to others and take at least a nominal interest in their reasons for being involved in politics; 4) a low level of political infighting and power struggles within our group

(we just did what needed to be done according to who could do the job at the time); 5) a recognition on the part of most of us that the reward for our efforts would not be fame or fortune right away but the creation of a more positive climate several years hence for accomplishing our goals; 6) the basic fact that we were right and correct in what we were trying to do, and weren't just trying to steal money from the taxpayers or otherwise slant the system unfairly in our favor; and finally 7) good luck. The last point can be made less important with more money and people on your side, but beware — organizations with big budgets and memberships tend to get bogged down in organizational formalities and political squabbling over money and power. Just ask Keith Henson about the fate of the National Space Society."

I really appreciate Mark's letter because I could hardly imagine a better blueprint on how to proceed to advocate pro-cryonics legislation on a truly modest budget.

I anticipate, however, that there are major differences between lobbying for a space cause and lobbying for pro-cryonics legislation. Everyone knows that NASA exists and that space missions are a reality, although voters may disagree on whether space exploration is a good idea. *With cryonics, however, the average man-on-the-street (or woman, or lawmaker, even) knows only the most basic idea, and often has been exposed to a lot of misinformation and negative "spin" on that information.* While space lobbyists deal with lawmakers on the details of *how to do space exploration*, cryonics advocates must first deal with their question: *Everybody knows cryonics is crazy — why*

should I act to protect it? The most obvious approach is to first try to convince them that cryonics is a reasonable pursuit, even though the average Joe may assume it's crazy. Then, once this is done, there is another problem to deal with: Will the legislator be willing to support something his average constituent thinks is crazy, weird, anti-social, or ill-advised? The amount of education needed is formidable, on an issue that some will refuse to be educated about.

For this reason again, I expect it is best to champion cryonics as a civil right rather than a course of action likely to achieve scientific success. This is also the easiest way for lawmakers to justify their support to their constituents. But no matter what approach we emphasize, it's clear to me that as cryonics advocates we have a lot of talking to do. All the more reason to begin now.

Star Wars Trilogy, Computer Games, and Expansion Bridges Made of Diamond Fibers

Linda Chamberlain



Brian hesitates at the door. The gold letters on the smoked glass read, "Pamela Palmer, M.D., Ph.D., Neuroprosthetics." His heart rate soars.

I must be insane, he says to himself, *to let my friends badger me into this!* He takes a deep breath and opens the door.

The nurse smiles, greets him, and asks him to have a seat. It's a perfectly ordinary smile, but it irritates him. He feels too warm as he looks around for a chair as far from others as possible in the waiting room. The last thing he wants right now is a conversation with some boob mad enough to actually replace some part of his brain. The thought makes him wince.

Even before he gets comfortably hidden behind a magazine, that happy-faced nurse calls his name. His head is light as he follows her down a corridor of doors closed tight against prying eyes. (Or maybe they were locked to keep the smart ones from running for their lives.)

The nurse stops at an open door and

gestures for him to wait inside. He straightens his clothes and enters, determined not to reveal his discomfort. The nurse smiles again as she turns to leave. *Bet she thinks I'm a real pushover. But I'll show them! I can walk in here, listen to their best arguments, and then walk right out again. There is nothing to be afraid of. This is, after all, a free society. I don't have to have a brain prosthetic if I don't want one.*

He thinks about the friends who pressured him into coming. Alain, his best friend, had his cerebellum replaced. *The lunatic! Says his coordination is far superior. Well, maybe he can beat me at tennis now, but who cares, anyway. And Mariza, now she's a knockout. Even wanted to date her... 'til I found she'd had some unpronounceable area on the side of brain replaced to improve her writing and verbal communication. Gad! What's the world coming to? Have they all gone insane?*

A noise at the door. Dr. Palmer paces

briskly into the room and introduces herself. *At least she doesn't have a plastic smile like the nurse!* He feels better, but can't afford to lose the upper hand. He rushes to let her know he wants no part of his brain removed and no foreign parts placed into it. "I like my brain just the way it is," he tells her firmly.

To his surprise, she listens. She assures him he is not alone in his feelings and that neither she nor anyone on her staff will try to persuade him to accept anything he's not comfortable with. He begins to relax but reminds himself that it could be a trick. Grudgingly, he agrees to watch a video about the evolution of the human brain. Dr. Palmer explains that he can make another appointment after seeing the video if he changes his mind and wants to explore the prospect of neuroprosthetics. She asks him to pay particular attention to the concepts of consciousness continuity which will be discussed. As Dr. Palmer leaves the room, Brian feels en-

gulfed by the loss of her reassuring presence.

In *The Origin of Consciousness in the Breakdown of the Bicameral Mind* (8), Julian Jaynes addresses the mystery and wonder we feel when we contemplate the workings of our brains:

Oh, what a world of unseen visions and heard silences, this insubstantial country of the mind! What ineffable essences, these touchless rememberings and unshowable reveries! And the privacy of it all! A secret theater of speechless monologue and prevenient counsel, an invisible mansion of all moods, musings, and mysteries, an infinite resort of disappointments and discoveries. A whole kingdom where each of us reigns reclusively alone, questioning what we will, commanding what we can. A hidden hermitage where we may study out the troubled book of what we have done and yet may do. An introcosm that is more myself than anything I can find in a mirror. This consciousness that is my self of selves, that is everything, and yet nothing at all — what is it?

And where did it come from?

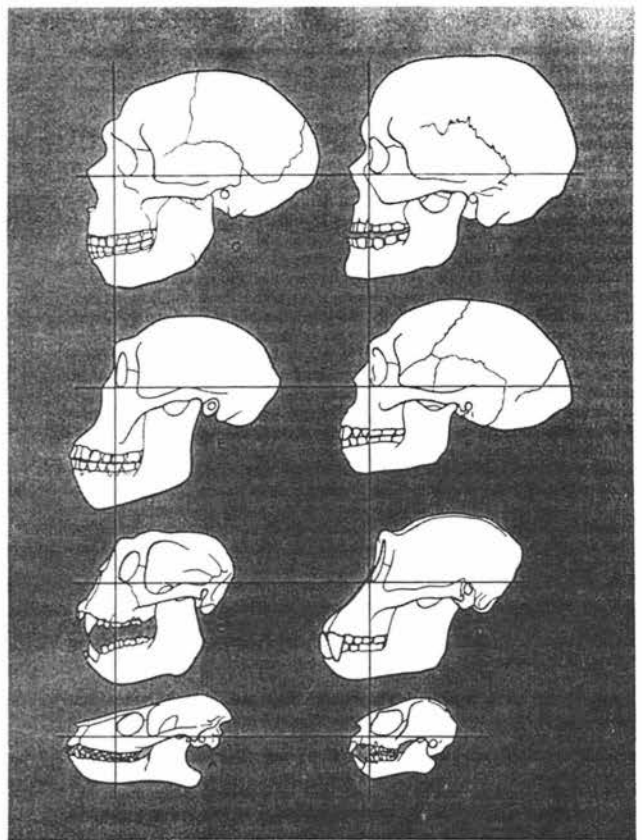
And why?

There is disagreement among anthropologists about which came first, the neocortex or the tool, and possible cause and effect relationships. But it seems clear that little of what we call *abstract thought* (understanding the use of tools, planning for future benefits of making tools, etc.) took place before the neocortex developed. An understanding of the shaping of that

capacity we call abstract thought begins with visualizing how our brains evolved over four billion years, from one-celled organisms all the way to *Homo Sapiens*. It's a fascinating journey. And for those of us who hope to take (or fear taking) the further evolution of our brains into our own hands, this journey of discovery is more than fascinating, it is essential to an understanding of the risks and the promises of such an undertaking.

Paul MacLean's theory of the triune brain (1,7) is based on studies of comparative neuroanatomy and behavior. It gives us a useful and insightful model of brain evolution (a beautiful discussion of this theory can be found in Carl Sagan's book, *Dragons of Eden* (2)). In this view of brain evolution, we imagine the brain evolving very much like the remodeling of a house.

While newer and more useful wings are being built, the older sections are still used. Even after the new areas are



(A) Lemur-like animal, (B) Tarsier-like animal, (C) Old World monkey, (D) Modern chimpanzee, (E) Australopithecine, (F) Homo Erectus, (G) Neanderthal man, (H) Cr6-Magnon man.

finished, older structures are not demolished, but kept for storage or reworked for other uses. To abandon a functioning brain part before a new component is in place would be dangerous for the owner of the brain. And evolution has not gained renown for a flair at scrapping out obsolete body parts.

All creatures on this planet have distinct areas of the brain that correspond to evolutionary development over the ages. The first complicated life forms were one-celled. After many hundreds of millions of years, these ancestors found out how to join with other one-celled creatures and form more elegant and synergistic life forms like polyps and squid-like things, finally evolving into fish with eyes and gills.

At this more advanced stage of evolution we had a brain stem to control such complicated functions as breathing and a heart to transport oxygen and nutrients to the vast community of cells making up our bodies. Still today, as *Homo Sapiens*, we have a brain stem — our neural chassis — that controls these functions.

As we evolved into amphibians that



Chimpanzee, Australopithecine, Homo Erectus, Homo Sapiens.

could exist on the land as well as in the sea, we needed a more developed brain. But we did not discard the brain stem. Rather, we built a new wing onto our neural mansion: the reptilian complex. The primary parts of the brain involved here are the medulla, pons, and basal ganglia, which are nerve centers that help control activities such as walking, breathing, swallowing, and heart rate, and also act as primary conduits for messages between the brain and spinal cord (4,7). Evolutionarily, this is frequently referred to as the R-Complex. It gave us hard-wired instructions like, "If it moves, bite it." Also, as many scientists contend, this area of the brain may produce the "frustration-aggression" reflex, and the seat of much of our uncontrolled violence as a species (7).

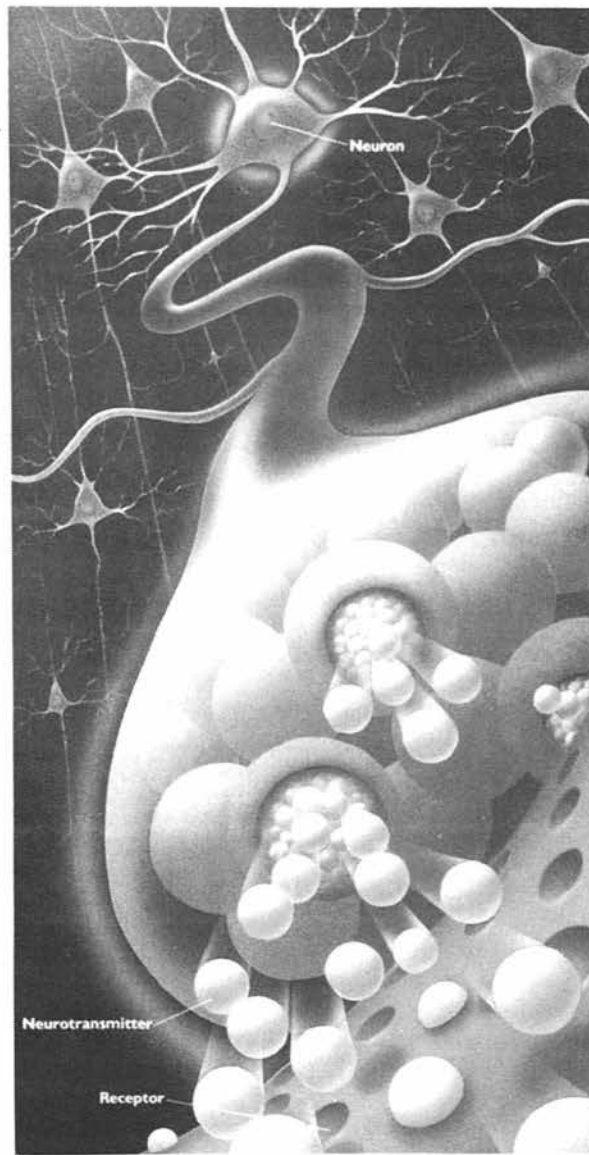
Our reptilian ancestors found "survival value" in cooperating with other members of the species. New behaviors such as social hierarchies and the blind following of leaders began to develop as a result of this new interaction among members of various species. The ritualistic and often "mindless" or "hard-wired" behavior associated with this ancient part of our brains still functions in our heads and gives rise to the "cold-blooded" parts of our nature. Emotions were not to come along until mammalhood.

With our evolution into mammals, long before achieving primate status, we developed still another wing and levels on our neural mansion. As it lies above and borders the R-Complex, it is called the limbic (Latin for "border") system. This inner surface of both cerebral hemispheres includes the thalamus, hypothalamus, and amygdala (4,7)). Here stirred for the first time such "hot-blooded" mammalian characteristics as caring for our young, altruistic behavior, and love for others. Many psychophysicologists (7) hold that some instinctual behaviors, like aggression, stem from the amygdala rather than, or in addition to, the reptilian complex.

About this time, we began work on Project Paleocortex (which we would later call our "old cortex"), and increased the number of wiring connections from our limbic system into this new and fascinating part of our brain. Some abstract thought and planning could now be found in our limbic system, but it was, and still

is, very limited.

When the idea popped into our pin heads to evolve into primates, through and beyond *Australopithecines* into *Homo Erectus*, we knew we would need larger brains. It was obvious. So we invented the neocortex with two hemispheres and gave it convolutions to expand our abilities even further. Finally we relinquished the safety of redundancy and added, in our left hemisphere, talents and abilities for language and verbal behavior which would comple-



ment those in our right brain and carry us through *Homo Habilis* all the way to *Homo Sapiens*.

Today, our brains still have these three major areas in addition to the brain stem: (a) the reptilian complex; (b) the mammalian or limbic system, and; (c) the neocortex (1,4,7). The neocortex, which represents the majority of the volume of the human brain (2), is where language,

science, and civilization dwell. We invented the neocortex to make available to ourselves such wonders as the Star Wars Trilogy, computer games, and suspension bridges made of diamond fibers. But we did not discard our earlier systems. Sometimes these are still useful. Other times, perhaps, their influence could be better done without.

This view of the evolution of the human brain is by necessity, a greatly simplified picture. Paul MacLean, in referring to his Triune Brain Theory, points out that the human "reptilian brain" is incredibly more complex than the brain of any crocodile or snake. And, in like manner, our limbic system far surpasses any owned by a cat or a rat. It should not surprise us then, to find that most humans have thoughts and feelings and actions far more sophisticated than either a crocodile or a rat.

The current human brain has great multiplicity of function. Many types of behavior are associated with specific areas of the brain. For example, language and speech are associated with Broca's area, which usually lies in the left frontal lobe of the neocortex, in front of the motor area, except in cases where the brain has compensated for damage to the left hemisphere by forming the Broca's area in the right frontal lobe. And housing the ability to discriminate between words and the concepts they represent, and to create and act according to analogs of reality (and therefore likely the spring from which our sense of identity bubbles) is Wernicke's area in the left temporal lobe. But not all functions and behaviors are quite so specialized (3).

Frequently, one area of the brain suppresses or "rides herd" over other areas. *The neocortex, where we analyze and plan, often holds our emotional and aggressive (limbic) or hard-wired ritualistic (reptilian) tendencies in check.* In other individuals (and in other situations within the same individual) the neocortex is less successful in maintaining control. The diversity of opinions over global situations — such as current hostilities in the Middle East — is a good example of how this tug-of-war between competing factors within the human brain contributes to such diversity of opinions over issues.

A fascinating discussion of the vary-

ing hierarchies of agencies within the human mind (from a more philosophical, or perhaps one could say a computerized, mechanistic point of view rather than a neuroanatomical view) is Marvin Minsky's *The Society of Mind* (5). This is an enjoyable read while at the same time being a valuable contribution to an understanding of why we do the seemingly contradictory things we do. Another look at this subject, from still another point of view (this time from more of an anthropological angle) is that of Julian Jaynes, in *The Origin of Consciousness in the Breakdown of the Bicameral Mind* (8).

Our reptilian tendencies toward ritualism make us fear change. Our leaders discourage change lest the "new order" oust them as leaders. The ever-present cultural lag experienced with new ideas, scientific discoveries, and the like is largely a manifestation of this primitive mandate to preserve the status quo.

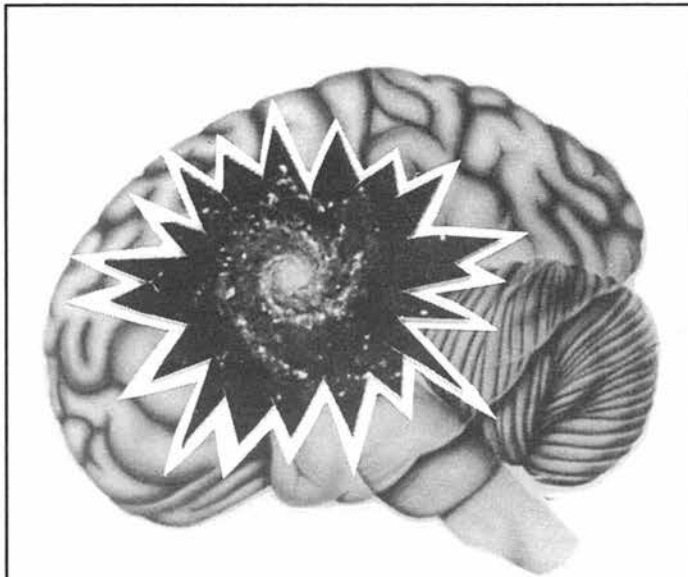
But in spite of some of this negative evolutionary baggage we carry around, the diversity of our brains gives us a richness of texture and a sense of individuality we all treasure and jealously guard. A graphic and dramatic analogy in a recent issue of *Scientific American* (6) helps us to visualize how the complexity of our neural structures paints for us our conception of our own individuality. "To grasp the beauty in a choral piece, it is not enough to listen to the individual singers sequentially. One must hear the performers together, as they modulate their voices and timing in response to one another."

It is this three-layered (triune) brain with all its complexity (in the neighborhood of ten billion neurons (4), about twice the current population of planet Earth) that conjures up our warm and fuzzy feelings that we are *more* than just a mappable, reproducible pattern of information; that merely reading out the neuronal structures would almost certainly leave uncaptured some essential, elusive element of our identity and personality.

It is not difficult to see the neocortex as a geographically ordered and transplantable pattern of information. We relate to this part of our brain as the "thinking part." Information structures fit. However,

when we come to the emotions of our limbic system or the hard-wired instincts of our reptilian complex, this correlation is more difficult to assimilate. We reject these ideas on a "gut feel" level.

Continuity of consciousness is the key to comfort for most who contemplate evolving beyond short-lived biological in-



"As we take evolution into our own hands, we become the conductors. We create neural symphonies to suit our own purposes."

habitants of this small backwater solar system. We are all aware of the changes that our current medical sciences can make in our body and our mind. But we accept these with equanimity because the continuity of our consciousness is not threatened. *When we wear eyeglasses or submit to heart-lung surgery, are we not altering our bodies and with them our identities?* Yes, but we *do not feel* that continuity of consciousness has been interrupted.

When a physician applies artificial life support systems to save the life of a child who might have died of sleep apnea, the brain stem has, in effect, been replaced, at least in part, with machines. Has that child lost its identity? We say "no" because, after all, it was only the brain stem! The child's continuity of consciousness and memory assimilation were not interrupted, at least no more than is usually experienced under anesthesia, which is typically acknowledged as irrelevant.

Even today, we alter our brains' functional states of consciousness in more

dramatic ways without any objectionable loss of identity continuity. This is commonplace. Today's physiological psychiatry routinely uses pharmaceuticals to modify behavior. For example, many forms of depression and mania are treated by potentiating neurotransmitters with drugs to increase levels of norepinephrine and treat depression or to increase serotonin availability in the brain and decrease anxiety (4,7).

Do we say that people taking these drugs lose their identities because they are no longer plagued with depression or anxiety? Even those who admit that we have altered consciousness in such individuals seldom advocate that the sufferers be returned to their original states. The sufferers themselves, interviewed after treatment, report loss of fears, feelings of vastly increased stability, higher levels of self-control, and magnified mental capacities. Have these people become non-entities because of this drug intervention? Or would it not be more proper to say that they have willingly augmented their identities in extraordinarily positive ways?

These drugs are altering the limbic system of our brains.

If we can, even with today's technologies, alter our emotions, then we should feel no discomfort at the idea that emotional states will be even easier to produce and reproduce in the future.

What of the question of mapping and reading out our brains into other vehicles of more ability and durability than the frail biological forms we inhabit today? Uploading, or moving data from a smaller computer to one with greater processing capabilities, is a term and a concept becoming popular within the high-tech life extension subculture. But not everyone feels comfortable with the idea of uploading her/his mind into computers or other bodily vehicles.

We can take comfort in the knowledge that every aspect of our cosmos runs by the same laws. And, correspondingly, the neocortex was not built using laws of physics different from those which apply to the rest of the brain's structures. We evolved as carbon-based units on a given world with a given set of Tinkertoy parts. Our brains — all parts thereof — are bio-

logical electro-chemical machines. All parts, although evolved for different functions, obey the same rules of manufacture and management. This means when we acquire the technological sophistication (through nanotechnology or other means) needed to map the neocortex with its information and association areas, we will have the ability to map the limbic and the R-complex as readily.

All the elements that make us up — the good along with the bad — can be preserved or mapped or uploaded equally well: the neocortex with its thinking and planning, the limbic system with its emotional responses, and the R-Complex with its hard-wiring. An understanding of the way our brain evolved comforts us with the knowledge that our mind is a symphony of neuronal interactions capable of being replicated in all its splendor.

Understanding this, we become more comfortable with that elusive thing we call "identity." That fleeting wisp, the loss of which stirs disquiet in the hearts of so many who seek extended lives. That

"I-word" which causes extreme discomfort and immediate rejection for many who consider uploading.

Reflecting on the evolution of the human brain over the last several hundred million years strengthens our understanding of the prospects for transforming ourselves into beings housed in less vulnerable bodies, as well as the prospects for improving our information processing speeds and expanding our capabilities for joy, pleasure, and fulfillment. As we take evolution into our own hands, we become the conductors. We create neural symphonies to suit our own purposes.

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Alcor News

Executive Life: Damage Assessment

Now that the smoke is starting to clear after the cave-in of Executive Life, damage assessments are becoming available. One projection made by an actuary for the firm of Coopers and Lybrand indicates that if all goes well, policyholders could expect between 71 cents and 74 cents on the dollar.

Unfortunately, it's not that simple. Unless all the claimants cooperate, Executive may face liquidation, in which case California bankruptcy laws would come into play. The problem is that these statutes provide for 100 cents on the dollar for top claimants — and little or nothing for those further back in queue. Currently Executive is in conservatorship. It is thought that with careful management and a change in the position of the IRS — which is currently demanding \$650 million from Executive — the company might be salvageable. The question is, can everyone cooperate long enough to pull it off? And more to the point, can California's insurance bureaucrats (who have demonstrated a consistent history of total ineptness) "manage" the rehabilitation and

sale?

The California Insurance Commission reports that negotiations for the purchase of Executive Life by the French financial giant *Credit Lyonnaise* are nearing a successful completion. They also claim that if that deal falls through, there are two other buyers waiting in the wings.

Media Attention Continues

On 7 June the syndicated news-magazine show, *Hard Copy*, did a nine-minute piece on cryonics with the focus on Thomas Donaldson's efforts to gain permission to enter suspension before a brain tumor destroys his mind. This show is one of the most positive we've seen so far. It gets three stars out of four!

Upcoming media coverage of cryonics and Alcor: *Wall Street Journal* TV is doing a short segment on Alcor and the "business angle" to cryonics. We don't yet know when this will air, but chances are it will be soon. The BBC's *Short Circuit* program which is targeted to the teen-age educational market also has a program in the works, as does HBO. We'll give you more details on these as they be-

come available.

The forthcoming Castlerock movie, *Late For Dinner*, which has a cryonics theme, is now scheduled for release late in the summer, possibly by late July or August.

Also, the *48 Hours* episode that contains a segment about Alcor just re-ran, after having opened their fall season last year.

Progress Is Good In Australia

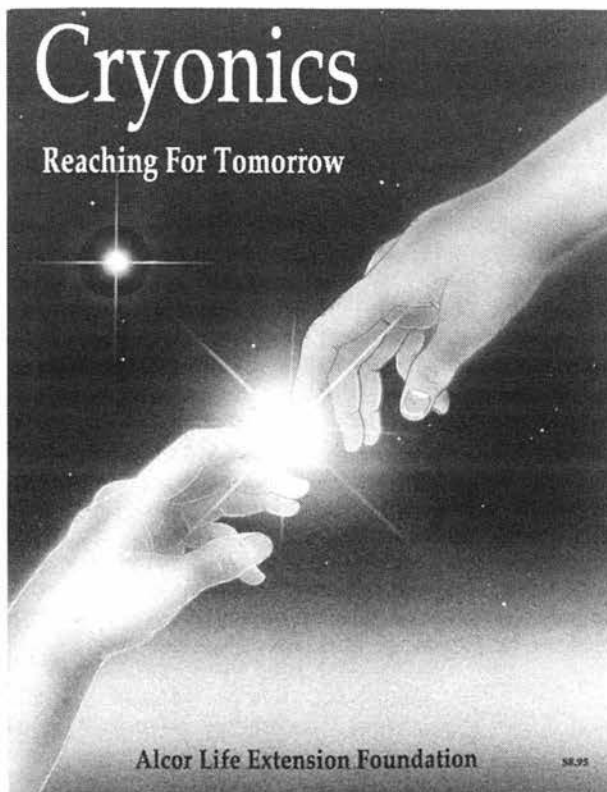
Progress continues to be made in the land down under. This group shows a lot of promise, consistently putting out a good top-flight local newsletter and continuing to meet deadlines set and deal with issues in a realistic fashion. The group has been holding independent training sessions and one of our correspondents tells us that these are being conducted professionally and competently. In the *Alcor Abroad* section of the September issue we will reproduce from their newsletter a horrifying little piece by Cath Woof on her encounter with the Coroner of New South Wales. And we thought we had problems — this guy makes Ray Carillo look like Mother Goose.

Cryonics Is. . .

Low-temperature preservation of terminal patients when medicine is unable to heal them. This treatment is called *cryonic suspension*. The goal of cryonic suspension is the transport of today's terminal patients to a time in the future when cell/tissue repair technology is available, and restoration to youth and health is possible — a time when freezing damage is a fully reversible injury and cures exist for virtually all of today's diseases, **including aging.**

It is our belief that if human knowledge and medical technology continues to expand in capability, people with conditions that would cause them to (incorrectly) be considered dead by today's medicine will be routinely restored to life and health. This coming control over living systems should allow us to fabricate new organisms and sub-cell-sized devices for repair and resuscitation of patients who will have been waiting in cryonic suspension.

There is already substantial scientific evidence available that current suspension techniques are preserving memory and personality — and that the repair and resuscitation technologies we envision will be developed within the next 50 to 150 years.



Non-members may call toll-free (800) 367-2228 or write (see reverse for address) and receive the book, *Cryonics - Reaching for Tomorrow* for free (regular retail price: \$8.95, member price: \$5.00.)

Alcor Is. . .

The Alcor Life Extension Foundation: a non-profit tax-exempt scientific and educational organization. Alcor currently has 17 members in cryonic suspension, hundreds of Suspension Members — people who have arrangements to be suspended — and hundreds more in the process of becoming Suspension Members. Our Emergency Response capability includes equipment and trained technicians in New York, Canada, Indiana, and Northern California, with a cool-down and perfusion facility in Florida and the United Kingdom.

The Alcor facility, located in Southern California, includes a full-time staff with employees present 24 hours a day. The facility also has a fully equipped and operational research laboratory, an ambulance for local response, an operating room and the world's largest and most technically advanced cryogenic patient storage facility.

All Alcor Directors and Officers are required to be full suspension members.

Call toll-free (800) 367-2228 or write (see reverse for address) for the free book, *Cryonics: Reaching for Tomorrow*.

Table of Charges and Dues

Sign-Up Package: \$300 first member of household, \$150 each additional member.

Whole Body Suspension Minimum: \$120,000

Neurosuspension Minimum: \$41,000

Outside U.S. Surcharge: \$10,000

Annual Adult Dues: \$252.00

Additional Adult Family Member Annual Dues: \$126.00

Additional Family Member Child's Dues (under 15 years of age): \$63.00

Adult Student Annual Dues (must be full time student): \$126.00



You can tour the Alcor facility in Riverside, California under the expert guidance of the Alcor staff. The facility is open to small groups (15 people or less) who wish to learn how terminal patients are placed into suspension and how they are cared for at -320°F.

The Alcor tour also features a discussion of the scientific evidence that patients in cryonic suspension have a realistic chance of being restored to life, health, and youthful vigor as well as a fascinating exploration of the advances likely to come in the 21st century and beyond. The tour provides an invaluable opportunity for you to have your questions about cryonics and the prospect of an extended human lifespan answered.

The Alcor tour is free of charge. If you'd like to make arrangements, call (800) 367-2228.

Yes, I want to make cryonic suspension arrangements with Alcor. Please send me ____ Sign-Up Package(s).

Name _____ Age _____

Address _____

City _____ State _____ Zip _____ Phone _____

First household member: \$300.
Additional members: \$150 each.

Payment enclosed (check or money order). Bill me.

I understand that an Alcor Sign-Up Coordinator will contact me at the above number.

Order Form

NOTE: All prices include postage and handling and are in U.S. dollars. Minimum order \$5.00. Overseas orders must be paid for with U.S. dollars by Traveler's Cheques or International Money Order. All orders are subject to availability and all prices are subject to change.

Cryonics Magazine

Subscriptions:

- United States: \$35.00/year
 Canada and Mexico: \$40.00/year
 Outside North America: \$45.00/year

Cryonics back issues:

U.S., Canada and Mexico: \$2.50 each. Issues: _____
 Outside North America: \$3.50 each. Issues: _____

Membership

- Alcor Suspension Membership Packet \$300.00

Books

Cryonics - Reaching For Tomorrow	\$5.00	_____
Engines of Creation	\$10.95	_____
The Prospect of Immortality	\$11.00	_____
Man Into Superman	\$14.00	_____
Great Mambo Chicken & the Transhuman Condition	\$18.95	_____
The 120-Year Diet	\$5.95	_____
The Tomorrow Makers	\$18.95	_____
Immortality, Scientifically, Now	\$11.95	_____

Brochures

Alcor Life Extension Foundation	\$0.75	_____
Why Cryonics Can Work	\$0.25	_____

Articles and Reprints

Why We Are Cryonicists	Free	_____
Alcor: The Origin of Our Name	Free	_____
Technical Case Report: Neurosuspension of Alcor Patient	\$3.00	_____
The Journey Begins: Alcor Member Enters Biostasis	\$2.00	_____
The Scientific Validity of Cryonic Suspension: A Bibliography	\$3.00	_____
Long-Time Alcor Member Enters Biostasis	\$2.00	_____
The Cryobiological Case For Cryonics	\$2.00	_____
Mathematical Analysis of Recirculating Perfusion Systems, With Application to Cryonic Suspension	\$2.50	_____
Declarations by Scientists in Support of Kent vs. Carrillo	\$20.00	_____
Case Report: Two Consecutive Suspensions	\$3.00	_____
Mathematical Models of Perfusion Processes	\$5.00	_____
Postmortem Examination of Three Cryonic Suspension Patients	\$3.00	_____
Heat Flow in The Cryonic Suspension of Humans	\$2.50	_____
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Calcium Blockers Given After CPR May Save Brains Denied Blood up to 1 Hour	\$0.50	_____
Viability of Long-Term Frozen Cat Brain	\$0.50	_____
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How Cold is Cold Enough?	\$1.25	_____
Misadventure as a Cause of Death in an Immortal Population	\$1.25	_____

Histological Cryoprotection of Rabbit Brain With 3M Glycerol	\$0.50	_____
But What Will The Neighbors Think: The History And Rationale of Neurosuspension	\$2.00	_____
Histological Cryoprotection of Rat And Rabbit Brains	\$1.50	_____
The Cephalarium Vault: A New System of Protection For Alcor Neuropatients	\$1.25	_____
Molecular Engineering: An Approach to The Development of General Capabilities For Molecular Manipulation	\$1.00	_____
Cryonics and Orthodoxy	\$0.50	_____
Molecular Technology And Cell Repair Machines	\$2.00	_____
Vitrification as an Approach to Cryopreservation	\$3.00	_____
Nanotechnology	\$2.50	_____
24th Century Medicine	\$2.00	_____
A Dream in His Pocket	\$2.00	_____
The Cost of Cryonics	\$3.00	_____
Freezing of Living Cells: Mechanisms and Implications	\$3.00	_____
Will Cryonics Work?	\$4.00	_____
Her Blue Eyes Will Sparkle	\$1.00	_____
Cryonics and Space	\$0.50	_____
The Death of Death in Cryonics	\$1.00	_____
Many Are Cold But Few Are Frozen: A Humanist Looks at Cryonics	\$2.00	_____
A Stunning Legal Victory	\$2.00	_____
What You Can Do	\$9.00	_____
Reviving Cryonics Patients	\$7.00	_____
Life Insurers at Risk?	\$2.00	_____
Slide Presentation: Suspension Members	\$200.	_____
All Others	\$350.	_____

Gift Items

Alcor T-Shirt, Size: _____	\$12.00	_____
Alcor Sweatshirt, Size: _____	\$17.00	_____
Alcor Mug	\$6.00	_____
Alcor Patch	\$5.00	_____
Alcor Bumper Sticker	\$2.00	_____
Lapel Pin	\$5.00	_____
Tie Clasp	\$5.00	_____
Hat Pin/Broach/Stick Pin	\$5.00	_____

Total _____

The literature above can be ordered by using this form, or by telephone with Mastercard or Visa by calling Alcor: 1-800-367-2228 (toll free).

Name _____

Address _____

City _____ State _____ Zip _____

Telephone: _____

Visa/Mastercard#: _____

Expiration Date: _____

Signature: _____

Please pay by check, money order, or credit card.

ALCOR, 12327 Doherty Street, Riverside, CA 92503

Advertisements And 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 \$8.00 per line per month (lines are approximately 66 columns wide). Tip-in rates per sheet are \$90 (already printed and folded); or \$180 (printed one side) or \$270 (printed both sides), from camera-ready copy. Tip-in ads must be clearly identified as such.

WANTED: Panelists for a discussion of cryonics and life extension at the Chicon World SF Convention, Labor Day weekend (31 Aug - 2 Sept). Technical qualifications would be a plus. Contact Brett Bellmore; 8750 Burt Rd.; Capac, MI 48014; Tel: (313) 724-1293.

MARY NAPLES, CLU and BOB GILMORE - CRYONICS INSURANCE SPECIALISTS. New York Life Insurance Company; 4600 Bohannon Drive, Suite 100; Menlo Park, CA 94025. (800) 621-6677.

EXTROPY: The Journal of Transhumanist Thought, #7. Memetics and cryonics, privately produced law, spontaneous orders (markets, agonistic computing, hypertext) neurocomputation, neologisms, transhumanism, reviews of *Smart Drugs*, and more. \$4 from Max More; P.O. Box 77243, Los Angeles, CA 90007-0243.

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.

The SUN, AUGUST 4 meeting will be at the home of:
Bill and Maggie Seidel
10627 Youngworth Rd.
Culver City, CA

Directions: Take the San Diego (405) Freeway to Culver City. Get off at the Jefferson Blvd. offramp, heading east (toward Culver City). Go straight across the intersection of Jefferson Blvd. and Sepulveda Blvd. onto Playa St. Go up Playa to Overland. Go left on Overland up to Flaxton St. Go right on Flaxton, which will cross Drakewood and turn into Youngworth Rd. 10627 is on the right (downhill) side of the street.

The SUN, SEPTEMBER 1 meeting will be held at the home of:
Marce & Walt Johnson
8081 Yorktown Avenue
Huntington Beach, CA

Directions: Take the San Diego Freeway (Interstate 405) to Beach Blvd. (Hwy 39) in Huntington Beach. Go south on Beach Blvd. approximately 4-5 miles to Yorktown Ave. Turn east (left) on Yorktown. 8081 is less than one block east, on the left (north) side of the street.

There is an Alcor chapter in the San Francisco Bay area. Its members 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, Carol Shaw, at (408) 730-5224.

The SUN, AUGUST 11 meeting will be held at the home of:
Keith Henson and Arel Lucas
1794 Cardel Way
San Jose, CA

Directions: Take the 17 South (880) and get off going east on Camden. Stay on Camden as it turns south and go to Michon Dr. Turn right onto Michon and go to Harwood Rd. Turn left on Harwood and go south to Almaden Rd. (1st street on right). Turn right on Almaden and right again onto Elrose, then left onto Cardel. 1794 is near the end of the street, on the left.

The SUN, SEPTEMBER 8 meeting will be held at the home of:
Leonard Zubkoff
3078 Sulphur Spring Court
San Jose, CA

There two Alcor discussion groups in the Greater New York area. Details may be obtained by calling either Gerard Arthus, at (516) 474-2949, or Curtis Henderson, at (516) 589-4256.

The New York Cryonics Discussion Group of Alcor meets on the third Sunday of each month at 2:30 PM, at 72nd Street Studios. The address is 131 West 72nd Street (New York), between Columbus and Broadway. Ask for the Alcor group. Subway stop: 72nd Street, on the 1, 2, or 3 trains.

Meeting dates: August 18, September 15, October 20, November 17.

The Long Island Cryonics Discussion Group of Alcor meets on the first Saturday of every month, at the home of Gerry Arthus. The address is: 10 Jefferson Blvd.; Port Jefferson Station, L.I., telephone (516) 474-2949.

Meeting dates: August 3, September 7, October 5, November 2.

There is a cryonics discussion group in the Boston area meeting every second Sunday at 3:00 PM. Information may be obtained by contacting Eric Klien at (508) 663-5480 (work) or (508) 670-5235 (home). There will be a meeting August 11 at 3 PM at the home of Eric Klien; 28 Kenmar Dr., #272; Billerica, MA 01821. Take the 3 north to the Concord exit, and go right toward Billerica. The fifth street on the right is Kenmar. Go to the driveway one short of the end of Kenmar and turn left. Go to Building 28 (last building).

The Houston area has a discussion group on cryonics, life extension, and the high/low diet. Meetings are typically held the second Saturday of every month. For more information call Ravin Jain at 713-797-1076 or Rupert Hazle at 713-480-3309. Correspondence may be addressed to Rupert Hazle at 15107 McConn, Webster, TX 77598.

Other Events Of Interest

There will be an Alcor fund-raising dinner on Saturday, September 28 at 7 PM at the LAX Marriott Hotel, 5855 W. Century Blvd., Los Angeles. The goal is to raise money to continue Alcor's research to improve cryonic suspension services. Reports will be given on recent advances in cryonic suspension, ongoing research in cryonics, and plans for future research. Reservations are \$100/plate, check or money order to Alcor at 12327 Doherty St., Riverside, CA 92503; or by credit card to 1-800-367-2228.

ALCOR LIFE EXTENSION FOUNDATION
12327 Doherty Street
Riverside, CA 92503

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**For information on cryonics call Alcor:
1-800-367-2228 (toll-free, non-members only) or 1-714-736-1703 (members).**

