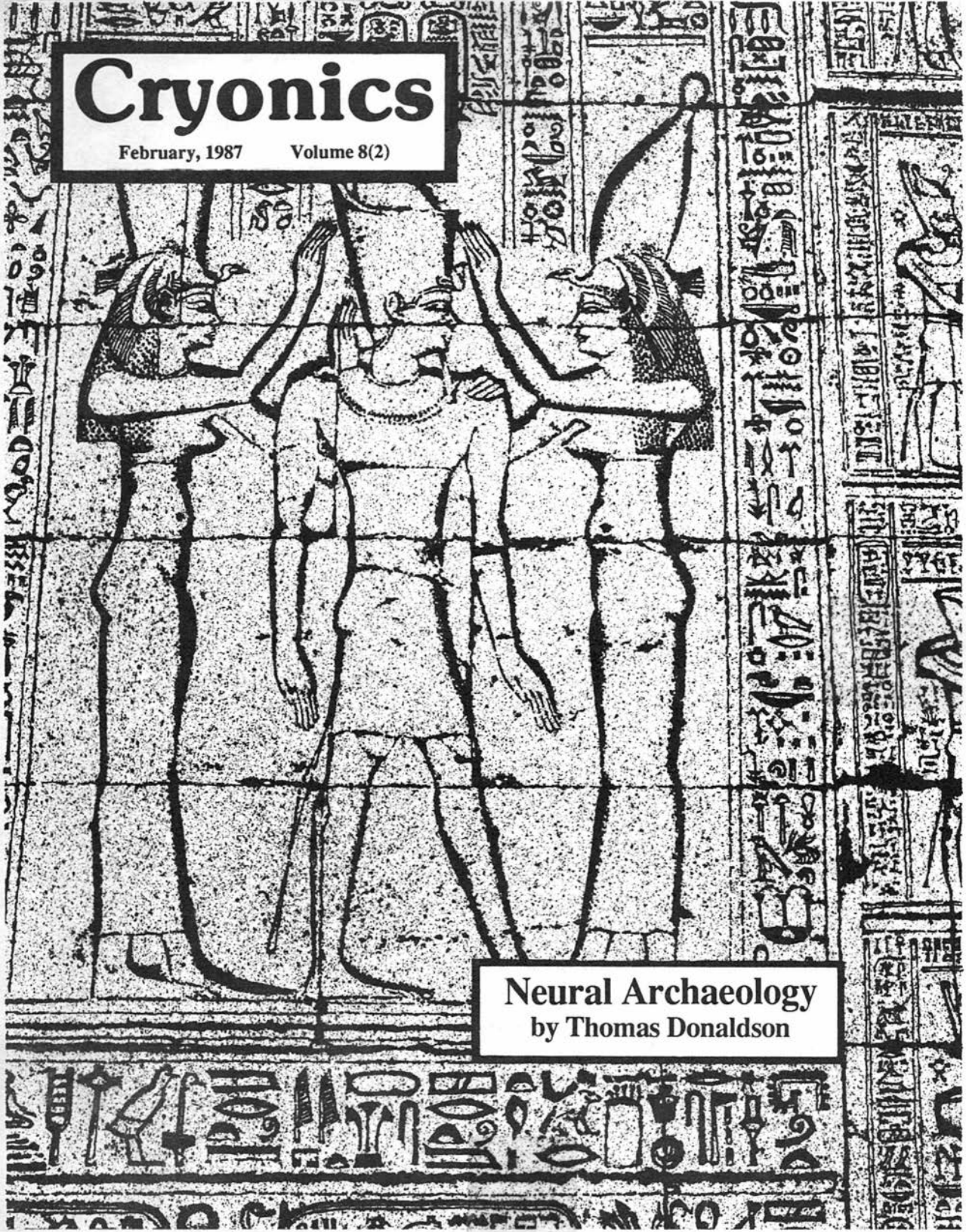
Cryonics

February, 1987 Volume 8(2)

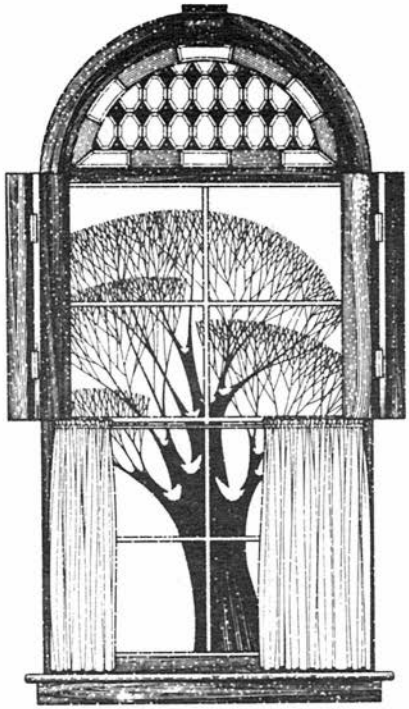


Neural Archaeology

by Thomas Donaldson

Volume 8(2) February, 1987 Issue #79

CRYONICS is the newsletter of the ALCOR Life Extension Foundation, Inc. Mike Darwin (Federowicz) and Hugh Hixon, Editors. Published monthly. Individual subscriptions: $20.00 per year in the U.S.; $30.00 per year in Canada and Mexico; $35.00 per year all others. Group Rates available upon request. Please address all editorial correspondence to ALCOR, 4030 North Palm #304, Fullerton, California 92635 or phone (800) 367-2228 (in California: (714) 738-5569). The price of back issues is $2.00 each in the U.S., Canada, and Mexico, and $3.00 for all others.



EDITORIAL MATTERS

Usually, putting out CRYONICS is big chore which the editors look forward to in a grudging kind of way. It is a big job, and it happens every month, and it really occupies our attention for awhile. It also provides a kind of sorting out process for us; it allows us to sit down and organize and reflect on the past month's events as well as to plan a little for the next one's. Nevertheless, it is a big load of work and as such is always a little intimidating.

This month was something else altogether. We have never had a month like this one. There was no "grudging" this month, it was sheer agony at the thought of having to do it. Where would we get the time? Not only are we nearly 10 days late going to press (even a suspension never did that to us!) but we are deluged with activity in almost every area. We don't mean to paint a gloomy picture. Far from it, we've been making progress and if this is success, well, then all we can say is "Gee, it feels good, but nobody told us it would be such hard work!"

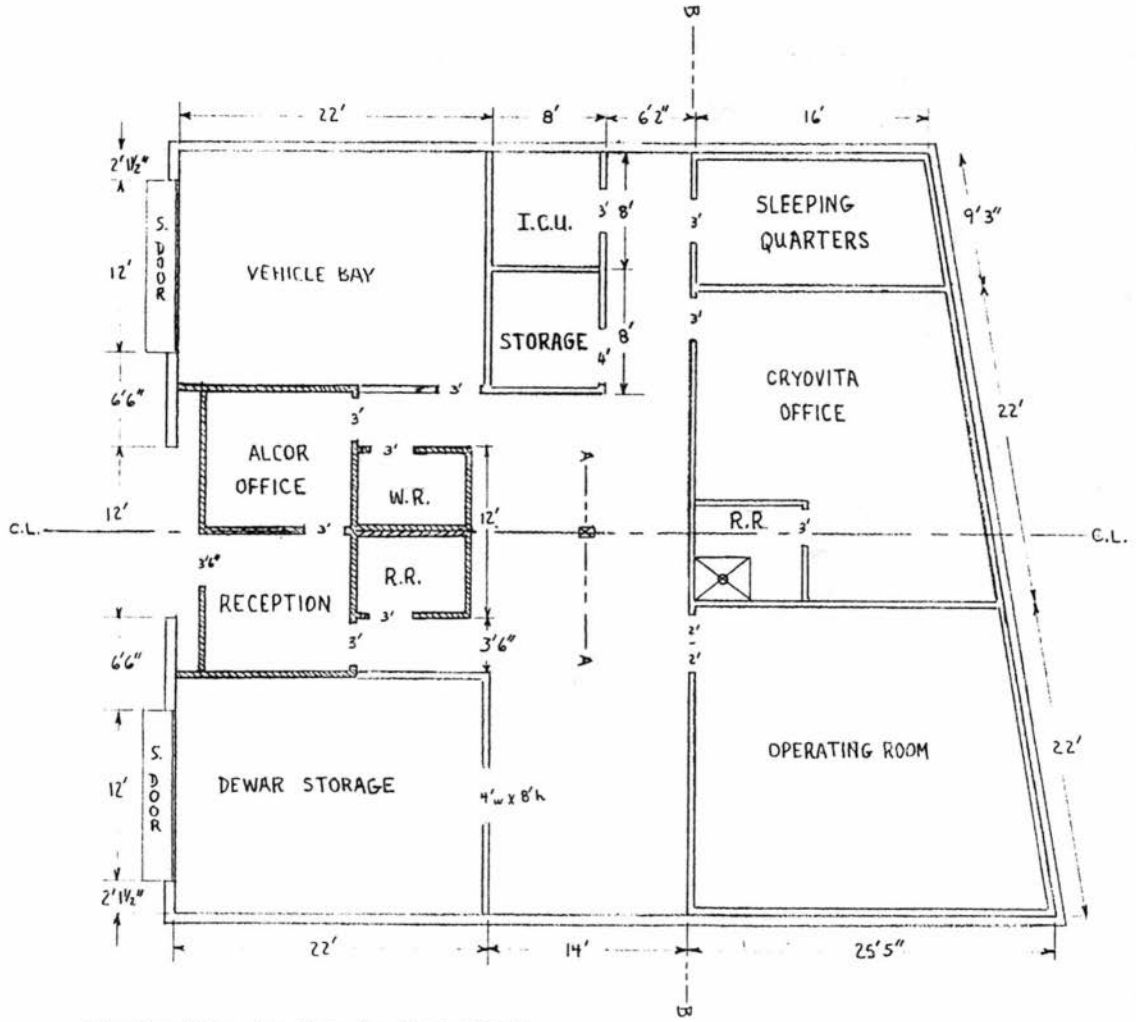
Normally we have our "state of the union" address from ALCOR president Mike Darwin in this issue. This year it will have to wait. Until it appears we can tell you this about ALCOR: we've never been busier or more productive!

ROUNDING THE BEND

A major factor in keeping us occupied has been the new ALCOR facility. The building itself is complete: the painting, parking, landscaping — all of it — and it looks great! The Symbex Property Group closed escrow on December 24th (what a Christmas present!) and they now own the building. We are currently in the process of doing our "TIs" (that's short for "tenant improvements"), and the workload has been staggering. We are acting as our own general contractor, which means we pull the whole operation together by contracting independently with framing, electrical, plumbing, and drywall people. Locating, retaining, coordinating, and supervising these tradesmen is an art and an achievement which we never appreciated before. We now understand why general contractors charge what they do.

On the other hand we've been very fortunate in that the contractors we've chosen have been fast, efficient, and highly professional. We've made more progress **inside** the building in the last three days than was made on the whole project in a month! And the results are unbelievable.

The facility is going to have over 5000 interior square feet. There will



Construction drawings by Jerry Leaf

be a state-of-the art operating room with over 500 square feet, multiple offices, a large laboratory area, an animal intensive care unit (ICU), a complete laundry, three restrooms, shower facilities, overnight sleeping quarters with the ability to accommodate 8 people, X-ray facilities, and wall outlets for oxygen in all operating and procedure rooms.

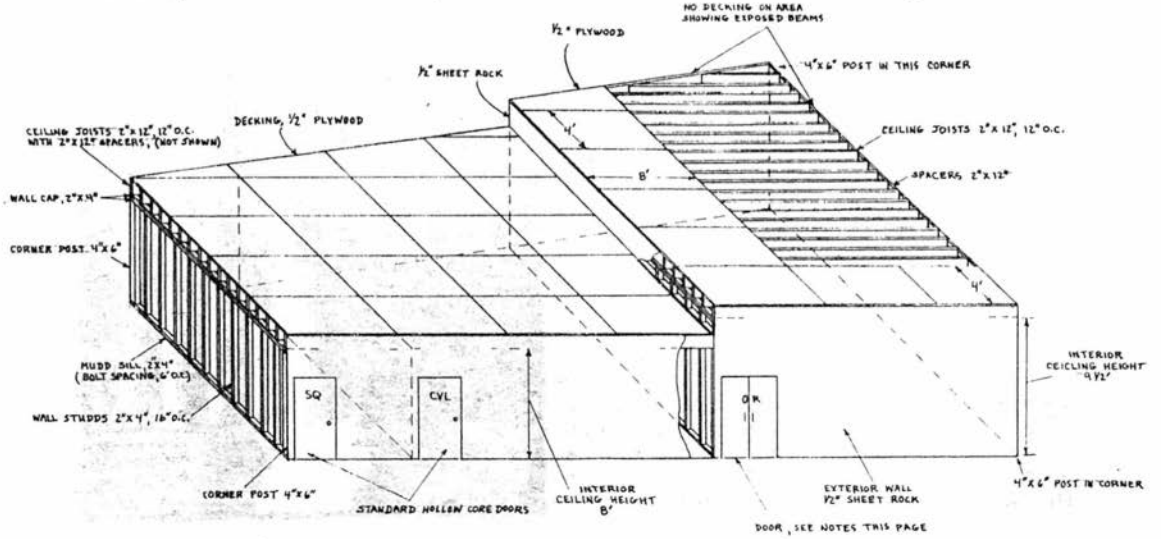
At the time of this writing all of the framing work has been done, as well as most of the electrical and plumbing work. The framing work has proved particularly satisfying and impressive. The floor plan for the facility and much of the architectural work was generated by Jerry Leaf. The internal construction was designed in such a way as to create a "building within a building" as an extra protection against earthquake damage. While the building itself was specially designed to ride out a massive earthquake (7-1/2" steel-

reinforced seismic panels, seismic straps on all roof members, heavy duty slab with steel reinforcing...) we decided to go the extra 100% and create an internal structure which far exceeded the building code requirements for internal subdivision. We have thus created a strong, massive structure which should be able to tolerate collapse of the roof without destroying our working capability. This internal "building" also adds tremendous structural support to the outer concrete shell of the building. The reaction of a structural engineer who looked in on the project sums it up well: "My God, what are you doing this for? You could build a two story house on top of this thing!" We just smiled and replied, "Well, the ground's been known to shake around here. Ya never can tell, might happen again someday."

While there's no guarantee our precautions will protect us during an earthquake, they certainly should help. We have spent **a lot** of time looking at the earthquake problem and one of things we have learned is that a lot of the damage and down time from an earthquake results from things moving around which shouldn't. This may sound like a pretty trite observation, but it's not. A few quick for-instances may help to illustrate our point.

We've investigated what happens at grocery stores and laboratories during and earthquakes, and a tremendous amount of the destruction is due to things being shaken off of shelves and countertops. In grocery stores the aisles are simply filled with a chaotic jumble of everything that was on the shelves. What you end up with is a sticky, dangerous mess of broken and damaged containers about a foot and a half deep! The building may be just fine, but try finding anything or doing business!

In a laboratory the problem is much the same: shelves are emptied onto the floor, cabinet doors pop open and their contents are chucked out on the floor; only instead of fruit juice and chocolate syrup, it's acids and chemicals! It is also likely to be tens of thousands of dollars worth of delicate analytical equipment which **was** sitting on countertops. We intend to try and prevent this easily preventable damage by doing some simple things. First of all, all our shelving will have an earthquake sill with construction resembling that used in

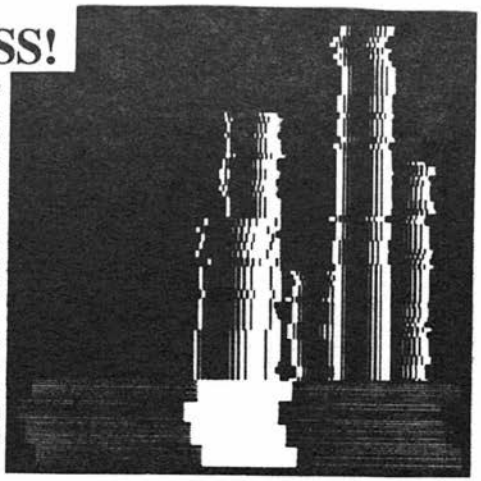


boats. Cabinets will have positive locking latches which will prevent them from shaking open. As much as we can, we intend to cushion fragile items (glassware and so on) inside the cabinets. Again, taking our cue from seafaring living quarters, all heavy items of furniture such as desks, lab benches, filing cabinets, and so on will be bolted to the floor. During an earthquake this kind of furniture slides around the room like it was on casters, damaging itself and everything in its path. Analytical equipment such as centrifuges, osmometers, and microscopes will be attached to work surfaces or placed inside "corrals" to prevent it from being dumped on the floor.

All of this represents a tremendous amount of work. And, while most of the big structural work was farmed out to professionals (for bureaucratic and time reasons) a tremendous amount of finish work remains for us to do. We are running some of the wiring ourselves (phones in every room including and especially in the restrooms!), doing much of the specialized plumbing and virtually all of the finish work such as hanging doors, insulating, painting, carpeting and decking. Just thinking about what needs to be done is a full time job!

We anticipate that, barring any unforeseen problems, we should be making the move into the new facility during the first part of February. If you can help with the move during that time, please give us a call!

FUNDRAISING SUCCESS!



As all of you who are subscribers to CRYONICS know, ALCOR board member Brenda Peters conducted a drive in December to raise funds for the completion of the operating room at the new facility. The OR is the heart of ALCOR's suspension facilities, and its completion was expected to cost $6,000 beyond the equipment and funds ALCOR and Cryovita had on hand to equip it. As of this writing, Brenda's drive has brought in $5,302. The members and the Board of ALCOR thank all of you who contributed to this special effort. You have helped to provide an operating room suite easily comparable to the best hospital operating rooms.

Along these lines, we would also like to thank Bill Seidel for the donation of roughly $3,000 of video cable, including several hundred feet of 22-conductor video control cable. This windfall is so much beyond our wildest dreams of electronics capability that all we can do for the present is run it anyplace we suspect there might be a use for it and wait for uses to turn up!

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

CRYONICS AND COMPANION ANIMALS

by Mike Darwin

One of the very few things of worth to come out of the militant animal rights movement are the words "companion animal" to describe pets. I have owned a number of dogs during my life, and while the word "pet" is often a good one to describe the relationship between dog or cat and man, it is also often woefully inadequate. At their best, dogs and cats can be considerably more worthwhile companions than people at their worst. They have minds of their own, can give and receive affection, love, loyalty and respect and in order to have those things in a relationship with an animal (or a person for that matter) it is necessary to accord them some status as "equals" and to offer them respect rather than patronization. Relationships with animals can be very good for man and beast, extending the lives of both parties and adding immeasurable joy in the bargain.

Thus it is not surprizing that people would want to see to it that the dogs and cats (and perhaps other animals too) who share their lives should be suspended when the need arises. In November, 1978 I put my own dog into biostasis and she rests there now, quietly waiting for me to join her. Sometimes people snicker or sneer when I mention that my dog is in suspension. The one thing they never succeed in doing is making me feel embarrassed, weak or bad for putting her there. I valued her as I have valued few things in life; her decency, devotion and unbridled joy in living were and are reflections of **my** highest values. I am not ashamed that I acted to conserve them.

A few weeks ago ALCOR did another animal suspension and we now have a Neurocan in our cephalarium just for pets. About two years ago ALCOR activists and Suspension Members Cathy Woof and Thomas Donaldson inquired about suspension arrangements for their cat, Daisy, who had developed serious kidney disease. It was pretty much decided in a preliminary way at that time that if the need arose, Daisy would be suspended. Fortunately, with good veterinary care Daisy made it through that crisis. Unfortunately, several months ago it was discovered that Daisy had a malignant tumor in her throat and would probably deanimate in the next few months.

In many ways it was the typical cryonics situation. Daisy was expected to have more time than she did (physicians and veterinarians will usually give an optimistic estimate; after all, in noncryonics situations there isn't anything that can be done so why depress the patient/family further by telling them the worst case possibility rather than the best?) so plans were underway to set up for her care and do her suspension in a month or so when the situation became

more critical.

Within a couple of weeks of the initial call, Daisy's condition began to deteriorate very rapidly and Cathy and Thomas decided to fly down with her and get her safely into suspension before she deanimated under uncontrolled conditions. In many ways Daisy had a far easier and better time of it than we humans are likely to. She entered suspension at just the right time; in the closing hours of life when she was no longer able to eat or drink, but was still mentally intact and surrounded by people who loved and cared about her. Because there was some advance notice, the perfusate was mixed, the circuit was set up, and there were no delays. She was anesthetized with no struggle and her last experience was being held and stroked by those she had spent a lifetime with and had come to trust.

For the record, Daisy's suspension went very well technically. There were a few tense moments during surgery, but it all worked out in the end and the perfusion was technically flawless. We reached a terminal glycerol concentration of 4.2M in Daisy, which is higher than we have reached in any other animal we've perfused. Daisy rests now in liquid nitrogen and she is referred to around here by the moniker Jerry Leaf gave her some days ago: "The Littlest Neuro."

We learned a fair amount from Daisy. Technically she reemphasized to us the urgency of finding a better cryoprotective mixture than glycerol. Despite the fact that we perfused Daisy at a temperature of 19°C during glycerol introduction, dehydration was still very severe.

But, leaving aside the technical issues, Daisy also pointed up the stark contrast between what is possible and was is available. This cryonicist would like to make the transition like Daisy did. I do not want to suffer the ravages of a long agonal course. I do not want to have to experience clinical death and needless ischemia in order to satisfy some bureaucratic requirements.

It is a bitter, bitter irony that our pets, or if you prefer, the companion animals who share our lives, will enter suspension under better conditions than we

will. The corollary of that as Saul Kent has pointed out is that "our pets are likely to be revived before we are!"

There is also one other observation worth noting: for our pets, cryonics is likely to be free of most of the downside possibilities which trouble so many of us. They will not have to worry about culture shock, job retraining, or a remarried spouse. For them it should be like falling off a log. They will wake, stretch, and ask us where the saucer of milk is.

Lucky dogs! (and cats too!).

Bon Voyage Daisy.

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

A CHILLY HOLMES

Cryonics slowly continues to penetrate the popular culture via television. This time the tube gave us a positive portrayal in the form of "Arctic Sleep", the "cryogenic" technique employed by none other than the indomitable Mr. Sherlock Holmes himself to escape from the year 1901 and a case of the bubonic plague to the year 1987. The circumstances of Holmes' daring use of cryonic technology were detailed on a made-for-TV movie aired by CBS on the evening of January 10th.

Holmes, played by Michael Pennington, contracts the bubonic plague and places himself into a state of suspended animation with the help of his faithful physician sidekick, Dr. Watson. Holmes had been experimenting with "cryogenics" on mice and had developed successful techniques for them. When he discovered he had the plague (which was then incurable), he hastily adapted the rodent technology for human use and hopped into the future.

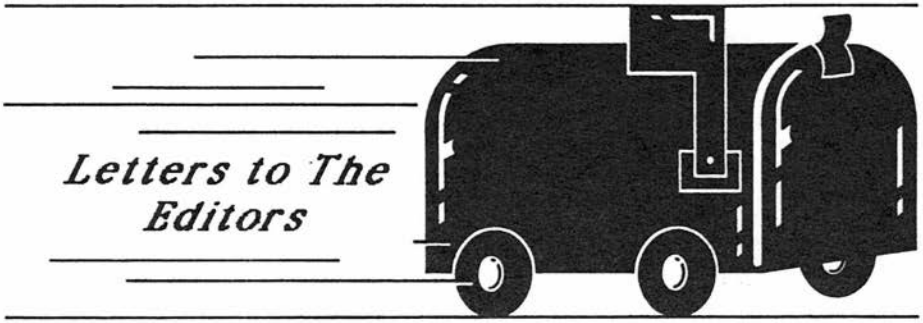
Of course, 86 years have elapsed and faithful Dr. Watson is no longer around. However, Watson's great granddaughter in the comely form of Jane Watson (played by Margaret Colin) is. Jane defrosts Holmes using a contraption of Rube Goldbergish complexity and restores him to life. Holmes' first question upon awakening? "Do you have an antidote for the plague!?" Said in true cryonicist style!

The acting in **THE RETURN OF SHERLOCK HOLMES** was not bad, and the story line had a degree of cleverness which was unexpected. Our reviewer turned it on only to watch the cryonics

sequence on the front-end and found the drama sufficiently entertaining to watch it through to the end. We understand that the **RETURN OF SHERLOCK HOLMES** is a potential pilot for a TV series and from what we've seen on TV lately, CBS could do a lot worse.

In any event it was a welcome change from the sinister television portrayal of cryonics which CBS last gave us when they aired **CHILLER.**

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



Dear Mr. Davison,

This is a reply to your recent letter to myself and ALCOR (Jan. CRYONICS).

You seem to be upset because in the OMNI forum debate I seemed unreceptive and closed to ideas other than my own. There is a very simple reason for this, and it has nothing to do with any inability or unwillingness to listen to ideas of others. The reason I was staunch and uncompromising about the central ideas I stood on is that they were RIGHT. They were objectively true, supported by firm arguments, and the unfortunate fact that Nancy Lucas did not understand these arguments did not alter their logical validity. If receptivity and an open mind consist of abandoning logic and reason for the sake of compromising with any and all contrary assertions regardless of their validity, then I fail to see the value of these attributes.

"The reason I was staunch and uncompromising about the central ideas I stood on is that they were RIGHT."

You correctly pointed out that the importance of human longevity is a philosophical and moral issue. Then perhaps you are bothered by unequivocal claims of certainty about these kinds of issues. Therefore I'll explain exactly why, and in what sense, it is incontrovertibly WRONG not to advocate the aggressive elimination of all constraints upon human longevity.

First of all, yes, it is important to discuss the possible consequences of living longer, and to prepare anticipated consequences if many people start living longer. SF has explored some of the consequences, although certainly not "fairly thoroughly".

Discussing consequences is one thing, though. Using alleged consequences as

"What you and Nancy don't seem to realize is that while you casually muse over alleged scarcity, boredom, science fiction stories, or whatever, REAL PEOPLE ARE DYING."

excuses for not developing treatments for deadly medical conditions is quite another. What you and Nancy don't seem to realize is that while you casually muse over alleged scarcity, boredom, science fiction stories, or whatever, REAL PEOPLE ARE DYING. Longevity is not merely some distant abstraction and intellectual plaything for futurists and social engineers. The aggression with which we pursue means to control biological determinants of human longevity is a concrete medical/ethical issue with ultimately BILLIONS of real lives hanging in the balance.

The most important philosophical/moral question involved in the advocacy of an indefinite human lifespan is very simple. This question, which suicidal/homicidal deathists will go to any lengths to evade, is NOT a question about the desirability of a society of immortals and its various consequences. Nor is it even a question about the benefits vs. supposed detriments of extreme longevity to the individual. And it's certainly not a question about whether anyone SHOULD, as an imperative, live a long life. (These are the issues people will often pursue in order to avoid facing the REAL question.) The REAL question on which the importance of achieving an indefinite lifespan pivots is simply: "Is it proper for innocent human beings to involuntarily die (i.e. be killed)?"

Obviously, if a person's lifespan is less than indefinite, if some internal constraint to their longevity exists, then at some point SOMETHING is going to KILL them. (The use of the word "kill" here is perfectly appropriate since most people who die of health problems die involuntarily, and for anyone who dies involuntarily, the cause of the calamity, be it a virus, aging clock, or assassin, is going to be completely academic.) Thus we see that the importance of an indefinite lifespan is logically implicit in any morality that holds individuals should never die except by their own decision. It should also be clear at this point that apathy about achieving an indefinite lifespan is an apathy about whether people live by choice and control, or are manipulated and killed by forces beyond their control. To put it even more bluntly, but accurately, such an apathy is an apathy about people getting killed.

As I stated earlier, such an apathy is wrong. If we adopt as an axiom that the casual acceptance of the killing of innocent human beings (be it by nuclear bombs, external natural disasters, or internal pathology) is WRONG, then this apathy is WRONG.

Of course, apathy about removing our internal longevity constraints would be somewhat justifiable IF we were living under circumstances where we were being killed by primarily external factors. Yet the real situation is the precise opposite. Internal pathologies of various sorts are the main causes of physical suffering and death in the world today. Moreover, a certain genetically inherited chronic degenerative process lies at the root of most of these pathologies. This degenerative process leads to millions of deaths (most deaths) every year, and continuously drains health and life from every remaining person.

The sickening tragedy of it all, a tragedy that should enrage any decent

human being, is that this situation exists purely by default. The technological potential to begin making inroads into this problem has existed for years. It has not been exploited. Instead medicine has been engaging in a pathetic charade of progress, half-heartedly picking away at a host of "diseases" which are but mere symptoms of our REAL problem. The REAL problem, the physical root cause of the major "killers" medicine is supposedly at "war" against, the REAL KILLER, is AGING. (Anyone who has any doubts about this should ask themselves how many 20-year-olds they know who have heart disease, cancer, arthritis, or strokes.)

In the face of this kind of world medical predicament, apathy about aging intervention unambiguously implies the acceptance of carnage on an immense scale.

Do I sound angry? Is that perhaps what bothered you about my article? Well, you bet I'm angry. I've spent the past two months listening to a college-educated human being engage in sophisticated and blatantly mystical waffling about why she thinks involuntary death is not a particularly bad thing provided it occurs as a result of a degenerative process whose only claim to special medical or moral status is that we all share it. Now you, a technically knowledgeable person who self-admittedly KNOWS an indefinite human lifespan is possible, write and tell me you suspect that living long is probably a bad idea, ostensibly citing paranoid SF fantasy as relevant. From this, and the rest of your letter, I must assume you think tolerating the programmed destruction of human beings may be a better idea. Now THAT is sad.

There is no doubt in my mind that extollments of the virtues of aging and death, like so many other tacit endorsements of suffering and destruction in humanity's past, will eventually end up on the philosophical junk heap of history. The question is how much more untold agony and loss of human life is going to occur before these colossal lies (which even Nancy ultimately admits are supported by nothing more than a "feeling") are widely exposed. The sooner the arbitrary hypocritical stone-age notion that aging is something that cannot/should not be touched by medical science is generally revealed as the deadly nonsense it is, the sooner medical science will be able to get on with the task of reaching its full health-promoting and life-saving potential ---the rightful removal of ALL internal causes of suffering and death.

"With so much at stake, I'm not going to pretend for one minute that apathy about aging intervention and human longevity is an opinion any less reprehensible than it truly is."

With so much at stake, I'm not going to pretend for one minute that apathy about aging intervention and human longevity is an opinion any less reprehensible than it truly is. Perhaps that will help you understand the tone of this letter, the article, and indeed the debate.

Finally, Mr. Davison, I am truly sorry your life is going so poorly that you would consider refusing treatment for a condition that's going to end it in a few short years. If you decide that reading about the future is enjoyable, while living in it won't be, that's your prerogative. But before you admonish me for being unreceptive to someone's excuses for complacency over default

genocide, I hope you fully understand the ethical implications of that complacency, and its real costs in human terms.

Brian Wowk
Winnipeg, Manitoba

To the Editors:

I would like to make some comments on Mike Darwin's response to R.G.'s question concerning For-Profit vs. Non-Profit organizations in the January, 1987 CRYONICS.

In general and over the long run, I stand with RG's capitalist position, but **at this time** for reasons explained below, I believe it best for ALCOR to remain a non-profit organization.

My comments below are based upon my experience as an executive in a non-profit firm, as the founder and 19 years chief executive of a major public for-profit professional service firm, and as the founder and first president of a trade association of for-profit professional services firms, which association had available to it many studies on the matters discussed below.

My great admiration for Mike is a strong part of my current position in favor of ALCOR's remaining a non-profit firm, but I do believe he errs in several ways in his understanding of the structure and the workings of for-profit firms.

First, a little fundamentals. With inevitable exceptions, the for-profit firms in a capitalist economy (even with government interference) are considerably more efficient than non-profit or governmental organizations because of two capitalist motivations:

1. The key employee desire for personal monetary gain which comes from bonuses and, when the firm is larger, from the value of stock.

2. Competition.

The second factor, competition, exists to an extent among some non-profits. as ALCOR well knows. However, the first of the above motivations does not. Now I agree with Mike that the first motivation is very weak in very large bureaucratic organizations which are sometimes nearly as inefficient as the largest non-profit, the federal government. But the very great majority of all for-profit firms practice efficiencies brought about by that first motivation. This great majority includes all small businesses and nearly all larger **growth** companies (including publicly owned ones where the key employees are motivated by stock options) of up to half a billion dollars business volume. Mike says, and I agree, that money is not the only motivation, and indeed when other motivations are strongly present in the executives of a firm (such as in ALCOR), the firm is lucky, but these other motivations are rare. Indeed the success of the capitalistic system is due to the wide-spread presence of the money

motivation (I suggest a little study of Milton Friedman's works).

Further, as to fundamentals, I must add that the executives collectively of successful growth companies, must have certain personality characteristics, including marketing and management abilities (the latter including planning, organizing, controlling, decision making, follow-thru, and many aspects of good interpersonal relations). When the original entrepreneurs do not sufficiently have these abilities or see the need to hire people who have them, the firm remains a small business (tho' still motivated by the two capitalistic factors above).

Stock ownership in most for-profits arises principally from contribution of start-up efforts and from rewards for later services; ownership related to monetary investment usually comes later, sometimes as late as when the firm first goes public. Most firms grow slowly at first but sometimes seek venture capital or public investment to grow more rapidly. However, the majority of well managed, growing, service firms never need funds from investors (only from clients) and when (and if) the firm goes public, it does so not for the funds but for the value established for its stock causing better motivation for its further growth.

"Nearly 100% of for-profit organizations are not run democratically, even the very large and inefficient ones."

Nearly 100% of for-profit organizations are **not** run democratically, even the very large and inefficient ones. One most important management principle relied upon is that of each employee having only one boss. The CEO has nearly absolute power, being delegated by the Board nearly all authority to run the corporation except for stock matters, major financial matters, and the election of the officers. The stockholders, where a priori democracy could exist, get to vote only on the directors and such major matters as takeovers. Although much publicity exists on takeovers (mostly involving the large inefficient firms), most firms, when they outgrow CEO-dominant ownership as publicly owned companies, are more and more protected from involuntary takeover by various legal devices including two classes of stock.

In the very great majority of for-profit firms, there are no "organizational restrictions which make stability and quality leadership difficult". When these negative qualities are present, or worse, when the organization fails, it is almost always due to bad management. Taxes are significant, but the loss of income due to this factor is very small compared to that which occurs in non-profit organizations (studies have shown that non-profits incur upwards of 50% more overhead in the conduct of business similar to those done by for-profits). An important example of this is the dominant non-profit structure of hospitals. Inefficiencies caused by lack of management motivation are the main cause of heavily increasing medical costs (at a rate of nearly twice that of the general increase of cost of living). I agree with Mike on HMOs where the reason is different; although they are "for-profit", they are run in sort of a socialistic way with mediocre service. I advocate for-profit status for **regular** hospitals and doctors with patients able to choose among them as they do for most other services.

"There is too much feeling growing these days, due I believe to bad teaching in the secondary schools, that the profit motive is somehow dirty."

There is too much feeling growing these days, due I believe to bad teaching in the secondary schools, that the profit motive is somehow dirty. This arises from a lack of understanding that the great majority of the managements of growth oriented for-profit firms realize that to make a profit over a **long period of time**, they must pay attention to the long term satisfaction of their clients, which means that they have to pay attention to quality and ever improving products and, for the larger firms, to matters of public concern; in the short term this means attention to non-monetary matters. This consideration makes me dispute Mike's assertion that most for-profits are motivated by short range or quarterly profits. The great majority of for-profit firms are not publicly owned and even among the publicly owned ones, the quarterly profit motivation is not dominant.

In summary, my experience and information tells me that the opposite of what Mike in general describes is true — that efficient and well-motivated non-profits such as perhaps the Red Cross and St. Vincent's Hospital that were praised by Mike are the exception and conversely, that for-profits, with "a dismal history of recognizing the marketability of ideas . . . . . unwilling to shoulder the incredible expense of their development" are the exception among firms intent on growth.

Not what does all the above mean to ALCOR, since I said in the beginning that it is preferable for it to be run as a non-profit **at this time.** There are two reasons for this:

1. Government legal matters (Uniform Anatomical Gift Act, deductability of gifts, etc.). I agree with Mike on this, although at sometime in the growth of ALCOR , this factor will become less important (the new tax law has already made deductability of gifts less important.

2. Terrific motivation (without the profit motive) already existing in the highly dedicated competent current management of ALCOR.

Even if the first reason did not exist, I remain satisfied that ALCOR should continue as a non-profit while the current management exists because they are comfortable with it (even though I believe "small and competent" could be just as well achieved in a for-profit ALCOR with the current management maintaining their values and non-monetary motivations). But what of the future when the current management phases out — it is statistically unlikely that new people as dedicated as Mike and his associates can be found. At that point, the good old profit motive (rewards to key people) would be available to carry the organization stably forward if the organizational structure were for profit. This is not a problem of the moment, but at some time in the future, depending

on the rate of growth, and before Mike and his associates are too old, the matter of transition should be considered.

Bob Krueger
Los Angeles, CA

Sirs:

Thank you for Max O'Connor's excellent article on the problem of identity in the January 1987 **CRYONICS.** I was intrigued by Max's discussion of the concept of personal identity, and particularly by his defense of the existence of "essential criteria" for it. But I still have difficulty seeing how any definition of this concept can be more than a statement of personal taste. By this I mean that all of us seem to have a preconceived opinion of whether personal identity is stable over time, and we consequently test potential "essential criteria" of identity by using these preconceived notions as givens. For instance, we may take it for granted, in the case of the Brave Officer Paradox, that the boy is the same person (has the same identity) as the old soldier he will become. Then, since the boy and old soldier do not have continuity of memory, we may conclude that continuity of memory is not an essential criterion of identity.

"...all of us seem to have a preconceived opinion of whether personal identity is stable over time, and we consequently test potential "essential criteria" of identity by using these preconceived notions as givens."

But suppose we had made the different **a priori** assumption that the boy and soldier are **different** people? Where are we then? Continuity of memory then doesn't look like so bad a test.

It seems to me that the concept of **Weltanschauung** or "worldview," which Max proposes as the essential criterion of personal identity, suffers from the same problem. Objectivists have traditionally held that a person is defined by the sorts of things which he/she values. In fact, in many of Ayn Rand's works, the rabble who continuously change their opinions and values are not even regarded by the story's hero or heroine as identifiable **people**; they are ignored rather as part of the landscape. (By all accounts it was much the same in Ayn Rand's personal life).

"Unfortunately, repugnant though it may be to Objectivists, there is no doubt that personal philosophies **do** change, sometimes radically."

Unfortunately, repugnant though it may be to Objectivists, there is no doubt that personal philosophies **do** change, sometimes radically. This being the case, one can conclude either that personal identity **can** and does change over time in cases where there is a radical conversion in philosophy, (e.g. Saul of Tarsus), and that worldview is a good criterion for identity; OR conversely (and

just as validly), one may decide that personal identity (as one wishes to define it) is **stable** over time, and that worldview is a bad (or incomplete) criterion for it. Take your pick.

The problem with many essentialist arguments is that they contain such hidden premises (here everyone accuses everyone else of committing the fallacy of the stolen concept). If one takes it as axiomatic, for instance, that thinking must be done by a **single** person, and cannot ever get done by a collection of persons while in the act of changing into each other, then all of Max's arguments logically follow. But in consequence, this view amounts to accepting that the main criterion for continuity of personal identity is **continuity of thought**, rather than continuity of personal philosophy. Under this assumption, the person who begins **Atlas Shrugged** is held to be (indeed, **defined** to be), the same person who finishes it, since otherwise one could assert, as Max does, that no **ONE** is reading the book, therefore it is not being read. But note that this argument obtains no matter how much the reader's values and view of the world change while reading. If ONE person read the book, and yet his basic values changed, then these values are poor markers for personal identity.

Of course, the problem of identity has a large mundane side which stubbornly clouds the issues. For legal purposes we presently identify people on the basis of physical characteristics (hardware) only. This is a pragmatic practice: although one might argue philosophically that the man who suffers brain damage, then converts to fundamentalist Christianity (I assume this is the correct order of events), becomes a different person, legally it would be impractical to make him apply for a new social security number, marriage license, etc.

In the far future, it may be that a person's hardware and software components will be separable. Then, as Max suggests, identification will be on the basis of software only. It seems inevitable in such circumstances that the identification of various pieces of human software (i.e., people) will come under the same difficulties as are seen in software patent infringement cases today.

For instance, one can imagine a scenario in which someone deliberately deletes a particular human mind from the universe. Question: How different must it be from any known backup copy before a murder has been committed? And who is to answer for the deed? Consider that the original criminal might alter him/her/itself after the crime, so that there might then exist only pieces of software with 99%, or 98%, or 97%, etc. concordance with the individual who committed the crime. And all of these individuals will no doubt strenuously deny responsibility.

The fact that a legal line regarding identity will need to be drawn then, as now, should not confuse us as to whether objective criteria for the choice "really" exist. As always, grey does not separate itself into black and white because there is need for it. It is simply that the tendency of legislatures to draw lines arbitrarily when there is no better way (and often even if there is), may unwisely convince us otherwise. Consider highway speed limits, the timing of legal abortion, and the permissible parking distance from fire hydrants. The chief danger, it seems to me, lies in confusing the necessity for future legislation with the necessity for constructing a philosophy. But I did enjoy Max's article, and I hope that he will continue to amplify his ideas for us in

the pages of **CRYONICS.**

Steve Harris
Long Beach, CA

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

Simple, Isn't It?

by Mike Darwin

When I was 11 years old I was told that large numbers of people would be working and living in space by 1990. I expected to be one of them. Like a million other American youngsters in 1966, I wanted to be an astronaut and a lunar colonist. I fully **expected** to be living and working on the moon by the time I was an "ancient" 31 years old.

But it didn't work out that way. A lot of dreams and expectations I had when I was 11 have vanished in the intervening years. Nuclear power was supposed to be incredibly cheap and available. The deserts were suppose to bloom with desalinated water from cheap nuclear energy.

What happened? What went wrong with the utopian visions of "tomorrow" that I teethed on?

The answer is simple and at the the same time complex. It's an answer with a message for cryonicists, a message we'd best pay attention to if we want to survive and be happy in the "Golden Age" we imagine for ourselves in the next "tomorrow" which awaits us.

Part of the reason I'm not sitting in front of a computer on the moon right now is that the expectations of **some** of the engineers and the technical people who produced all the glossy NASA literature and slick TV documentaries were unrealistic. And part of it, the larger part of it by far, was that the "marketing" and "public relations people" took the unrealistic "blue-skying" of those people — and developed it into a world-view that was totally unrealistic.

At the root of the problem was a

desire for quick answers and easy solutions. I have since come to call it the Big Fix Mentality (BFM). Nowhere was it (and is it) more apparent than in the U.S. space program. It started in the 1960's with Kennedy's decision to abandon the careful, step by step development of a reliable and reusable orbital capability in place of shooting men up in tin cans to keep up with the Joneses — or, in this case, the Joneskis. A sane, economical and sensible program of space development (such as the Air Force's X-series aircraft and Dyna-Soar programs) was scrapped in favor the totally unrealistic and beside the point effort of putting a man on the moon -- regardless of the lack of long-term economic benefit.

While no one can deny that many advances have come out of the space program, few would argue that it was the optimum way to go. The sad irony is that had a more rational course of action been pursued, there might now very likely, very realistically, be hundreds or even a thousand or more men and women working in space -- and perhaps a few living and working on the moon as well! While the passage of time has made me more realistic and sanguine about **my** chances for having been one of those people, the main point is still there. If only a long term view had been taken early on, an order of magnitude or more progress would have been possible with far less expenditure of money — and we would all be better off in the bargain.

Because of impatience and lack of realism by the people who controlled the space program — that was not to be. Instead, we have the Challenger disaster, and recent pronouncements, such as the one by James Fletcher, current head of NASA, that what the space program needs is a "big project" such as a U.S. lunar colony by the first decade of the next century to recapture the **imagination** of the American Public!

Cryonicists are peculiarly susceptible to the BFM. I guess it comes with the turf. With more frequency that I care to admit, I hear cryonicists talking about how they're going to "make it big" on the stock market, or in real estate, or in the human potential movement. Maybe what our critics say about us is true: maybe we are incurable, gullible optimists who've bought the Brooklyn Bridge and are now casting about for ways to make payments on it. After all, what is cryonics but a Big Fix itself? We get frozen, we get thawed out and we awake to a world where death, disease, hunger, old age, nuclear bombs, and tooth decay are only a bad dream.

Are we crazy — or are we crazy?! The answer is, "Well yes...and no." Much like the space program, cryonics offers a real possibility for changing the world, expanding the choices open to people and radically transforming human life. Those possibilities are real. After all, the world has, by and large, gotten better. But not all of the problems have gone away, and many new ones have surfaced to replace old ones. With increased options and increased choice comes increased **responsibility.**

Not all technologies turn out like the space program or nuclear power.

Those that manage, by luck or design, to stay free of the hype artists and the unrealistic dreamers, grow and prosper and change the world, often in a surprisingly short period of time. Nuclear power didn't have to turn out the way it did. There were (and are) designs for inherently safe reactors and reactors which do not have the potential for nuclear waste generation and environmental contamination that current, water-cooled reactors have. Designs for these plants were waved aside by the slick marketing people, the unrealistic engineers, and the Harvard MBAs all of whom were in a hurry to cash in on the credits and all of whom were more than willing to gloss over the troubling technical "details" which would have taken care, time, and dollars to iron out. The result? The nuclear power industry is all but dead in this country. The very word strikes fear into the hearts of millions -- and to some extent, with good reason. While nuclear power still may be a good bargain (even in its present, aborted form) it would have been a much better bargain if only a modest amount of thought and effort had been put into developing it well -- with the long-term view in mind. Of course, the decisions concerning nuclear power were made by government and corporate bureaucrats enmeshed in an unreal world of "hype" far removed from the personal consequences of the decisions they made. Under pressure for quick profits and fast solutions they made lousy long-term decisions.

The relevance of all this to cryonics is that we are now fast approaching the same turning point in **our** history. There are plenty of folks out there with the BFM who are cryonicists. Some of them are even ALCOR members. All they can see is Growth, Growth, Growth. Any way you can get it, anyhow, NOW. Say what you need to say, market what you will, do this or that, and your problems will all be solved.

Cryonics has always attracted "salesman" and "marketing" types. In the past, this has hardly mattered, since most of these people wised up right away, and walked right away. Most of these guys are interested in turning a fast buck, and cryonics doesn't offer that — or at least it hasn't offered it in the past.

But times are changing. As we are able to better buttress our position, and as more objective evidence comes on line to support our worldview, more and more people will become interested. Some of these people will not be cryonicists. Not in the sense that **they** want to live and survive. Some will be

marketing types, intent on making money and building up their own egos. Some will be technical, engineering, or professional people who will be fascinated with the technical or logistic challenges posed by cryonics, but who won't give a damn whether it works or not -- since their asses (and their other parts as well) will not be on the line.

These people will lack the one thing that is essential to the success of any venture: proprietary interest. In other words, they will lack the feeling of personal responsibility and personal concern which comes out of knowing that your survival and well-being are tied to the enterprise you're involved with. Lack of proprietary interest is a notorious problem in both business and government. Professional management types won't dismantle and sell off a company in the face of unrealistic demands by workers, even though that might be the best thing for the stockholders in the **long run**, because to do so would mean they would be out of jobs! And yet, if you I or were **owners** of a business that was no longer profitable because of unrealistic or impossible wage demands or market conditions we'd simply sell it and put our money to work elsewhere. That's proprietary interest.

Of course, in the long run no one really escapes the consequences of their actions. For years the professional management and Harvard MBA types bargained away the profitability of the companies they ran -- and along came "corporate raiders". No matter how hard you try, in the **long run** you can't escape responsibility.

Someday there will be colonies on the moon and not merely hundreds but hundreds of thousands and even millions of people living and working in space. It's in the cards (if we don't **really** screw up and end everything) and the setbacks and delays will be temporary. But they will have been **costly** too. How many people will have died from lack of abundant energy which **could have been there**? How many people will suffer and die needlessly due to the delay of the industrialization of space?

In cryonics, the price may be just as high if not higher. It may also be more personal. A major screw-up or delay here could cost us more than time: it could cost us our lives.

The slick marketing types and the unconcerned "professionals" are starting to arrive on-scene and set up camp. They promise us quick progress and the Big Fix. They tell us, with smiling faces, that the Big Fix is just what we need and that success is just around the corner. We are, all of us, particularly vulnerable to that kind of message. Anyone who's dug a hundred miles of trench by hand is going to listen with more than casual interest to stories about

backhoes.

But there's a difference between the responsible vendor and the slick salesman. A backhoe may sound too good to be true until a salesman drops off a quarter million dollar, 10,000 pound machine which promptly sinks to half it's height in the soft mud of your rice paddy — a paddy which is a hundred miles and a hundred cultural years removed from the nearest gas pump or service facilities.

The problem with these outsiders and camp followers is a complex one. We do not want to become insular, paranoid, and suspicious. That is a dead end too. There is much we cryonicists have to learn. But the first thing we must learn is to be discriminating, responsible, and determined. We must be careful to ask the right questions, and to find out and carefully think through whether we need, want, and can afford a backhoe before we take delivery on one and find ourselves saddled with ruinous payments and no panacea or big payoff. In other words, we have to use good judgement and exercise our responsibility to take care of ourselves and to take responsibility for our own progress and well being.

We may not be marketing experts, or big time money people. But what we are experts in is what is good for us, what is in our long term best interest. There is a strong tendency amongst people (and I see it in myself as well) to defer to the "experts" and to listen to the sweet lies of the BFM's. These people come along and tell us we've been doing it all wrong, that they have the answers, and that if we "just let them make a few big changes" we'll be on the high road to success.

The fact is, we are doing a lot of things "wrong". Sometimes we could profit from advice and information from the "experts" in marketing and sales. We've known this all along. But what we also know is that the most dangerous thing that can happen to us is for there to be major disparity between reality and marketing: between research and public relations. Our first responsibility is to see that cryonics is pursued thoughtfully and carefully. We're bound to make mistakes and in many areas progress is going to continue to be slow and undramatic for a long while to come. But the results will be worth it.

If we try to sell cryonics like

toilet paper or life insurance, we'll fail. No, cryonics as a whole won't fail — this idea is here to stay — but we'll fail, personally, painfully. There's a reasonable chance we might even end up dead as a consequence. The careless and haphazard way human embryo freezing was handled by its developers in Australia (the contract between hospital and the couples was less than a page long and didn't even mention what would be done if the couple was killed or died!) led to the passage of restrictive legislation there which all but outlawed the technique! A little thoughtful planning and personal responsibility could have avoided that problem altogether. We don't want the same thing to happen in cryonics.

ALCOR can't control what goes on or will go on in other cryonics organizations. All we can do is keep everyone informed of what's happening and try our best to be thoughtful and careful about what we do. We will need to keep our priorities in order and stay focused on the long view. And that's going to get harder to do. The glamor acts will soon be on the scene. There will be big temptations in the years ahead, and the slick backhoe salesman will come knocking on our doors. The management of ALCOR and you, the membership, will have to do some careful thinking.

After digging a hundred miles of trench, it won't be easy. But just remember, the soil is soft and muddy, the rains are hard and long. A new tool, if it is light, strong, flexible, and suited to our needs may be a very good thing indeed. A backhoe, for all its power and strength will just sink into the mud — and bankrupt us.

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

IDENTITY, IDENTITY, WHAT FOR ART THOU, IDENTITY?

by Mike Darwin

Ever since it was discovered that Sir Cyril Burt engaged in one of the most far-reaching frauds in the history of science by faking his data on the effects of heredity vs. environment on identical twins raised apart, the debate has raged about which is more important in shaping human behavior: nature (genetics) or nurture (environment). This debate has been a rather sterile thing until recently, and a rather inconclusive one as well. Many cryonicists we know won't even discuss the issue, considering it on a par with questions about how many angels can dance on the head on of a pin. However, the issue is of interest to more than sociologists and behaviorists and it bears on an issue of considerable interest to cryonicists: what makes us what we are? What is identity and how much of it is in our genes as opposed to our life experiences?

While we hardly propose to answer that question here (we'll leave that to the likes of Max O'Connor and Steve Harris) we would like to point out some intriguing research which may provide some insight on the issue of identity. The January 12, 1987 issue of **TIME** magazine contains a fascinating article on recent research into the behavior of identical twins, particularly the behavior of identical twins separated at birth and reared apart, often in radically different environments. The studies reported on in **TIME** are followups and

extensions of studies begun a number of years ago by psychologist Thomas Bouchard. Our first contact with Dr. Bouchard's work was an article which appeared in the November, 1980 issue of the popular magazine **SCIENCE 80.** At that time we were rather amazed by Dr. Bouchard's findings and decided to take a wait-and-see attitude and to watch for follow-up work by other investigators. Dr. Bouchard recently published a massive study of twins in **THE JOURNAL OF PERSONALITY AND SOCIAL PSYCHOLOGY** and, further, has had his work reduplicated and extended by other investigators, some of whom were initially hostile to or skeptical of his previously reported findings. Once you hear what Bouchard's conclusions are, you'll better understand the skepticism.

Ever since Cyril Burt's "landmark" studies of twins which were conducted during the 1920's, '30's and 40's it has been almost a dogma in the social sciences that human behavior and potential are shaped largely by environment. This has been the basis of most of the social aid and affirmative action programs of the past 40 years. Burt himself put the figures at 80%/20%; 80% environment, 20% genes. Bouchard's work calls for a reassessment of the importance of genetics in shaping behavior.

What Bouchard has found is that in identical twins reared apart (with no knowledge of each other's lives) there is a striking, almost eerie similarity in both the general structure of their personalities and often in the more mundane minutiae of their daily lives. Not only are their brainwaves and handwriting strikingly similar, but their occupations, tastes in automobiles, jewelry, spouses, pets and foods also overlap to an amazing degree.

For one of the more remarkable examples, lets look at the case of the "Jim" twins. Jim Springer and Jim Lewis were identical twins who were separated at 4 weeks of age and adopted into two blue collar families. They did not meet or know of each other until they were 39 years old. Nevertheless, both were in law enforcement and worked part-time as deputy sheriffs, drove Chevrolets of the same model, and routinely vacationed in Florida. Both men married and divorced women named Linda, owned dogs named Toy, and named their sons James Allan and James Allen respectively. Both men also excelled at the same subjects in school, played the same sports and had similar grade distributions!

It would be amusing but of little interest if Springer and Lewis were a bizarre exception, but they are not. Coincidences like the ones detailed above are frequent occurrences with twins. The responses of twins to routine social situations or stressful ones is strikingly congruous. If one twin is claustrophobic, the other twin is very, very likely to be as well. Bouchard discusses the case of twins Irene and Jeanette who were separated at birth and reared in England and Scotland. They were evaluated by Bouchard's team separately, and yet both balked when asked to go into a cubicle for their EEG (they are claustrophobic) and both finally agreed on the condition that the cubicle door be left open. Both are "compulsive counters"; feeling compelled to number everything they see such as the wheels on trucks and both "count themselves to sleep".

It would be peculiar enough if overlaps in behavior were confined to things as mundane as ice cream or automobile preference, but this is not the case. Political beliefs, aggressiveness, strategies for dealing with stress and managing social situations are also strikingly similar.

All this should be of interest to cryonicists because it bears, at least indirectly, on the question of identity. "What are we? What makes us human beings, individuals, the person we are?" These are questions which are uniquely important for cryonicists to ask and answer. While Bouchard's work doesn't directly deal with any of these questions, it provides some clues and perhaps some reassurance.

Few people would argue that at least a significant part of what makes us who we are is determined by the structure of our personalities, by our abilities and disabilities, weaknesses and strengths, likes and dislikes. What Bouchard and an increasing chorus of other investigators seem to be telling us is that to a surprizing extent, those things seem to be determined by our genes, not by our environment. Bouchard puts his estimate on the impact of genes in shaping human behavior at around 50%. That should be of interest to cryonicists because it puts something of a lower limit on the fidelity of reconstitution which should be achievable with existing technology. We **know with certainty** that existing cryonic techniques are, as a minimum, preserving our genetic complement.

Of course 50% fidelity would satisfy scarcely anyone, and certainly none of the cryonicists we know. Nevertheless, it is a starting point. If one considers how much improvement in fidelity might be gotten by being able to recover the unique pattern of gross neural connections present in an individual's brain (something which we know is also preserved with existing techniques and which is only partly determined by genes), and adds to that what might be inferred or directly learned from handwriting, correspondence, and video or written journals, the fidelity might be much higher—even without any

improvement in preservation techniques. Certainly it would be higher than it is in the case of permanent amnesia victims today. And keep in mind that society does not usually consider someone with amnesia to have "died" at all!

While this kind of reconstitution is hardly what most cryonicists are aiming for, as we've already noted it does bound the lower limits of what's possible quite nicely. This is useful for at least two reasons. Firstly, because it points out how much you may be able to get with so little to work with, and secondly because it points out that critics like the cryobiologist Dr. Peter Mazur, who attack cryonics as a totally hopeless problem likening chances of revival to the chances of reconstituting a cow from hamburger, haven't done their homework. In fact, it would appear that the chances of reconstituting a cow from hamburger (via cloning) are quite good. Cows, unlike people, have very little "declarative" or factual memory (and as consequence we see no bovine philosophers, artists, or cryonicists) and probably consist mostly of basic responses and "abilities and disabilities". Probably 90% of what makes a given cow the cow he or she happens to be **is in the genes**!

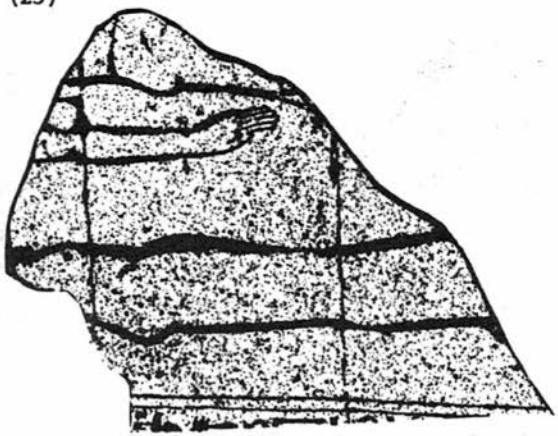
The "experts" should be more careful. The average cow ground to hamburger and then cloned may have a **better** chance! And even **our** bare minimum of 50% fidelity is grounds for some optimism. Given what we've seen of some humans, there may be people among us who may be guaranteed nearly 100% fidelity of recovery on the basis of preservation of a hangnail.

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

Neural Archaeology
by Thomas Donaldson

Recently ALCOR conducted some very important experiments. They are important not because they answer any questions, prove or disprove anything, or even tell us much directly. They are important because they are the very first studies of their kind carried out **by cryonicists.** They may in fact be among the few studies of their kind at all.

What ALCOR has done is to produce micrographs, both on a light level and on an electron microscopic level, of several different brain regions of dog brains undergoing **warm ischemia.** That is, these brains were subject to periods of no blood flow and then examined to see the state of the neurons. The periods in question were 2 hours, 12 hours, and 24 hours. Qualitatively, these brains were not in a good state. Mike Darwin himself refers to their contents as "just debris". My own feeling on seeing the ALCOR micrographs is that our understanding is still too rudimentary to draw conclusions. To obscure the matter more, for instance, there is one reference to successful cell cultures of gray matter taken from the human cerebrum 2 to 3



hours after death (Z. Wroblewska, D.H. Gilden et al, **J COMPARATIVE NEUROLOGY, 16(3),** 295-306 (1975)). DNA will also survive in ischemic neurons for at least 2 hours (N. Becker, **AMER J PATHOLOGY, 38,** 587 (1961)). All this work needs extension, replication, and clarification.

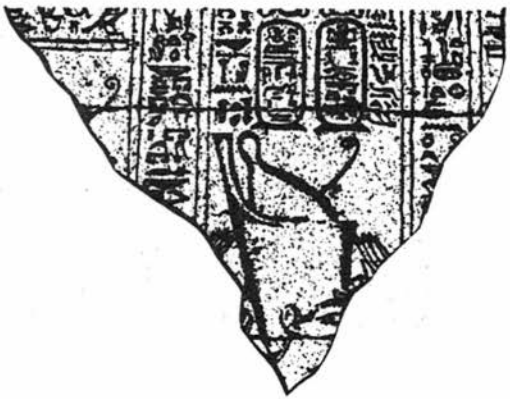
Not many years ago cryonics experienced a very positive event. Someone from outside cryonics (Eric Drexler) came to understand our ideas on cellular repair and their importance. I think they are important, and I think Eric has done a service in both spreading them around and tying together all the thinking people have done, both in the electronics industry and in biology, about "nanotechnology". What these ideas give us, of course, is some idea about how repairs **can be done.**

But there is another side to cryonics, and that is the issue of **whether the information survives at all.** Without the information we can't really think of bringing anyone back, no matter what our technology. (Of course, behind that point about survival of information lies another point, about whether the information is sufficient: just what **is** this identity we want to preserve. But for purposes of this article, I'll simply say that **survival of information** is the second fundamental issue with which cryonics must deal).

Many cryonicists might hope for a similar "win" about survival of information to the one we've just had with nanotechnology. I'm going to argue that we can't really expect that "win" until it's irrelevant to us, that in fact the **nonexistence** of such a "win" is fundamental to the whole cryonics idea.

"We would all like proof that cryonics will work. **There never will be proof that cryonics will work."**

We would all like "proof" that cryonics will work. **There will never be proof that cryonics will work.** Certainly, individual people will be revived. Some of them (we hope a very large percentage) will actually come back as the same people as those who "died". There will certainly be proof that we can successfully freeze human brains and definitively preserve personality, identity, the "soul", or what have you. But those things aren't cryonics, they're just particular technologies. They don't really embody the key idea.



The really **key idea** in cryonics is the idea of freezing (or otherwise

preserving) people when **we don't know** if we can ever revive them. Of course, we intend to figure out **later** whether we can do this. We intend to **succeed in reviving them.** But before we've actually done so, we certainly can't prove we will succeed. And funny thing, after we've done so, the proof will be irrelevant. If we know how to bring somebody back as a fully functioning human being after an hour of ischemia, why should we **ever** bother to go to the added expense and trouble of freezing them first? That would be bizarre and unnecessary.

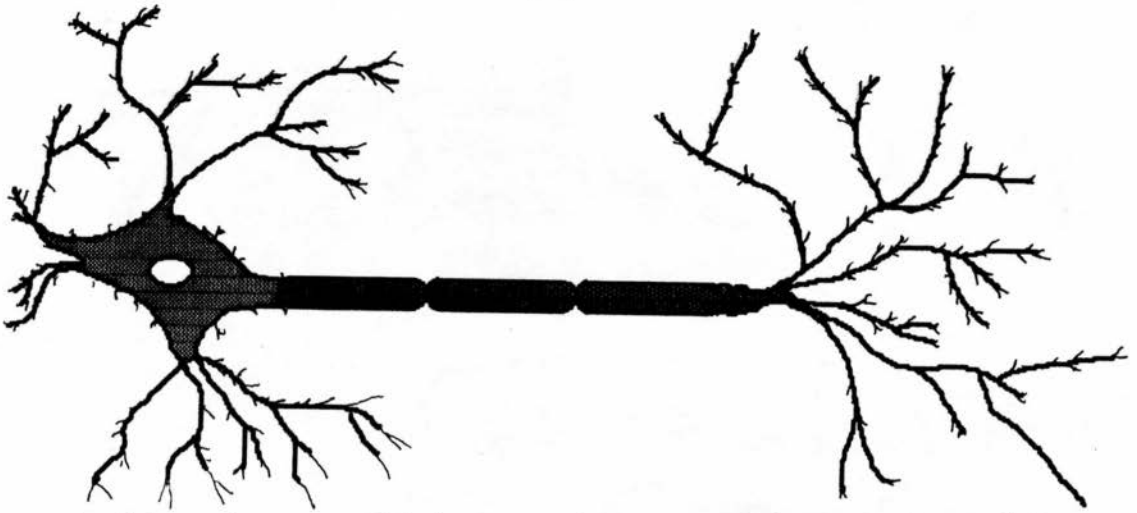
If you're involved in cryonics, you've got to make your peace with the unknown, because it will always be there. You've simply got to **make your peace** with it.

Before cryonics, there was "death". After cryonics, there are a host a **pathologies.** Brains ischemic for 12 hours are one instance of a pathology. We have many others, and yet others piled on top of them. Brains ischemic for less than 12 hours, brains poisoned with cyanide, with nerve gas, with botulin toxin. Brains hacked into pieces. Brains **improperly frozen** or **improperly revived** (in that are thousands of different pathologies not yet even named!). Brains fried in radiation. Brains taken over by nanotechnological machines. Brains subject to Gaucher's disease, Alzheimer's disease, kuru, dementia from AIDS, Kreutzfeldt-Jacob disease...and so on and on. The cryonics proposal is to treat everyone with these conditions as a permanent patient, until means are found to bring them back.

We do this not just because it is humane and liberating (yes, it is humane and liberating. It's even in the highest tradition of medicine. But I'm not going to argue that). We do it because we know of **at least one technology** which makes it **possible** to treat people as permanent patients (I mean **permanent**). Of course, that technology is cryonic suspension. Currently we know of no other technology, but it won't change matters if another one comes along. It is even likely that another one will come along. But we do have to be clear that the effects of cold are a fundamental **empirical** premise. We also have to be clear that cryonic suspension isn't the same as suspended animation. It only looks the same.

The word "nanotechnology" doesn't provide us with a magic wand we can wave over all such problems to transform them into a solution. It doesn't do so because the **preservation of information** will always be a fundamental issue. For most frozen patients we're unlikely to even have proof that their identity survives. This is because the problem of recovering identity isn't the same and **can't** be the same as the problem of how memory is stored. The second problem is a solvable problem in neurophysiology. The first problem is a problem in **nerve cell archaeology:** to infer from whatever clues remain at hand what the memory was before. This discipline doesn't yet even **exist.** It has been inaugurated by the recent ALCOR work.

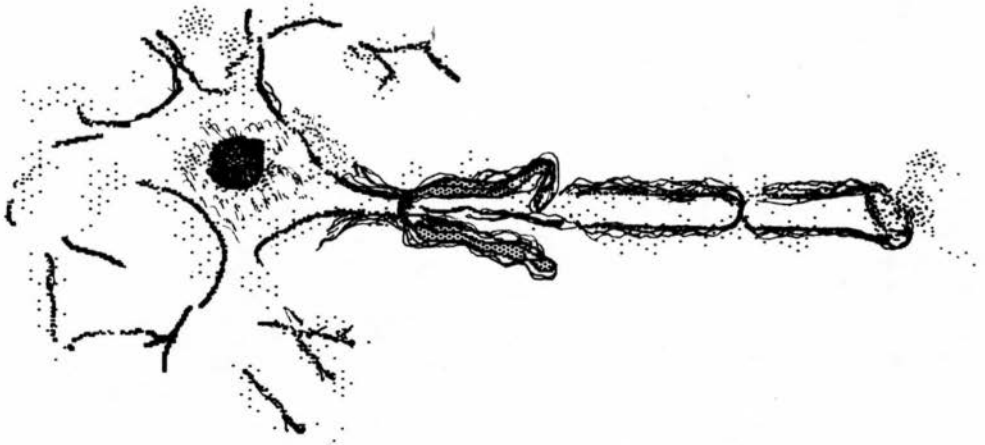
To do neural archaeology it's not just necessary to understand the

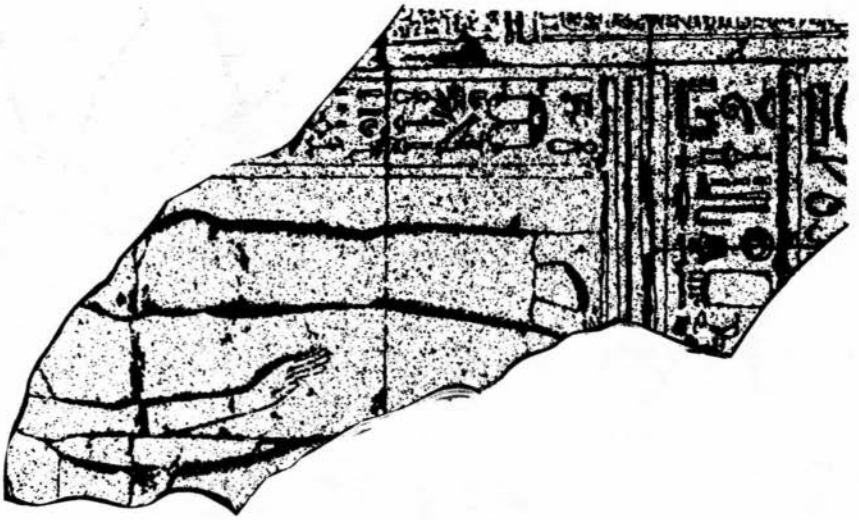


physiology of memory. Life is not nearly so easy. We have to understand the entire workings of nerve cells and **all the other brain cells,** to such a degree that we can predict in advance how they will respond if stressed in different ways: by ischemia, by poisons, by radiation exposure, by hostile nanotechnology. We have to understand **every single** pathological condition, and have a detailed picture of the sequence of events occurring in brain cells subjected to these pathologies, second by second, straight down to total autolysis. This is a fundamentally infinite task. True, the brain is a finite system. But the number of possible stressors and the damage they can cause to it is inexhaustible.

"Often in medical periodicals people will publish articles about the future of medicine. They are usually insipid."

Often in medical periodicals people will publish reflective articles about the future of medicine. They are usually insipid. Well, **cryonics** is the future of medicine. I don't mean just that people will someday be frozen and that





gerontology will rejuvenate us so that we live indefinitely long. I mean that we're going to see a change in **boundaries.** All of the deaths that we now know of as deaths, and simply abandon, will become pathological conditions, to be studied as problems with the aim of a cure. The future of medicine consists of finding ways to recover poorly frozen patients with Alzheimer's disease and an hour of warm ischemia.

We already have a class of diseases called **iatrogenic diseases.** These are conditions which result from medical treatments. Antipsychotic drugs, for instance, cause a neurological condition called **tardive dyskinesia,** which consists of violent facial tics. These conditions are not the same as malpractice, at all. What has happened is that our treatments simply aren't perfect. We'd like to think that we'll have perfect freezing and perfect rejuvenation. But that can't happen either. Even if things go well for most people, for some people things will go badly. They will become medical cases. Some people will go to their doctor for rejuvenation, and wake up 200 years later because they reacted badly to the treatment.

Solving the problem of neural archaeology is like curing or preventing **all** diseases. It won't happen. (Give me a particular disease, and it will be either cured or prevented. But that's not the same thing).

What If The Information Isn't There?

The existence of at least one way to put people into stasis has one more consequence. We can say that a condition is **incurable** (meaning permanently incurable, not just incurable by present technology) if the information is permanently lost. Without any means to put patients in stasis, doctors must decide what is curable and incurable in a hasty fashion. Nobody can afford to wait. But with cryonic suspension, there is no hurry at all. We simply don't have to decide that someone is gone until we have full and complete understanding of what happened to them. Before cryonics, the patient was assumed dead unless proven otherwise; after cryonics, we assume that the patient

is alive unless proven otherwise.

To prove that someone is gone must necessarily take a long time. This is the point where we have to make our peace with the unknown. The key fact is that we have barely begun to study this subject. We have only a few micrographs, with a small number of stains. We lack biochemical data. We lack many more studies, using many more stains. For instance, **osmium tetroxide** is a common stain for electron microscopy. This chemical binds to lipids in cell membranes. If it isn't present in a cell region, this should tell us that the cell membranes have missing lipids. Are these all lipids, or only particular lipids? Are there other structures which remain? We lack a knowledge of the chemistry/physiology of this degradation. Even following a dog brain at intervals of (say) 15 minutes, watching the structures change, would tell us a lot about what's happening. In fact, even for this ONE pathological condition of prolonged ischemia getting a complete account of what happened would take lifetimes of scientific work.

About 10 years ago I looked through the literature with neural archaeology in mind. I wrote up some of what I found in my bibliography (**A Brief Scientific Introduction to Cryonics**). This bibliography is of course very out of date. But there is one thing I never said much about in it, and that fact is fundamental to what we are now doing. The truth is, every single paper I quoted was written with some other aim in mind. Nobody was seriously trying to study the physiology of ischemia at 2 hours. These authors hadn't **imagined** the idea of studying that. In fact, they'd all probably react with **outrage** to someone quoting them as I did. They were always interested in something else, and the information I wanted just fell out. It is reported that DNA is recoverable from brains at 2 hours warm ischemia. We need studies of DNA in brains. There are stains for DNA we might use. It is also reported that lysosomal enzymes don't actually play a large role in events during warm ischemia. A fascinating fact, if true. There are known stains to localize these enzymes. Who has done this work? Who **will do** this work, other than cryonicists?

But the question with which I began this section contains much more than just an expression of doubt. Right now, we don't know enough to say. But it is **certain** that if we never look for remains of memory in these brains, we'll never ever find them. We've barely begun to look.

It's in the dynamic of cryonics that every patient stored will come back **in some form.** Why not? If you have spent 300 years to clarify this patient's problem, it would be senseless to just throw them away.

There are two special objections to neural archaeology deserving of an answer.

"Debris has a structure too. We discover this structure by looking at the relations of its parts to one another, not just by looking at the parts."

1. Brain cells are on such a small scale compared to archeological objects that the available room for the same kind of special inference is too small.

This statement presupposes that the only kind of archaeological inference possible consists of examining the **parts** of the fragments we find. For instance, archaeologists might look at fragments of wood, and date them using radiocarbon dating techniques. **However**, archeology does **not** only look at parts of parts. The first thing done in examining an archeological site is to **carefully plot the relation of all the fragments to one another.** Debris has a structure too. We discover this structure by looking at the relations of its parts to one another, not just by looking at the parts. (Archaeologists in Central America complain constantly that valuable artifacts are taken away and sold, with no record of where they were found, in relation to what). If a protein has two degradation parts, we can learn a lot by knowing where these parts are found in the remains of a cell.

In fact, one way of looking at cryonics is that it is simply a way of making such a detailed record. Here is a patient's brain, in the condition it was when we lost him.

Furthermore, it's not clear or obvious that we can't examine some of the parts. Decomposition products of brain chemicals can be specific indicators that they were there. Enough DNA fragments can tell us an entire genome. Proteins and polypeptides in nerve cells can be 10,000 to 100,000 daltons molecular weight or more. Even if fragmented, the fragments can give us much information.

2. If we make such a reconstruction of a patient from debris, will the patient be the same person?

This question, of course, is the question about identity (or the soul) with which every committed cryonicist is obsessed. It is right to be obsessed. It is fascinating to watch, because the fact that we are obsessed by it tells us about the future of humanity. When we take over, no joke, the newspapers will have pages devoted to the problem of identity every day of the week. (No longer aging now, but instead **identity**!) As for **answering** the question, I don't know. We can do this to animals, and if they pass all tests we'll say they have come back. But **animals**, of course, aren't aware (?) or at least can't tell us so. It seems to me a fundamentally unknowable question, akin to asking if someone else has self-awareness.

But some things can be said. For instance, if memory is stored in proteins, and if these undergo constant turnover, then exactly what is the difference between this renewal process and recovery of memories from protein fragments? Your memories wouldn't even be the same **molecules** from day to day. Some patients have ischemic episodes from which they recover. During these they show fleeting symptoms exactly like those of stroke patients (if this happens to you, see your doctor **immediately.** You may soon have a real stroke, and something **can** be done about it before it happens). No such patient has ever

claimed that they were fundamentally different while this went on. It is not easy to draw any lines here. It will become far less easy in the future.

If we take seriously the proposal that our souls are patterns of organization, then it must follow that these souls are recovered when we do this archaeology. Isn't the pattern of organization recovered? I cannot think of any experimental difference between the notion that I would be the same person after recovery and the notion that I am the same person as I was when I was 8 years old.

The Unknown As A Fundamental Problem

But there is a fundamental practical problem, not to neural archaeology but to the issue of **knowledge.** I've just argued that only cryonicists would even think of doing the kind of studies we'd need. This comes down to making peace with the unknown. You see, even cryonicists aren't going to get any answers for a long time on **any** of these death pathologies. And when we do finally get answers for **some** of them, we'll discover many others we haven't even imagined. We won't just find out about ischemia. We're much more likely to discover many new varieties of ischemia, some of which we understand and others we do not.

It's obvious what is happening. Medical conditions aren't all studied with equal intensity. We don't notice the same amounts of money going into cystic fibrosis research as into cancer. As societies we rank these conditions according to how immediately pressing they are. We then work on them in proportion. This must therefore mean that we will always have a vast number of medical problems for which study has hardly even begun. "Death" isn't really unique here. It's a commonplace that we know of many more diseases now than 100 years ago. Heart disease is now intensively studied, while in 1886 it received little attention. If a medical condition is unstudied, we can't be surprised that very little is known about it.

It is exactly these **as yet unstudied** problems for which cryonic suspension is intended. When thousands of scientists and doctors work in their laboratories to find a vaccine for polio, we **know** that the vaccine is imminent. It won't be hard to convince anybody that help is coming. Why would so many work on the problem unless they expected imminent success? Why should one lone scientist work on something else, when he knows that his own unaided efforts will make little progress with the problem? It is under exactly these conditions, when everyone agrees that success is imminent, that cryonic suspension will soon become useless. Cures will be found and the problem will vanish overnight. Yet a vast number of unstudied problems will remain, all summed up in a few words: **death, fits, ague.** Once there was only "cancer", until we studied it and found a thousand kinds, all different.

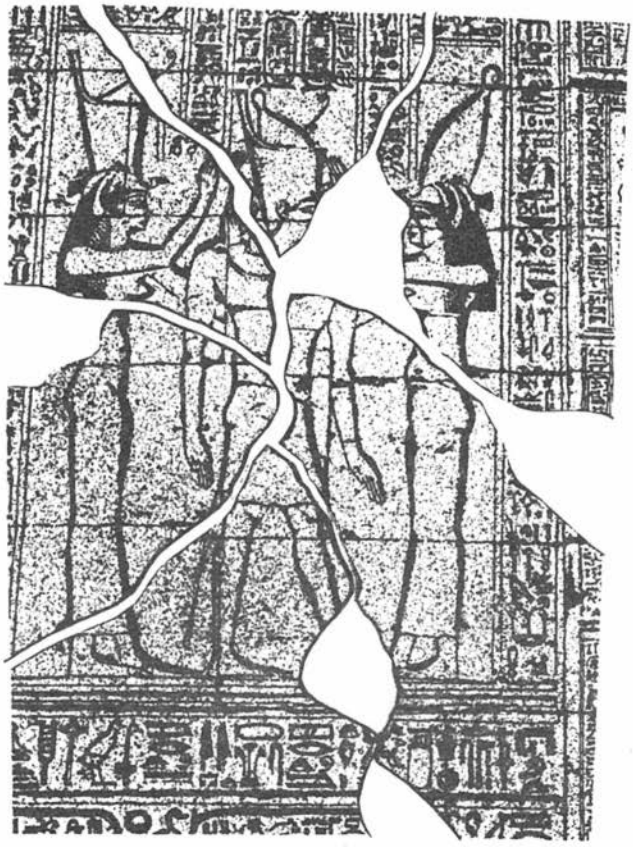
More than most, cryonicists believe that problems can have a technical solution. But that is simply not the belief of most people. Among cryonicists, even many longtime cryonicists who I feel should know better, there is an easy assumption that provable suspension and revival of brains will solve our problem. I believe strongly that work to suspend brains should be pursued. But I will also say that mere technical problems aren't really the key issue. If you want to be suspended, you'll have to make your peace with the unknown. The problem is that to all of those people out there, **it is not obvious** that aging will be curable. **It is not obvious** that their diseases will ever find solution.

It is not obvious that we can raise the dead.

You think that all we have to do is to convince people that we can freeze and store them. But **they** believe that all their problems are fundamental aspects of human existence. What a pointless procedure to take a dying man and plunge him 200 years into the future so that he can die there! What fantastic nonsense, that the human life cycle will ever change! What we have to do to make cryonics spread is to change public attitudes to the **unknown.** That's much harder to do that just to prove suspension of brains. And it's the **unknown** for which cryonics is **intended.** If we knew how to cure this man's problem, we would not freeze him in the first place. And the unknown always dances just one step ahead of us, always out of reach.

What Do We Do Now?

We have many pressing problems. Current dog experiments at **Cryovita** and elsewhere focus rightly on the most probable case. That is one in which we capture the patient in a hospital, apply CPR or even ECMO, and therefore both cool and oxygenate their brains. The ischemia experiments **don't even apply** to this case. But even for this case they provide a baseline. We can think about doing a similar series for dogs treated parallel to the way human hospital patients are treated. This would give us valuable feedback about our procedures. Furthermore, it's not quite the same as current dog experiments, which involve rapid cardiopulmonary support rather than HLR treatment with drugs. We need more work like the recent **Cryovita** model of no oxygenation, to find drug regimens which will better protect patients treated in this likely way.

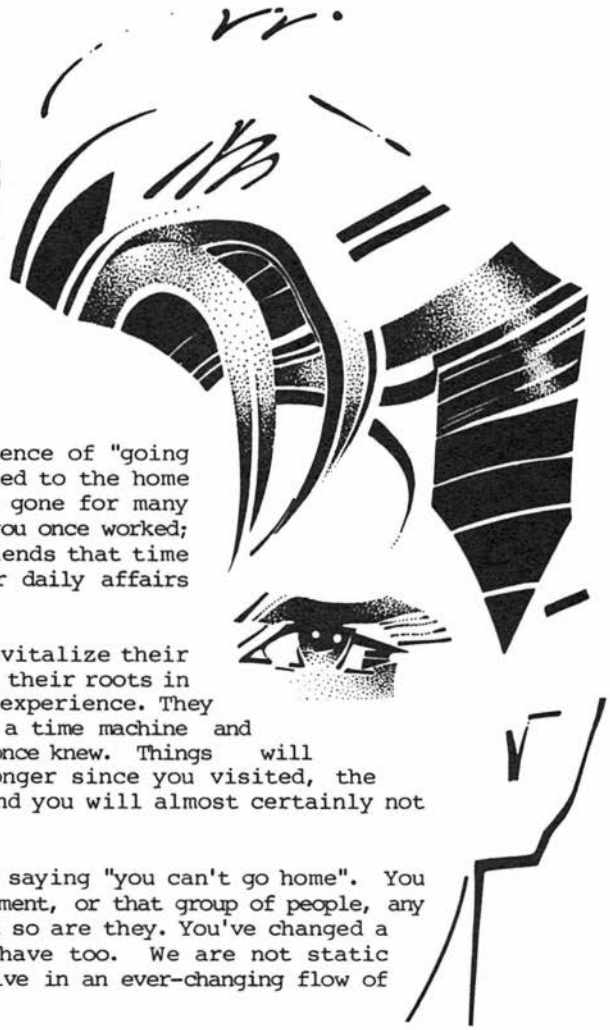


Unfortunately money and time are very short. However, I believe that we should continue the ischemia experiments too, although with lesser priority. My reason is that all members face a significant risk of freezing in poor conditions. The risk of autopsy alone is enough to merit work on ischemia. What we need is much more work to define what is happening to ischemic brains. For light microscopy, we need a greater variety of histochemical stains. We need work done at smaller inter-

vals, particularly in the earlier stages of ischemia. We need attempts at cell culture, to bound (for instance) the times at which isolated brain cells can recover (The no-reflow phenomenon, and all the difficulties in restoring circulation, won't play any role in recovering isolated cells. It seems to be an **assumption** that brain cells won't survive. This is not an experimental fact). We need to correlate electron-microscopic stains with their chemical affinities and work out a historical account of what has happened to these cells.

What will come of such a study? **I don't know.** But then, this article is about making peace with the unknown. There are very few references for our question. **We have to provide them for ourselves.** It's called **pioneering**, which is exactly about making peace with the unknown.

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



VIDEO MEMORIES: A STRATEGY FOR PRESERVING YOUR IDENTITY

by Linda Chamberlain

Have you ever had the experience of "going home"? Maybe you actually returned to the home where you grew up (if you've been gone for many years); or visited an office where you once worked; or perhaps traveled to see old friends that time and distance have removed from your daily affairs for one reason or another?

Most people who attempt to revitalize their sense of identity by rediscovering their roots in this way are disappointed by the experience. They find that they can't just step into a time machine and step out into the environment they once knew. Things will have changed a great deal (the longer since you visited, the more the changes you will find) and you will almost certainly not feel "at home".

This is what is meant by the saying "you can't go home". You aren't really a part of that environment, or that group of people, any more. You're into other things and so are they. You've changed a great deal over the years; they have too. We are not static creatures, cast in concrete. We live in an ever-changing flow of

activities and ideas and we, ourselves (whatever "that" is) are constantly changing, as well.

When my father-in-law (Fred Chamberlain, Jr.) was frozen after his death in 1976 it sparked a few curious questions in my mind: "When he's reanimated, which of the many "Freds" that he has been would he prefer to be again? This person has experienced many "eras of being" during a single lifespan! Which of **these** would he return to if given a choice? We know he can not really "go back", but nonetheless, when he looks in the mirror, what would he be most comfortable with?

There is currently a picture of Fred Jr. hanging on the wall at the ALCOR Life Extension Foundation (the organization which suspended him) along with pictures of other ALCOR members who have been suspended. It is a picture taken approximately 25 years before his death when he was about 50 years old and a Colonel in the U.S. Army. I never knew Fred Jr. during that part of his life. I only knew him much later, during the last years of his life; years that he spent in a convalescent hospital with most of his body paralyzed after falling prey to diabetes and stroke.

I am certain that my father-in-law would not want to be reanimated as an old, diseased man, condemned to spend his newly won years in the physical condition which once ended his life. But I never thought to ask him these questions: "When you are reanimated, Fred, what physical age would you like to be? What part of your life do you most identify with? Which of the many Freds that you "have been" would you most like to become, again, when you are reanimated?"

Some people may prefer to be reanimated as 21 year old youths in every aspect. Others would find that although a young and healthy body is preferable to one which has begun to show the ravages of time, most people certainly wouldn't want to have to give up their hard earned "experience". In this sense, the "many Freds that Fred was from time to time", turn out to be, psychologically if not physically, the totality of what Fred was. Most people would not want to choose just one aspect of their past lives and discard the rest. After all, every memory, every experience is a part of the tinker toy structure which we call our identity. To throw away any part is to change the whole.

For many people, their contemplations on this subject are limited to what physical age they want to find themselves upon reanimation. For others, there is a temptation to request a new, improved, more beautiful, more useful, and more efficient body than the one which originally housed them. For others, such an idea would represent a terrifying loss

of identity.

There is a price to be paid for the "partly aged" housing, of course. Just as it will be more expensive to generate an adult clonal vehicle than an infant, it will be a further complexity to age the adult clonal receptacle to some specified point, determined to optimize adjustment upon reanimation, after which the recipient would probably want the new body to be rejuvenated! Notwithstanding these aspects, there may be factors of psychological continuity which warrant such steps.

The whole question of identity is fascinating to life extensionists, especially those involved in cryonics. Without the retention of your memories and identity, is there really "survival"? Is a person being kept alive by life support machines really surviving if his brain is dead and all his memories (the dendrites and other structures involved in memory) are falling apart? I hardly think so!

Memory and personality may be primarily a function of the interactions of biochemical activities in the body. Dendrites are laid down in a bio-mechanical way and electro-chemical processes determine their activity. Although this is a gross over-simplification of the process of memory, it brings up another subject of fascination for cryonicists. That is the question of "how much" memory will survive the deanimation, suspension, and reanimation processes.

If a person is reanimated and his memories have been programmed into the brain of an uneducated clone, he will have no more to work with than those memories which survived the freezing processes and were used. For many people, even a 90% loss of memory would be preferable to total biological obliteration! Nonetheless, anything which we can do to decrease the amount of loss represents a value worth seeking.

There is no shortage of speculation about future technologies which will allow us to map our memories moment by moment, store these in multiple and variously located safe vaults, and use these to program the brains of duplicates in events such as a plane crash, a supernova, or accidently falling into a black hole. Each of us undoubtedly has our own views on how realistic these schemes are and how far into the future they may lie.

What, then, can we do **now** without unlimited wealth or waiting for technological advances such as nanotechnology to solve this dilemma? This last New Year's Eve, I started a project with my partner (in both business and life) that we had been talking about for just about as long as we have been working together on cryonics. We have often discussed the nature of memory and identity. What is it? How can it be preserved? Would we want to be reanimated if our memories were all wiped out? When we are reanimated, how much of our memory and identity will we have left? How can we improve the possibilities?

A part of our impetus to start with this project was the recent involvement by the ALCOR Life Extension Foundation in preserving historical artifacts. Articles about cryonics printed on paper, as one example, will deteriorate rapidly over the years. ALCOR has begun planning to preserve as many of these

types of artifacts as possible by putting them into a gaseous nitrogen environment.

This heightened our own awareness that our personal, individual, biochemical memories are easily eroded also. It is said that we don't really lose our memories, that hypnosis, for example, can dig out things from our mental filing cabinets which we swear we have "forgotten". Nonetheless, it isn't really known how much of our memories will be recoverable when we are finally reanimated after having been frozen and stored for a very long time.

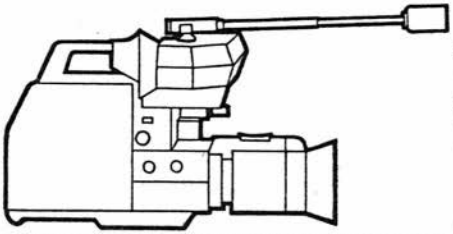
How many times have you come across an old scrapbook and been flooded with recollections which had lain undisturbed, for months, years, or decades, like a sleeping wooly mammoth, in your memory banks? It's a fulfilling experience when these memories awaken. It is also a clue to one possible way to preserve our memories, for ourselves, for the future.

If you plan ahead and take some simple, inexpensive steps, now, to store as many memories as possible, you can assist the restoration of sense of self when you are reanimated. If, when you are reanimated, you find your memories a little fuzzy, those nice people in hospital green (or mauve, or whatever color they use in the future) can fluff up your pillows and turn on your video machine for a history lesson about **you**! No science fiction or futuristic technology is required.

The use of video is suggested here because it is compact, easy to store in nitrogen gas, and moving pictures tell a better story than stills. Video cameras and recorders are very easily and inexpensively rented. On New Year's Eve, Fred and I sat down in front of a video camera and filmed the introduction to our own "videomemory". We plan to update and add to this tape at least once a year in order to capture the changing flow of our personalities. Our current idea of what to include in our own videomemory covers historical data about ourselves from childhood to present day, how we think and feel about things, what our values and philosophy consist of, and everything else that comes to mind.

If this idea appeals to you, gather up all your old photos and scrapbooks, sit in front of the camera with your mementos and reminisce! Hold nothing back! When you are watching these tapes in the future, you will be able to see yourself as well as photos of other people and places. Watching yourself as well as your photographic material and other memory joggers will be a valuable input about who you were and are.

Video and audio tape only lasts for about 30 years if not protected in some manner. You will need to make some special provisions for storing them. If you aren't comfortable with having these intimate details outside your personal control (this information **should** be intimate, because its meant for **your reanimation**) store it in such a way that it will become the property of ALCOR upon your death. (NOTE: There will be a companion article concerning archivability of videotape in the March issue of CRYONICS.



It includes some suggestions for do-it-yourself archival storage. ALCOR is not currently able to store this material for you, but a capability for archival storage of some sort is definitely an ALCOR objective. -Eds.)

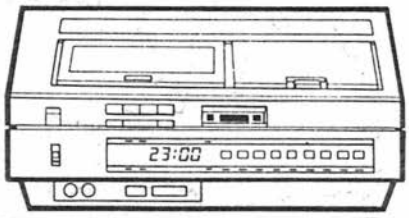
If you absolutely cannot get the use of a video camera, at the very least, gather up all your old scrapbooks and photos, shoot them onto 35 mm film, and have them developed (This last is important. The "virtual" image on exposed undeveloped photographic film is unstable, and fades over a period of years. -Eds.). Using black and white film will be much more effective than color. Black and white will last almost indefinitely, even at room temperature, whereas color film will deteriorate much more quickly. If you have a tape recorder, sit down and talk about the items which you have just put on 35 mm film. Number the photos, so that the narrative on the tape and the photos can be easily correlated. (NOTE: The storage conditions for audio tape and photographic film are probably the same as for videotape. See the article in the next issue of CRYONICS. -Eds.)

Using a questionnaire which you have prepared prior to your camera sessions will help you keep from going blank when the red eye of the camera stairs at you. Photos will accomplish this for your historical review. A prepared set of questions, as if you were interviewing yourself, will keep things rolling during that part of your tape where you discuss your thoughts and ideas, how you feel about politics, philosophy, religion, and other subjects of this nature. A copy of the question form Fred and I have developed is at the end of this article. If you have any suggestions to add, please send me a letter (Box 16220, So. Lake Tahoe, CA 95706). If you'd like a updated copy of the questionnaire, please send a self-addressed, stamped envelope to the same address.

Each one of us has experienced many different ages and different eras of our lives. Some positive, some less so, but they all go together to make up the elaborate biochemical latticework which differentiates us as individuals. We may find that we live to see nanotechnology or an equivalent which allows us to be suspended and reanimated with recall functions which far surpass those which we have today. Another very real possibility is that we will be reanimated with only a disappointingly small percentage of the memories we had when we deanimated. If the latter is the case, Fred and I hope that we will have hours and hours of memories to pour back into our heads.

Creating and storing "hard copies" of your memories is a realistic alternative to "going home". If estrangement is frequent when people return to their roots after just years of being away, the possible decades or centuries which may have elapsed

since a person deanimated will make going home to recapture memories next to impossible.



It is important to start archiving your memories right away and to keep embellishing them frequently. As you advance through different ages and eras of your life, your memories will be much more complete if you have done the storage a little at a time. Even if you never deanimate, this scrapbook supreme will reward you by capturing extra details from your memories and preserving your own "sense of self" by not letting your roots slip away as the centuries pass.

VIDEO-MEMORY QUESTIONNAIRE
by Fred and Linda Chamberlain

INTRODUCTION

Give today's date, your name, your age, and the purpose for which you are making this tape.

PART I: HISTORICAL

1. When were you born? Give a historical summary of the times and events which were taking place when you were growing up. How did these contribute to your development?

2. Did you grow up in a rural or and urban environment? How did this affect your physical and mental growth?

3. Were your parents divorced or did you live with both of your parents? Were you an orphan? How did this affect your personality?

4. How did you relate to your parents, grandparents, or other adults who cared for you? Did this relationship strengthen you, or do you feel it weakened you in some way?

5. Did you have any brothers and sisters? Was this a source of pleasure or pain for you? Discuss every relative you can remember. What did you like most about each one. What did you like least? What is the significance of each evaluation in relationship to how your personality developed?

6. What are the best memories you have about your early childhood, and why? What are the worst? The most embarrassing? The most prideful?

7. Did you experience any meaningful conflicts as a young child? With your parents? Brothers and sisters? Other

children? Other adults?

8. Did you experience any degree of estrangement from society, from your friends? Yes or no, explore why this happened and why you think this is important.

9. Did you ever question authority? Which form, and how?

Did this positively reinforce you, or were the results negative?

10. Did you ever find the "accepted truths" bewildering or anger provoking? If so, at what age did these bother you? What were these? What influence did these experiences have on your life and your development?

11. Did you like school? If so, what was it that you liked best about school or college? What subjects were your favorite. Try to recall and elaborate on some of your fondest schoolday memories.

12. If you did not like school and college, why? Try to recall and elaborate on what it was that you disliked, or on specific incidents which were unpleasant or distasteful for you.

13. What are some of the life lessons you feel you acquired during your school years?

14. Recall your earliest romance. What age were you? What was the object of your love like? Was it a happy relationship? Did it cause you pain?

15. Talk about all the romances you have had in your life, big and small, meaningful and not. Are these a source of joy to remember? Why, or why not?

16. Have you ever been married? Start with your first marriage and talk about everything you can remember about how you met, when, what were your ages, what attracted you to each other, how you felt about each other when you first met, during the early part of the relationship, how things might have changed as time passed, what influences contributed to deteriorating the relationship (if that happened), how it ended, and how you feel about all of it.

17. Discuss each of your marriages in the greatest detail possible.

18. How did each of your marriages contribute to your personal development? What are the greatest lessons you derived from each marriage?

19. How do you feel about children in general? Do you like being around them? Do you think they are a valuable asset to society?

20. Did you have any children? How many? Describe your children. What are your children like? Discuss in detail every aspect of your children. Do you love your children? Do you like your children? Are your children (each one separately, or as a group) a positive asset to your life, or are they a negative for you? Do you feel any guilt over your feelings for your children?

21. If you could start all over, would you rear your children any

differently than you did? If you had a choice, would you still want to have children?

22. What are the best memories you have of your children? What are the worst?

23. Have you learned any valuable lessons from having your children?

24. How did having children influence your life? Do you think you might have been any different as a person if you had not had your children?

25. Recall all of the friends you have had. Start with your earliest childhood friends. What age were you when you first met them? What age were they? Same sex or opposite? What was your friend like? What was your relationship like? What are the best or most joyful memories you associate with each friend? What are the worst or most painful memories?

26. How did each of these friendships contribute to your development as a human being?

27. When you were a young child, when did you first acquire an interest in what sort of career you wanted when you became an adult? What were your early occupational choices? Did you lock onto one idea, hold onto it without swerving, and finally adopt that occupation when you became an adult? Or, did you flip-flop from choice to choice as you grew older?

28. What age are you now? What careers have you had so far? Have these been your own choice or did others influence you? How do you feel about that? Do you have any unfulfilled career choices? How do you feel about that?

29. What sex are you? Are you happy to be the sex that you are? Do you feel it is an asset or a liability? Why? If you could change your sex, would you? Today, with the past context of your life unchanged? Would you wish to be born a different sex?

30. How do you feel about the physical act of sex? Is it important to you?

Do you enjoy it? Do you have feelings of guilt associated with sex? If so, why? Where did these stem from? How do you feel about that?

31. Are you homosexual, bisexual, or heterosexual? Are you happy with your sexual life? Would you change it if you could? If so, in what way? What is your attitude about these different sexual types? How were your attitudes formed, acquired or molded? How has this influenced your life?

32. Are you generally happy with your life? What changes would you make if you could? Why?

PART II: PHILOSOPHICAL (POLITICS, ETC.).

1. Do you think philosophy is important? Why or why not?

2. Have you always held virtually the same philosophical and political ideals, or have you gone through developmental stages, or perhaps swings in your thinking?

3. What events in your life helped to shape the philosophy you hold today?

4. What personal friends or relatives have had a strong influence on the development of your philosophy?

5. Which philosophers, ancient as well as contemporary, do you agree with, and why? Which philosophers to you disagree with, and why?

6. Are there any particular "labels" (such as Christianity, Socialism, Marxism, Objectivism, etc.) with which you identify? Where do you find that you have philosophical differences?

PART III: SPECULATION ON THE FUTURE.

1. How do you envision the world in 100 years? 1,000 years? 5,000 years? Do you have a positive outlook for the future of mankind or do you project a negative future. Discuss what you project for the future as well as why you make these predictions.

2. Do you think that humans will always reside in biological bodies of some type? Do you think the shape and function of these bodies will evolve in forms other than the one we have now? Why or why not?

3. Do you think that humans will abandon their biological bodies? Why or why not?

4. What sort or sorts of economic and political systems do you think will evolve for future generations? What forces will shape these changes?

5. Do you think humans will continue to populate primarily planetary systems, or do think something like space colonies will become more popular? Why?

6. How do all of these types of speculations relate to your cryonics and gerontological ideas and plans of action?

SCIENCE UPDATES

by Thomas Donaldson

A "NUCLEAR WINTER" IN 1915

Since the idea first arose, proponents of "nuclear winter" have presented nothing more than results of computer simulations to verify their contentions. Nobody, of course, wants to test out the nuclear winter thesis on the Earth. However an interesting letter in **NATURE** (**323**, 116-117 (11 Sept 1986)) describes a very widespread fire happening in 1915 in Siberia which may actually satisfy many conditions for a test of the nuclear winter thesis. Since we are still here and haven't even heard about this fire before now, the evidence might tend to show that "nuclear winter" as imagined simply won't happen.

The letter is by Russell Seitz of the Center for International Affairs at Harvard. He summarizes the case for nuclear winter by saying that its proponents suppose that about 1 million square kms of land would be burnt out by wildfires started by nuclear attacks, producing about 100 million tons of smoke. He then points out that one gigantic wildfire in Siberia in 1915 did actually burn out 1 million square kilometers of land and produce just as much smoke. The fire was the Great Siberian Fire of July and August 1915. It burnt out an area at least the size of Germany, 250,000 square kms, and probably much more. It may have produced as much as 180 million tons of smoke. Three investigators, V.B. Shostakovich, A. Vosnesensky, and J. Belyaeff of the Irkutsk Magnetic-Meteorological Observatory, mailed 500 questionaires throughout Siberia to survey what had happened.

The fire did produce some quite clear meteorological effects. In August one meteorological station recorded 7 days of temperatures 8 degrees less than the average. Visibility fell below 100 meters in an area of more than 4 million square km for more than 51 days. However agricultural consequences were not all that great. Harvest time was retarded by 10 to 15 days but no catastrophes occurred. Some cattle died from smoke inhalation.

I think everyone hopes that "nuclear winter" theses will never receive the only true test. But by studying historical events and known cases, we should get a much better idea of the goodness of our models. Results of these studies to date do not give total support to a thesis that "nuclear winter" would mean global destruction **even** of industrial civilization.

OUR NERVE CONNECTIONS ARE LAID DOWN AT BIRTH

Even the best freezing with contemporary techniques will cause cracking of our brains. Furthermore, when viewed under an electron microscope the cell structures seem quite disordered. This means that we must expect some anatomical disorganization from freezing.

When we also consider the effects of freezing under bad conditions we have even worse problems. For instance, late freezings (done some time after death) and freezings after autopsy which sections the brain will involve considerable anatomical disorganization.

We'd therefore like to know just how much of this disorganization destroys information about memories and personality. We freeze our brains so that our

selves (that is, our personalities and memories) will remain recoverable. This means that the information of what we were must remain available, even if our brain cells have no ability to restore themselves without help. How much information remains in a brain frozen under poor conditions?

For a long time one proposal about memory held that formation of new memories involved formation of actual new connections between neurons. While this idea seems less likely now, the issue isn't yet completely decided.

The alternative theory of nerve cells connections is that they are laid down at birth according to plans which have to do with development rather than memory. Some interesting recent papers on nerve cell connections in developing vertebrate brains put more weight on the theory of development rather than learning.

In **NATURE** (**320**, 266-9 (1986)) W.A. Harris reports his studies of nerve growth from transplanted eyes in **Xenopus**, the salamander. His technique is simple to state but only recently became available. He could label particular nerves and follow their connections as they grew. The issue he was addressing was that of HOW developing nerves know where they should go. Basically he transplanted one eye of the salamander so that its natural connections were to a different part of the brain. Usually this transplant went to the opposite side of the brain. The salamanders became "artificial flounders". He then watched to see where the nerve cells from the eye grew as the salamander nerve structures seem quite disordered. This means that we must expect some anatomical disorganization from freezing.

This guidance wasn't absolute, however. Transplantation to the spinal cord would lead to connections to the spinal cord rather than to the visual center.

The alternative theory suggested that these nerve cells would grow in random directions. Then, later, the false connections would die away. This isn't at all what happened. From the beginning, these nerve cells knew exactly where they should go, for a wide variety of starting locations.

A second paper in **NATURE** (**320**, 269-272 (1986)) by Judith Eisen and others from the Institute of Neuroscience, University of Oregon, reports studies of a similar phenomenon in the growth of motor neurons in zebra fish. Embryos of these fish are transparent, so that we can literally watch individual neurons grow to their targets. Eisen and her coworkers found no evidence of neurons growing to make wrong connections and then dying away. On the contrary, only one nerve path formed during growth. That one was the correct one.

The implication for cryonics is that our brain anatomy comes from a plan laid down before birth. This would mean that very wide anatomical destruction would still allow recovery of our memories. All a repair machine would have to do is consult its stored records of "brain anatomy, human, class B" and it will know where our connectors should go. It need not pay attention to the particular connections made in our own particular brain.

It's always possible that **most** brain connections are set down genetically while our memories form connections in a different way. Yet that would be very hard to meaningfully disprove. A proponent of such a theory is saying: well, of course all of these **known** connections are genetically determined. But how do we know that there are very important others **not yet known** which are not? We need

to remember that the alternative theory isn't actually disproven. But Occam's Razor would suggest that nerve cell connections within our brains are laid down genetically. Repair should be possible even after extensive anatomical injury.

MORE WORK ON REPAIR OF FREEZING DAMAGE

For many years now the cryobiologists J. Kruuv, L.E. McGann, and others working with them at the University of Waterloo in Canada have studied the crucial question of **repair processes** for freezing injury. So far they've not yet found any methods applicable to whole organ preservation. We have a long way to go. However the question is still fundamental, even more for cryonicists than for cryobiologists in general.

In a recent paper in **CRYOBIOLOGY (232,** 126-133 (1986)) J. Kruuv has published some of his work on processes which may **inhibit** repair of cells after freezing. Kruuv and his coworkers have previously shown that frozen cells **can** repair freezing damage (J. Kruuv et al, **CRYOLETTERS, 1,** 326-336 (1980)). This more recent work focuses on obstacles to repair.

In it, Kruuv studies another phenomenon related to repair. It is known that single cells will often somehow survive freezing better than clumps of cells or cells in tissues. Kruuv proposed to study the reasons for this.

He used a special experimental system, multicellular clumps of hamster fibroblast cells. Kruuv and his coworkers developed this system themselves. They have already used it to study repair of radiation damage (F.W. Hetzel, J. Kruuv, et al, **RADIATION RESEARCH, 68,** 308 (1976)). It imitates the normal situation of cells attached to one another in a mass, rather than isolated in suspension. These clumps contained about 1000 cells per clump. Kruuv froze them and then studied their recovery from freezing afterwards.

It turned out that if he froze clumps and then **immediately after thawing** separated the clumps into individual cells survival rates were markedly higher than if he left them in clumps. Survival was 50% for separated cells down to only 10% for cells left in clumps after thawing. Separating the cell clumps at varying times after thawing produced intermediate results.

Kruuv separated his cell clumps using trypsin. Could it be that trypsin rather than separation accounted for the greater survival? When Kruuv treated suspensions of separated cells with trypsin after freezing he got no statistically significant increase in survival.

There are two possible explanations for the higher survival after separation. First, freezing injury might produce a toxic product which inhibits repair. Cells in clumps must endure more of this toxic product. Second, contact of the cells might itself inhibit repair. These experiments don't distinguish between these two possibilities.

The question addressed by Kruuv, McGann, and their coworkers is very perceptive. If we can't prevent freezing damage, we can try to promote its repair. Complete prevention of freezing damage in whole organs is very unlikely. To store them, we **have** to understand means for enhancing repair. For cryonics, of course, their work is even more important. Cryonicists often

discuss this question of repair as if our cells totally lack any innate repair processes. That is an unlikely worst case. Technically, finding means to enhance a repair process which already exists is likely to be far easier than providing one which does not exist at all. This work suggests that revival of someone after freezing may be much closer than worst-case scenarios suggest. Unfortunately, however, no one can say how much closer.

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

FEBRUARY - MARCH 1987 MEETING CALENDAR

ALCOR meetings are usually held on the first Sunday of the month. Guests are welcome. Unless otherwise noted, meetings start at 1:00 PM. For meeting directions, or if you get lost, call ALCOR at (714) 738-5569 and page the technician on call.

ALCOR
ALCOR LIFE EXTENSION FOUNDATION
4030 NORTH PALM #304
FULLERTON, CALIFORNIA 92635
(714) 738-5569

The FEBRUARY meeting will be at the home of:

(SUN, 1 FEB 1987) Virginia Jacobs
29224 Indian Valley Road
Rolling Hills Estates, CA

DIRECTIONS: Take the Harbor Freeway (US 110) south to Pacific Coast Highway (State 1) and get off going west. Go along Pacific Coast past the Torrance Municipal Airport to Hawthorne Blvd. Turn left (south) on Hawthorne and go up into the hills past the Peninsula Shopping Center (Silver Spur Rd.). Hawthorne takes a long curve around to the left. Indian Valley Road is a little over two miles beyond the Center, on the left. 29224 is about 0.2 mi up Indian Valley Rd., opposite Firthridge Rd.

The MARCH meeting will be at the home of:

(SUN, 1 MAR 1987) Paul Genteman
535 S. Alexandria, #325
Los Angeles, CA

DIRECTIONS: From the Santa Monica Freeway (Interstate 10), exit at Vermont Avenue, and go north to 6th St.
From the Hollywood Freeway (US 101), exit at Vermont Avenue, and go south to 6th St.
Go west on 6th 4 blocks to Alexandria, and turn right. 535 is the first apartment building on the west side of the street. Ring #325 (Note: See the building directory for the correct phone number to punch) and someone will come down to let you in.

Alcor Life Extension Foundation
12327 Doherty St.
Riverside, CA 92503

Non-Profit Organization
U.S. POSTAGE PAID
Permit No. 5017
Riverside, CA 92503

ADDRESS CORRECTION AND FORWARDING REQUESTED

For Information on Cryonics Call ALCOR Toll Free: 1 (800) 367-2228