

Cryonics

July, 1986

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Editorial Matters

Last issue we promised a review of cryonics related papers presented at the LIFE EXTENSION BREAKTHROUGH CONFERENCE for this issue. The review is largely written, but we've decided to delay it another issue so that we can circulate it for review.

ENGINES OF CREATION

If you look at the flyer in the center of the magazine, you'll notice that we're offering Eric Drexler's **ENGINES OF CREATION** at rock bottom prices! The book is available to ALCOR Suspension and Supporting Members for \$9.00, to Associate Members for \$15.00. Those who are not members may purchase the book from us for the cover price of \$17.95. These are phenomenally low prices. In fact, the price to ALCOR Suspension Members represents our cost! We want to see **ENGINES OF CREATION** out there in the market place, and we want to assist in any way we can with its rapid distribution and penetration. We wish to emphasize that in our opinion, **ENGINES OF CREATION** is the cryonics book of the 1980's, and that it is extremely likely to result in the conversion of a large new wave of people to cryonics. We urge you to buy copies for yourself and to distribute to friends, local libraries, and local newspaper science book review critics.

We are also offering special copies of the book **autographed** by Eric Drexler. These will be available for the price of \$17.95, plus a \$2.00 shipping and handling charge. This offer will be available for a limited time only, and we urge you take advantage of it while it lasts. This would be a fine holiday gift which any cryonicist would appreciate. To order your autographed copy of **ENGINES OF CREATION**, please consult the flyer in the center of the magazine and return the order form with your check or money order. Alternatively, you may call our toll free number for credit card orders: (800) 367-2228. (In California, (714) 738-5569.)

ENGINES OF CREATION K. ERIC DREXLER

"K. Eric Drexler's **ENGINES OF CREATION** is an enormously original book about the consequences of new technologies. It is ambitious and imaginative and, best of all, the thinking is technically sound. . . . *Engines of Creation* is the best attempt so far to prepare us to think of what we might become, should we persist in making new technologies."

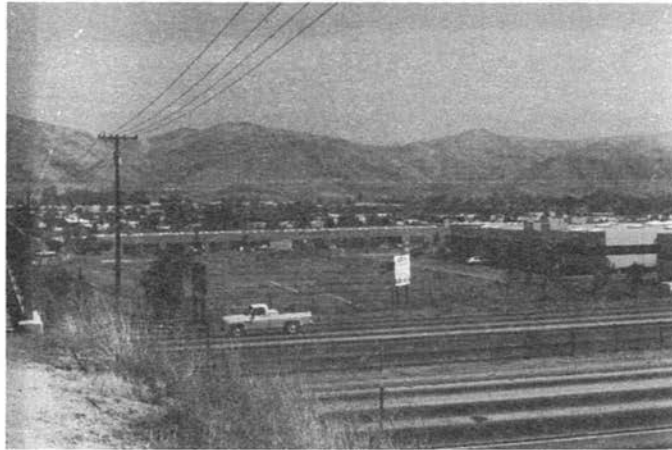
—From the Foreword
by Marvin Minsky

A New Home For ALCOR

Construction has started on a 3,200 square foot, earthquake-resistant tilt-up concrete industrial building which is to be ALCOR's new home. The building is under construction in the city of Riverside and it is currently estimated that it will be ready for occupancy around the first part of September. For a variety of reasons (which we'll explain later) we have been unable to provide many details about this new project. However, in the August issue of CRYONICS we will have a full report of progress and of other relevant details. The accompanying pictures show the site as it is at the time of this writing: grading has been completed, trenches for the utility service have been dug, and forms for pouring the foundation are being constructed.

We will provide you with something of a visual countdown on the construction progress. We look forward to being able to share more of the details of this project with you in the near future.

The site of the new industrial park that will be the future home of ALCOR. Site grading has just been completed. June 6, 1986.



The graded site where the ALCOR building will be, with trenching for the footings completed and rebar and pipe laid out to go in the trenches. June 10, 1986.



TBW Research: More Problems

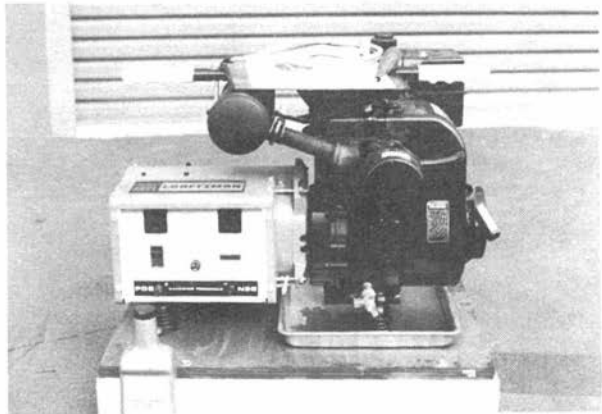
As we reported in the last issue of CRYONICS, we have been experiencing difficulty with our TBW program. Our experimental animals have been dying of pulmonary edema in the warming phase of the procedure. On the weekend of May 31st we attempted to repeat our previous work employing a closed chest, femoral perfusion model. This animal also died of pulmonary edema. This is a depressing and disturbing event. We have now lost three animals in a row to this problem, and this repeat "control" experiment indicates that we are doing something simple and basic the wrong way. We have tentatively ruled out as a cause a lot change in the hydroxyethyl starch we're using. The postmortems on these animals reveal no problems with any other organ system except the lungs. This observation is causing us to focus on a detailed evaluation of our respiratory support techniques.

Currently every aspect of the program is under scrutiny in an attempt to isolate the problem. The next experimental animal will be instrumented with a Swan-Ganz catheter so that we can measure the intrapulmonary artery "wedge" pressure. We have used central venous pressure measurement (CVP) in two previous animals that succumbed, and our CVP's have been excellent (tending to rule out high pulmonary artery pressure as a cause of the problem).

These kinds of snags, especially when it is not apparent what the cause of the problem is, can be very time consuming, costly, and frustrating to overcome. In the meantime, until we do solve this problem, all of our research which depends upon the TBW procedure is on hold. We have another experiment scheduled for the near future which should help to eliminate several possible causes for the problem from the list.

Emergency Generator Up And Running

Actually, this is an "old" story which we've been holding up for some months due to lack of space and more pressing topics. Still, it's a bit of progress worth sharing. Some months ago, we experienced a power failure during one of our TBWs. We keep hand cranks on the heart-lung machine at all times. Nevertheless, finding oneself in total blackness and faced with cranking a heart-lung machine (without any monitoring equipment to tell you how you're doing!) is a bleak one. This episode made us realize how serious a problem a truly



major power failure of long duration (like the New York City blackout of some years ago) would be.

So, we did something about it. We have set up a backup Sears Craftsman 2.2 Kw auxiliary power unit (APU) so that it can reasonably rapidly provide for the electrical needs of the critical operating room equipment needed during a suspension or large animal experiment. We have also set up a regular schedule of maintenance consisting of inspections and periodic start-ups (the latter of which are critical to the long-term health of the unit) to insure that the APU is ready when we need it.

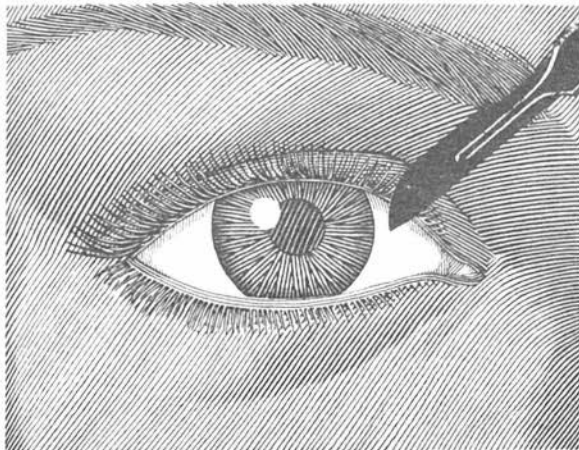
The unit has performed well in tests, and should stand us in good stead if there are any major grid failures here in the L.A. basin -- not only due to "summer overloads" but also in the (hopefully) less likely events of terrorist activity or earthquake damage. ALCOR director Hugh Hixon deserves much of the credit for "bringing the unit up" and getting it conveniently mounted on a roller base. (And Mike Darwin gets all the rest for having purchased it in the first place about eight years ago! — HH)

Stealing Eyes

Those good 'ol boys in Washington, D.C. have been at it again, hacking away at our rights. The **Orange County REGISTER** for March 25, 1986, reporting on current legal decisions, reports that on Monday, March 24, 1986 the United States Supreme Court let stand a Georgia law that allows hospitals, as part of any eye bank program, **to remove the eyes of deceased patients without notifying the next of kin, obtaining their permission, or the permission of the deceased!** Currently, 19 states are reported to have some version of this outrageous law on their books! Presumably this law would allow hospitals to remove the eyes of suspension patients who died suddenly or from accident before the cryonics organization or next of kin were even notified!

The 19 states which have such a law on their books are: Arizona, California, Colorado, Connecticut, Florida, Georgia, Louisiana, Maryland, Massachusetts, Mississippi, Montana, New York, North Carolina, Ohio, Oklahoma, Tennessee, Texas, Utah, and Wyoming.

We have not yet obtained a copy of the California law, so we do not know to what extent it mimics the Georgia law, or to what extent it allows an override if there has been prior direction given by the decedent. Once we have a copy of the relevant law in hand, we'll be better able to advise members about what to do. However, our initial conversation with Merle Wingate, Director of the Medical



Eye Bank of Orange County, was not encouraging. Ms. Wingate indicated that the California law gives coroners and hospitals the right to remove a "deceased" person's eyes during the course of an autopsy, without notifying the next of kin or obtaining their permission. Neither, apparently, do the wishes of the decedent matter; legally, coroners are laws unto themselves and do pretty much as they please. Ms. Wingate stated in her conversation to us that "coroners normally remove sections of tissue from all organs of the body during autopsy for later study, but they must return those samples to the family of the decedent when their study is complete. All this law does is allow the coroner to retain the two tiny little contact lenses, the corneas, which we so desperately need!"

What Ms. Wingate **did not** point out was that under the normal circumstances of an autopsy, coroners **virtually never** remove someone's eyes and that they do not often retain tissue sections — certainly not from most or all organs! Ms. Wingate explained that since the need for corneas was so great, and the time to collect them so short (about 4 hours) the law was designed to facilitate collection and prevent "waste". Ms. Wingate was also at pains to point out that her organization was not at this time using this law to collect corneal tissue.

Once again, someone's need is a claim on someone else's property! We take little comfort from the fact that this ugly law is not being actively used locally. It is bad enough that it has already been used in Georgia, and worse still that the Supreme Court has countenanced it. It sets an ugly precedent of interference with an individual's right to dispose of his body as he chooses. A precedent which has ominous potential to be expanded upon as the demand of transplantable organs becomes ever more acute. It is also the kind of law that a malicious and hostile coroner or hospital could use to further damage a suspension patient during the course of a postmortem examination.

Venturism

A new religion is being formulated. It is called Venturism. Venturists believe:

1. It may be up to Man to create his own everlasting life, perhaps through genetic (re)engineering or other life extension techniques. God may have given Man the intelligence to procure eternal survival and it may be up to Man to achieve this on his own.
2. Death and aging will likely be overcome in a few hundred years and people today will probably have to be cryonically suspended to reach that time period.
3. All life extensionists are akin, and Venturists want to assist life extension and cryonics organizations by helping to raise money for research, emergencies, and public relations programs. They also want to bring public opinion around to an open-minded way of thinking.
4. Venturists see no conflict with cryonics and/or life extension in any religious teachings.
5. Venturists, in any case, want to see as many people as possible have an opportunity to be frozen, in hope of additional and maybe



everlasting life, especially the young who die prematurely before they had a full life.

If you have any interest in the above or would like to share some of your ideas, that might help us get established please write.

David Pizer
1355 E. Peoria Ave.
Phoenix, Arizona 85020

Dr. Gregory Fahy And Vitrification In SCIENCE NEWS

The May 24th issue of SCIENCE NEWS contains an article documenting the work of Dr. Greg Fahy, of the Red Cross Blood Laboratory in Bethesda, Maryland. For several years now in the pages of CRYONICS we've been talking about vitrification and the tremendous promise it holds for the future of solid state organ and tissue banking -- as well as for cryonics. At long last the "popular" scientific press seems to have gotten wind of the potential of vitrification, thus the article in SCIENCE NEWS.

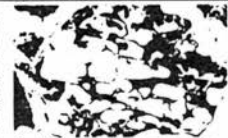
The article is basically accurate and upbeat, and there were less than the usual quota of media errors and distortions. The author of the article mistakenly stated that Fahy has not done microscopic studies to verify the quality of

Putting human tissue under glass

Human organs cannot survive long-term freezing—the ice crystals that inevitably form fatally impair their function. But Gregory M. Fahy, a researcher at the American Red Cross's Transplantation Laboratory in Bethesda, Md., thinks he has an alternative. Instead of turning the water within organs into ice, he super-cools it into glass. He and a former co-worker have already "vitrified" mouse embryos, at the Red Cross's recent Annual Scientific Symposium in Washington, D.C. Fahy described modifications to the procedure that may allow it to be used on entire organs.

With cooling, kidneys can be banked for two to three days, and hearts and livers for six to eight hours. Transplantation experts estimate that as many as 20 percent of the organs donated and available for transplantation have to be discarded because a matched recipient can't be found before the organs spoil. Fahy and William F. Rall, now at Rio

Laboratories in San Antonio, Tex., are currently studying mouse embryos initially described by Fahy and Rall.



Capillaries within the kidney show the disruption of freezing. Walls between the vessels in the upper left quadrant have broken down. Vitrification, Fahy says, will prevent this.

The vitrification process relies on the addition of several chemicals that prevent the crystallization of water within and outside the cells. With cooling, the molecules essentially are fixed in place, becoming what Fahy calls "a solid liquid." This is unlike conventional freezing, in which the water molecules crystallize into an orderly structure.

Organs present what Rall terms "huge technical problems." Among them are the use of high enough concentrations to induce vitrification, and the

vitreous preservation and she confuses rewarming from the vitreous state with "thawing" and incorrectly associates fracture formation with rewarming, rather than with cooling below -135°C , as is in fact the case.

Hopefully wider exposure of Fahy's vitrification work in the popular press will result in more investigators applying the technique and in wider funding support for this critical work. Despite the fact that Fahy's work, at this time, is the **only likely pathway open to the achievement of long term organ preservation** he is being funded only at very low levels, is carrying out this work with the support of only one technician under unbelievably cramped and primitive conditions, and is currently virtually out of money for additional, whole organ studies.

In a recent conversation with Dr. Fahy, following his presentation at the May LIFE EXTENSION BREAKTHROUGH CONFERENCE, he indicated that the work he is undertaking should, properly, be handled by a multidisciplinary research team of a **minimum** of six to ten people. Despite incredibly promising preliminary results and the successful vitrification of a range of white cells, embryos, and even human corneas, Fahy still does not have access to an urgently needed biochemist to help with studies in better identifying the mechanisms of cryoprotective agent toxicity.



Dr. Fahy

Public Education

Special Mailings

On the public relations and promotion front there have been both good things and "bad" things happening. First, the bad, then the good. As we told you some months ago, we undertook a pilot test mailing to about 30,000 subscribers of different publications. This test mailing was a "piggyback" mailing of our brochure which was enclosed along with several other life extension related mailings (offering a range of other services from a variety of other companies and nonprofit organizations). The immediate results of this mailing were **very poor**.

The mailing went out to readers of **OMNI, FORTUNE, REASON, LIFE EXTENSION REPORT**, and a number of smaller publications. The **OMNI, FORTUNE** and **REASON** markets were virtually a zero return! We can't say we're surprized at the results, but we also can't say we knew what to expect. It's worth pointing out that ALCOR didn't select these markets, lay out the mailing, or **pay for it**. We are very grateful that several other people **did** do these things for us because they have answered some important questions about how to "sell" cryonics, and what markets to use. We still don't know the best design of literature to use, and the answer is probably that different styles of literature need to be produced for different kinds of markets.

Now for the good news. The mailing **has** generated a slow, but steady stream of background inquiries. In this way, it has acted much as radio and TV interviews and stories have — the brochures seem to be circulating, and some



people have tucked them away for future reference (perhaps in an emergency). Beyond these rather nebulous and hard to assess benefits of public "consciousness raising" the mailing did establish several very good potential and actual markets for us. The Life Extension Foundation mailing had a **very** high rate of return -- well over 2% responded and this resulted in several hundred information inquiries. This pre-exposure worked greatly to our advantage when many of these people encountered us again one-on-one at the Life Extension Conference a few months after our mailing.

What we found was that the mailing established a baseline for us, raised people's consciousness about us and piqued their curiosity. It also made us seem "more familiar"; they'd already heard about us and seen printed material from us. With something as "spooky" as cryonics seems to the average person, you need all the pre-exposure you can get.

The mailings (including printing) cost about \$9,000, which probably is more than has been spent on the direct promotion of cryonics at any time in previous history. About \$2,000 of the \$9,000 was spent on printing of brochures which we have not yet been distributed, so the value of some of the expended money has yet to be realized, and the brochures do appear to be working well for us on a personal distribution basis and to "hot" markets.

In trying to sum up this experiment we would say the following:

- 1) Costly cold mailings to markets which have not shown a very good response to inexpensive test mailings should not be attempted unless the expected return is to be "consciousness raising".

- 2) "Hot" markets do exist and it definitely pays to identify and exploit them. We have picked up 10 to 15 Suspension Members in the last six months from this technique.
- 3) People need a fairly extensive packet of information in order to be "sold" on cryonics.
- 4) The lead time from initial contact with promotional material until a response is received can be a long time. We are still getting requests from material that was circulated over three years ago at FUTUREWORLD 1983!

Media Coverage and Classified Ads

We continue to get media coverage at a fairly steady rate. This has resulted in a steady stream of inquiries and a couple of Suspension Members. We also recently sold our first two sets of suspension paperwork as a result of a classified ad which Dave Kekich, one of our coordinators, ran. One of these people has been in touch by phone and seems very likely to sign up (although you **never** know until you have the completed paperwork/insurance in hand!).

Keith Henson's tireless efforts have also sold several sets of suspension paperwork and brought us several potential new suspension memberships. Subscriptions to CRYONICS are also way up, no doubt as a result of these and other efforts. Coordinators, keep up the good work.

To summarize, there has been no startling discovery about promotion of cryonics that our efforts have identified or resulted in. Steady, relentless hard work and "talking it up" seem to be the keys. We feel that the most positive things **you can do** to help with this effort are to circulate our brochures, talk about cryonics frequently to everyone you meet, and, perhaps most importantly, buy copies of Eric Drexler's **ENGINES OF CREATION** for friends and libraries.

Oregon Tragedy: Can We Talk?

Toward the end of May, we were in the middle of a frantic production cycle of CRYONICS, trying to recover from a canine total body washout (TBW) experiment, and coping with details relating to the construction of ALCOR's new home. The phone rings. A well meaning individual is on the other end of the line carrying on about the plight of some people "trapped in a snowstorm in Oregon and what we, with our expertise in hypothermia and cryonics could do to help them."

The caller presumed several things, all of them wrong, but the first and perhaps most important thing he presumed was that we knew what he was talking about! As a point of important, general information, **THE ALCOR STAFF DOES NOT WATCH TELEVISION, AND WE ONLY OCCASIONALLY READ THE NEWSPAPERS.**

("What!" you're no doubt saying, "You mean we entrust our lives to the likes of such illiterates!" Answer: You bet you do! We don't watch TV or read newspapers because they are: a) largely lies; b) consume a great deal of time and provide a lot more irrelevant and distracting information than they do

worthwhile information; c) what truth they do contain is usually badly distorted, and; d) we're too busy trying to save **our** lives and **your** lives. **We don't have time.** Now, this is not to say that we don't keep reasonably well informed. We do. But we do so by reading other print media whose accuracy and substance we have more respect for. So, if some earthshaking event has occurred, it helps if you're a little patient with us and first **explain** what has gone wrong in detail -- or gone right, for that matter.)

And this brings us to the second point about the caller and the Oregon tragedy: be well informed yourself if you expect us to do anything. The fellow who called knew virtually nothing about the situation except that he wanted us to help. With that kind of information, or lack of it, we are **not about to drop everything we're doing and run out to the nearest TV set.** We have serious responsibilities and pressures in taking care of our own members -- who are paying us to do so!

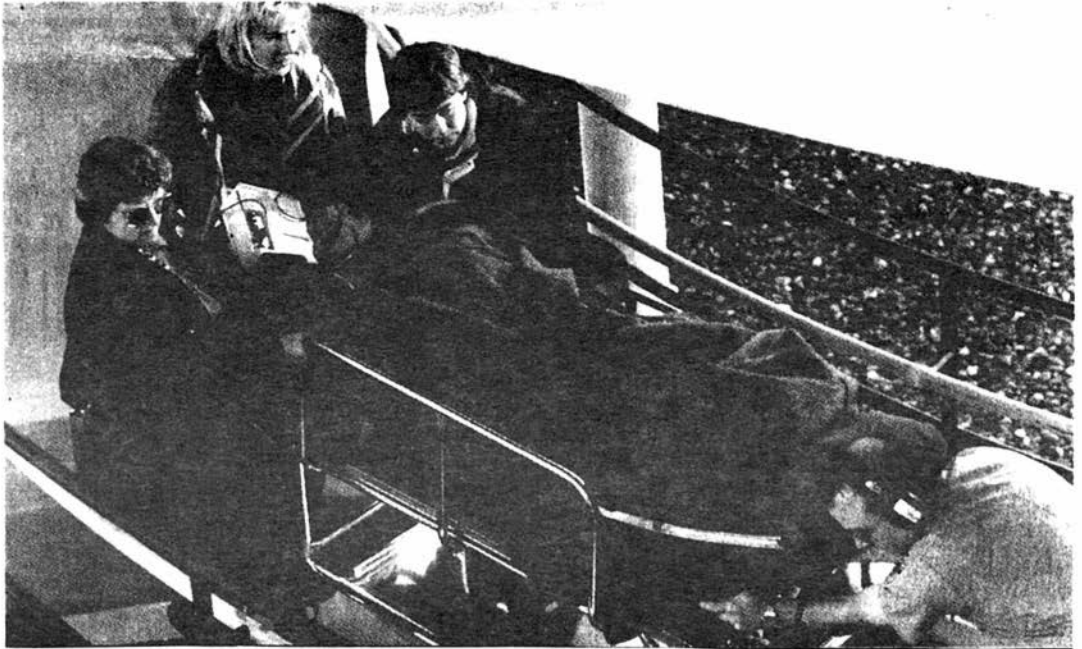
A little while after that first phone call, there were several others, all related in one way or another. The story of what had gone wrong in Oregon had gradually begun to emerge. What had happened was that a group of eleven high school students and two adults became separated and stranded during a severe, unexpected snowstorm on Oregon's Mount Hood. When rescuers finally reached the group, nine of them were profoundly hypothermic with rectal temperatures ranging from the low 30's to the high 40's °F. The physicians in attendance decided to undertake a relatively unexplored maneuver and rewarm these people using cardiopulmonary bypass. World literature indicates that in some instances people have been revived after 11 hours of apparent pulselessness in deep hypothermia. One boy survived rewarming, but none of the climbers whose rectal temperature was 42°F or below survived. (One survivor is better than we would have thought possible!)

Two of the callers were insistent that we intervene and "in some way provide help." Another person sent a telegram offering to pay all our expenses if we would fly to Emanuel Hospital in Portland and lend our assistance. One of the callers pledged to pay for suspension if there were any takers and we thought we could make a media extravaganza out of it. This is not the first time this kind of thing has happened. When an Air Florida jet plunged into the Potomac River several years ago, we received calls imploring us to help reanimate survivors who were drowned and chilled by submersion in the frigid winter waters!

Several points about these kinds of incidents in general, and these two in particular need to be made:

First, we are not experts in treating accidental hypothermia. Protocols for reviving people from moderate hypothermia are reasonably well established, and we cannot really comment on their adequacy or lack thereof, since **accidental hypothermia** is outside our range of experience. The kind of hypothermia we're familiar with, and have success (sometimes) in reversing is the planned kind: where there is excellent respiratory support, buffering, and cardiovascular support all the way down and up again. When someone becomes accidentally hypothermic a whole host of complicating factors intervene which lie outside our area of experimental knowledge.

Second, when we did finally get some hard information about what was going on, the approach the physicians in charge were using seemed very reasonable.



One of the Mt. Hood hypothermia victims is brought into a hospital after helicopter transport.

They put the patients on heart-lung machines, they buffered them against acidosis, they rewarmed them rapidly and they even used hemodialysis — which is a trick we thought we alone had thought of to normalize blood electrolytes and pH after washout with our "intracellular" TBW solution.

Third, unknown people (who are not themselves physicians) ringing up physicians who are in the midst of life or death situations are not likely to do them much good — or us either. For one thing, **think about it:** by the time the media reports these events, the key decisions have been made and most often, indeed almost always, the events being reported are already history. By the time the national media were reporting heart-lung machine assisted rewarming of the victims, they had already been rewarmed to life — or death. Remember the lag time and remember that even if we wanted to help, we would probably be unable to reach the scene in time or to reach the critical people making decisions at the scene. In this instance, one boy (the one who survived) wasn't found until the following day, but that is the exception in these events rather than the rule.

Finally, as usual, two of the callers were in almost a frenzy to get these people suspended. They called the wrong cryonics organization if that's what they had in mind.

We are not ambulance chasers. We are not about to thrust a complex and difficult-to-grasp idea on grief- and panic-stricken people who probably are not interested. We find the "vulture" mentality exhibited by some cryonicists who

run around trying to get dead or unconscious "celebrities" frozen repulsive. (If someone makes a public plea for information about **cryonics**, that's another matter altogether.) One sympathetic and supportive caller said: "All I know is that people from the American Cryonics Society were willing to go up there and try to help -- and get media attention for cryonics -- and no doubt your unwillingness to do that is responsible for your not getting money from some people."

We don't feel that that kind of "media attention" is going to do us or anyone any good.

But, beyond these points, we feel a very important fact is being missed. As terrible and as unique as the Mount Hood tragedy was, by comparison, in an awful kind of way, it was no big deal. Right now, at this very moment, in hospitals, on streets, in homes **people are dying**. Well over ten thousand children and teenagers are dying of cancer right now. These people are dying slow, gruesome, predictable deaths and most of them, unlike the Mount Hood climbers, have no hope or prospect of rescue to sustain them. People are dying everywhere, young and old alike. In many ways, the deaths of the elderly are a greater loss -- they have more experiences, more knowledge, more wisdom, and often more appreciation for and love of life than the young. There is horrible, unjust, and inescapable death everywhere. Why do the Mount Hood victims deserve special favors or consideration?

We raise this issue because it is admittedly a sore point with us. In the past, on several occasions, we have tried to raise money to keep two existing patients in suspension and to get financial assistance to suspend an individual who was unable to pay for the service, but desperately wanted it. In almost every case we were told "No." Several times we were told "That's their tough luck!" One of the people who called up about the Mount Hood disaster, ostensibly full of concern about the youngsters getting frozen, was one of the same people who turned us down -- when no press mileage was to be gotten out of it.

Everyone is free to spend their money as they choose. No one is obligated to support charity. Nevertheless, we would like to point out that ALCOR has its own standards for when and how to provide help. We believe that people who genuinely **want** to survive, and who are desperately **working within their means** to get suspended, should be the first to receive help, if there's any to be had. We also believe that decency, decorum, and informed consent are critical elements in marketing cryonics. Ambulance chasing has a sleazy reputation because **it is sleazy**. It exploits people at a time when good judgement and rational faculties are at low ebb. Such an attitude in cryonics invites litigation and reprisals -- as past history sadly testifies. It does nothing to build public confidence or respect.

Finally, there is the issue of responsibility to our members. Mike Darwin, Jerry Leaf, and Hugh Hixon, the core ALCOR technical people, feel guilty enough when they **have** to travel, since their absence alone or singly could negatively affect patient care during a suspension. They are not about to run off chasing the problems of other people **for whom neither they nor ALCOR have any responsibility**, and in the process jeopardize the safety of the people who count on them and for whom they truly are responsible.

In the future, there may be times when our expertise or knowledge may be of

use in a "public" emergency. Don't hesitate to call us if you feel this to be the case. But don't be angry or disappointed if we tell you that we are unable or unwilling to become involved in some situations. Also, and most importantly, don't expect too much from us. We are, after all, for now at least, far better at freezing people than at reviving them.

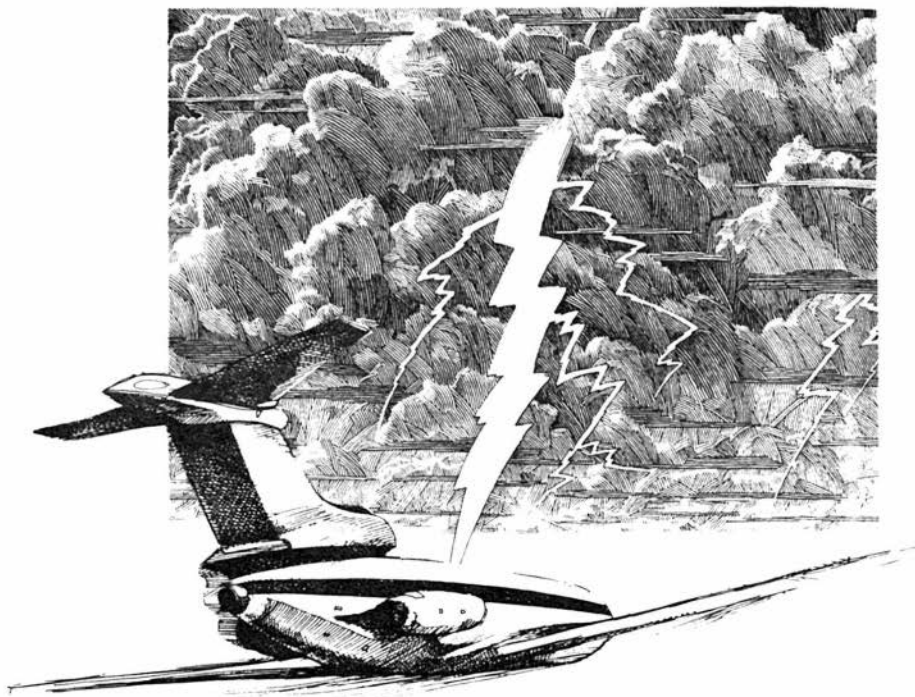
The Last Flight Of Howard Hughes

by Fred Chamberlain

Mike Darwin has quoted me, on occasion, for an offhand comment back in the mid-70's while watching a TV news broadcast of Howard Hughes' body being unloaded from an aircraft.

"There **was** a very rich man!" goes the quote!

But you have to know the background to see this thing through my eyes, or through Mike's...because Mike was in California working with Linda and I about that time, and he surely grasped the same conclusion, before anything was said by either of us!



Part of the context is that back in 1971 and 1972, we were putting together a manual of instructions for cryonic suspension. Greg Fahy had supplied a great deal of information, and Art Quaife had developed a very elaborate mathematical model of perfusion which was part of the procedure. There were inputs from many, many other people as well. The "Manrise Manual", as it came to be called, was about 100 pages long and contained chapters on procedures for perfusion below 0°C, as well as sections on how to handle avoidance of autopsy, equipment design considerations, and so on. This was a very limited and preliminary attempt to define what we needed to do, but it was better than nothing.

Anyway, it was well known to all of us cryonicists that Howard Hughes had expressed interest in the subject, had even stated an "intention" to be frozen if and when he died. Still, we didn't have the slightest clue to the state of his preparations. If Howard Hughes already had a program, we wanted to "sign up"! If he didn't, we really would have been more than glad to help develop something, even if this were just sweeping the floors in his research lab. So, we mailed him a copy of our manual. It didn't come back...we knew somebody received it, but there was no response. For years thereafter, we wondered if Hughes had such an advanced set-up that our information was useless, or perhaps Hughes was just talking about being frozen but in reality was doing nothing???

Time passed. Mike Darwin moved to California for a year or so, and during that time commercial property was rented, a van was outfitted for cryonic suspension, and a rescue vehicle was purchased and equipped. Mike pursued research he'd begun earlier in designing perfusates and protocols for suspension. At last, we were beginning to "come out of the cave", and we felt we could actually do a suspension in an organized way for the first time. Then, on April 5, 1976, word spread through the media that "Howard Hughes had died!" We couldn't help but wonder...had he been frozen?

You have to picture the TV report that Linda, Mike, and I saw, to imagine how we felt. There on television was an airplane with a mobile stairway at its entry door; then a number of people in white coats came out carrying a stretcher on which there was a long object wrapped in a sheet. This was represented to be Hughes' corpse, and he was reported to have died quite a number of hours before. He was not packed in ice or prepared in any way for suspension, so far as we could see. One could question if this was **really** Howard Hughes, but we had no good reason to doubt it.

A year earlier, or five years earlier, Howard Hughes could have hired almost every cryobiologist in the "free world" if he'd been so inclined... He could have established a gigantic research effort to develop advanced methods for attempting suspended animation, and forced forward progress in this technology at an incredible rate. He didn't do this. Howard Hughes, with a history of reckless disregard of others' opinions in the aircraft and movie industries had stated his intention to pursue the extension of his life through suspended animation, and then had done nothing to fulfill this vision of what might be possible.

As we watched his stretcher being carried across the landing field, we could clearly see that Hughes was a "has been" if there ever was one. We were sick at what might have been, at the loss of what Hughes might have accomplished. We were reminded that there is an incalculable degree of waste

loose in the world, and we knew we were seeing a classic example of it at that moment.

So, what exactly were we looking at, then? We were looking at some sort of "thing" which had, just a little earlier, been Howard Hughes. Now it was just tissue and bone wrapped up in a sheet, with whatever might have been left of Howard Hughes' identity melting away at a ferocious rate as autolysis, or biological dissolution, reduced his brain's structures to mush. In a way, we might as well have been looking at some animal that had been struck on the head at a slaughterhouse. We were looking at a thing that "had been" a very wealthy man, but now this thing was **not** a "very wealthy man"...it was just a mass of biologically disintegrating material!

So what's the lesson in this? Are there ways we can better understand what we must do, because of it? Howard Hughes vanished like a puff of smoke, and all of the incredible resources of power and money he commanded just hours before were of no help to him. Can we avoid this terrible situation, ourselves?

Perhaps! We can see that we are incomparable wealthier, alive and with a chance to be suspended when we die, than if we were in the position of Howard Hughes, deanimated and being carried down the steps from a plane with no arrangements for suspension! We may not have Hughes' level of resources to put into our preparations, but what we **do** have is infinitely more than what Hughes had, since he had nothing at all, at a point where "anything" would have been much, much better than "nothing"!

Now its time for you to take a look at your **own** situation! Do you have **your** suspension arrangements in place? Or are you, like Howard Hughes, in a position where all the money in the world won't do you the least bit of good if you suddenly die and doctors can't immediately restore you to life?

Are you satisfied with the answers to those questions? You don't want to be like Howard Hughes, do you? A dead billionaire with "nothing at all"?



POSTSCRIPT
by Mike Darwin

In reading the above piece, I feel that Fred has told only half of the story about Howard Hughes, and its implications for cryonicists.

I had come to California in July of 1974. My coming to California was motivated in no small way by my evaluation of Fred and Linda Chamberlain; their energy, their competence, and their philosophy struck me as real positive values for my survival. But it was another man who made that decision on my part possible. He was Fred's father, Frederick Rockwell Chamberlain Jr. Fred Jr. was a retired Army colonel who was in declining health, having suffered a stroke

several years earlier. Our efforts to rapidly improve the state of the art in cryonics were focused on Fred Jr. more than anyone else, for it was apparent that for him, time was fast running out.

Fred Jr. was not a wealthy man. Certainly he was no Howard Hughes. What Fred Jr. was, was an honest, principled, and caring man whom I grew to love and respect during the course of my year and a half in California. It was due to him that I was able to come to California, and it was largely for him that Fred, Linda, and I -- as well as others -- worked to prepare a solid cryonics capability. In July of 1976, Fred Jr. took advantage of that expertise, simple and crude as it was, and began his long journey into tomorrow.

Despite the obvious differences in economic status, Howard Hughes and Fred Jr. were alike in some ways. Both were hard driving, disciplined men who had made their way through life with confidence and vigor. Both had, in their youth, enjoyed a ravenous appetite for life. One approached old age and death with a staggering amount of assets and power; with the world at his feet, the other, quietly, with a modest sum of money accumulated from a life of service to a cause he believed in, and hard work.

Oddly enough, it is now Fred Jr. who is the one who has the only chance of enjoying the future. Hughes, for all his staggering wealth, is, after all, a dead man, whom no one really cares about: beyond haggling over his dwindling billions. By contrast, Fred Jr. remains cared for and deeply loved. Most of what made him the man he was still waits, quietly, in the cool embrace of liquid nitrogen, until our skill catches up with his needs.

If and when Fred Jr. wakes, he will wake to a world of unprecedented options, freedom, and wealth. He will command more power, more money, more quality life than the richest potentate or despot of today.

Then, it will be Fred Jr., who will be the **ultimate billionaire**. And he will have purchased his life with the modest coin of a lifetime of work, and the priceless one of clear vision, foresight, and the ability to **see ALCOR**.

That is the other half of the story. **That** is the lesson for all of us.

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Risk Watch: A Review

by Thomas Donaldson

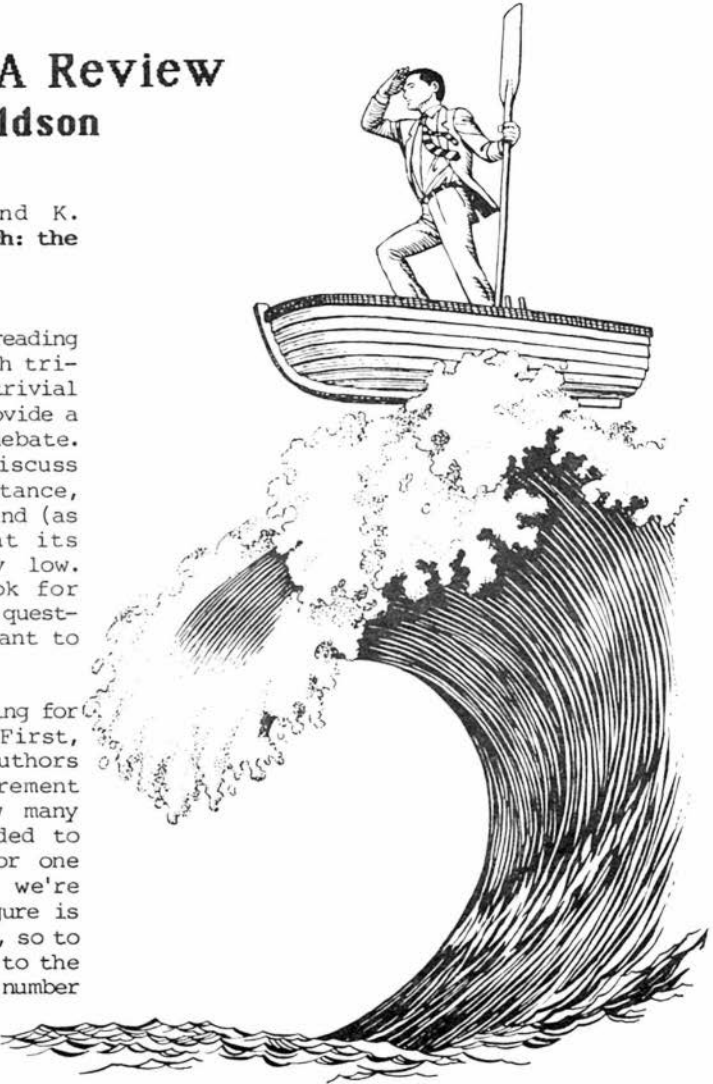
J. Urquhart, M.D. and K. Heilmann, M.D., **Risk Watch: the odds of life.**

This book is worth reading for several reasons, both trivial and important. The trivial reason is that it will provide a lot of ammunition in debate. Urquhart and Heilmann discuss nuclear power, for instance, from a risk standpoint and (as expected) discover that its risks are comparatively low. Here is a place to look for facts and figures on such questions, when and if you want to debate.

It's also worth reading for more serious reasons. First, it's informative. The authors set up a simple measurement scheme for risks. How many people at risk are needed to produce one fatality (or one injury, if it is injury we're talking about)? This figure is generally a LARGE number, so to compare we take its log to the base 10 (i.e., simply the number of decimal places). We call this number the SDU for the event.

For instance, if out of every 1 million people in the United States, 1 person dies of bee stings, then the SDU of death from bee stings is 6 (a comparatively low risk).

We can use this figure to get a feeling for the statistics of dying. For instance, Chapter 5, "Prominent voluntary hazards in everyday life" discusses the different voluntary risks. We're all familiar with the main lines: automobile fatalities are the highest risk among voluntary hazards. But Urquhart and Heilmann go further than this. By country, France has a relatively high risk of auto fatalities (70 per 100,000 vehicles per year), and safety has actually **improved** since 1930. In Britain, there were about 6700 fatalities with 2.2 million autos in 1931. In 1979, there were 6352 fatalities, but almost 10 times more autos on the road, 18.6 million. Risk depends markedly on age and





sex. For instance, in the US 8.4% of licensed drivers are under 20 but account for 16.9% of all fatal accidents. For a male the risk of dying in an auto accident is about 3 times higher than for a female.

Motorcycles are an interesting case because of the widespread perception that they are more dangerous than cars. It turns out that **if we correct for the age and sex of the driver** they're still not as safe as cars, but a lot of the difference disappears. Fatal accidents in motorcycles occur at a rate of 1 per 1000 registered cycles; in cars they occur at 1 per 4000 cars. But the overwhelming majority of motorcyclists are males under 25, so that the age/sex adjusted risk is about 1.5 to 2 times higher. Cynicists who ride motorcycles may be taking a risk, but much less of a risk than we might think.

Secondly, the book is an interesting introduction to a subject which is (or ought to be) very interesting to any immortalist, the subject of **epidemiology**. As the authors themselves say, life is an experiment. Epidemiology is the science of systematically comparing statistics of death to winkle out from them information about just which "experiments" may cause these deaths.

Urquhart and Heilmann have a good chapter on **medical risks**, which count such things as the risk of developing serious side effects from a drug treatment. They have some excellent points to make about difficulties in measuring risk of side effects. A prerelease study of a drug by a large pharmaceutical company involves testing on about 1000 to 2000 people. Such tests simply cannot show risks which occur with a frequency of less than 1 in

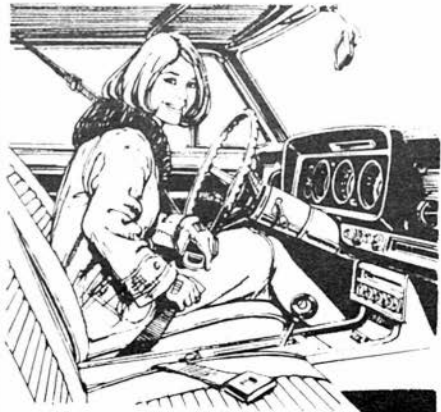
200 or 1 in 500. At the same time, many drugs are withdrawn from the market if they show significant risks to 1 in 1000 up to 1 in 30,000. These are levels at which it is mathematically impossible to discover the risk with less than 5000 to 150,000 test subjects. Such numbers are far too large for economic testing. Such epidemiological testing involves another problem too: normal tests only last for a short time. They won't reveal risks which take a long time to show up. For instance, diethylstilbestrol (DES) was widely and incorrectly used to treat impending miscarriage. It produces genital cancer in babies "treated" by it, but only after they reach puberty.

These problems concern **everyone** because drug testing is highly politicized. Drug companies who introduce a drug on the basis of extensive prerelease testing are thoroughly punished if their drug shows side effects which cannot possibly be discovered in cohorts the size of a normal testing population. This inhibits progress in drug research. But even more, for immortalists, this problem is a KILLER. It is probably the reason why none of the currently known drugs for aging has yet reached any level of acceptance, and why so much effort goes into treating conditions of aging (such as Alzheimer's disease).

The obvious answer is to set up systematic arrangements for reporting **outcomes** of drug treatment among the population of users at large. The authors argue for this. It's worth thinking about what can be done to measure effects of vitamins and other drugs on lifespan. The hardest problem, of course, is the problem of **setting up** such a reporting scheme. A large vitamin company might actually do something here by systematically collecting information about its customers. This information would have some (frankly unknown) value as commercial information, but might also reveal something of the effects of a drug. For instance, if customers never seem to continue using a particular drug that **MEANS** something. It could mean that the customers went elsewhere for their supply (which may be of commercial value). It might also mean that the drug had side effects which led most users to drop it. This might be of more than commercial interest.

Of course, any such information needs analysis and publication. Perhaps these problems can all be worked out.

Finally, I must also say that one reason for reading the book is not the one the authors intended. The authors are NOT immortalists. They do not speak of "deaths" but of "premature deaths". The meaning of their figures stares them in the face, but they look away. Right now, the major diseases causing both death and morbidity are aging-related. We can read their statistics as a strong exhortation to gerontological research. Urquhart and Heilmann even recount the stories of the **REALLY** large medical studies on risks of hypertension and its treatment. These can involve over 10,000 people. Any study on that scale would also tell us about effects of the antiaging drugs, if only doctors would collect these statistics. Vitamin use is widespread already, and some of the harder drugs, such as L-Dopa, are now bought and



used. The only change needed is to remove the word "premature" from our accounting of deaths and study them all en bloc.

Prognosis And Cryonics by Thomas Donaldson

This article is really a set of questions rather than a set of answers. The answers to the questions change constantly as medical technology and cryonics experience advances. The fundamental questions will always remain.

The fundamental question (from which most of the others in this article derive) is that of how we (as cryonics bystanders) can know that someone near us is close to death.

I've worded this quite carefully. The fact is that most likely, when we ourselves are close to death, we'll either never know it or else know it but be quite unable to take action on that basis. It is poor thinking to believe that as soon as we know we're dying we can (under our own steam) fly by public transport to the ALCOR facility. It's even poorer thinking to believe that we can actually sign up for suspension in such a condition. So this article isn't really addressed to anyone who's dying. It's addressed to those who are caring for them.



Of course the first obstacle is psychological. If we could KNOW that someone was about to die then our problems would be solved. But there's always a tendency to hope that it ain't so. (If you are the one dying, this is even more likely to be true. No, you needn't make arrangements just yet, things aren't THAT bad...).

It happens that in the medical literature there are studies of a close parallel case. It's the case of how someone nearby can recognize that someone else is having a serious heart attack, especially for the first time. This isn't just a matter of recognizing symptoms; it also involves recognizing that something needs doing QUICKLY or the patient will die. That's a much "softer", sociological sort of problem.

In **MEDICAL CARE** (18(3), 297 (1980)), A.A. Alonzo presents a statistical study of how people decide to seek emergency help for a coronary attack. If they extend to cryonic suspension, his results raise some significant problems for us. The immediate problem he addresses is that of finding out how long a patient and those around him take to decide to use the Mobile Coronary Care Unit (MCCU). Someone faced with a possible heart attack might decide that their symptoms are "merely heartburn" and do nothing until too late. They might try to go to the nearest hospital emergency room by public transport, call a doctor

(expecting the doctor to decide), or finally call the MCCU. All of these decisions, of course, affect the time available for treatment.

It turns out that only 6 percent of patients decided on their own to call the MCCU. Fifty-two percent of patients went through a phase of "self-evaluation" followed by consulting friends and associates. Sometimes this "consultation", of course, consisted of their physical collapse. Friends and associates then had to decide what to do. In another large block of cases, 41 percent of patients consulted with friends and associates immediately without any phase of self-evaluation.

It seems from Alonzo's study that two factors had a major influence on a decision to call the emergency MCCU. Usually MCCU calls would happen because someone else nearby, NOT a doctor, took over the problem and called the MCCU. Secondly, patients whose symptoms came on quickly and were incapacitating tended to approach the MCCU more frequently. Difficulty breathing and heartbeat problems led to much more rapid calls to the MCCU than did pain (which many might misinterpret as "merely heartburn").

One of the more interesting outcomes of such work is what it says about family members. Immediate family members are almost as involved as the patients themselves. If someone has a severe heart attack, everyone close to him (or her) will have their lives and future disrupted. Just as patients will want to explain away their symptoms as "minor", so will close family members. Several different studies of how a patient decides his problem is serious enough for emergency care suggest that close family members aren't as reliable as lay members of the general public in dealing with a serious heart attack.

Similar problems also exist for more lingering conditions than heart attacks. In **BRITISH MED JOUR** (281, 1328 (1980)) John Hinton writes about communication between spouses, one of whom suffers from a terminal disease (usually cancer). He found that people with average or poor marriages were much more likely to share their perceptions of impending death than those with close marriages. Even in close marriages, however, a significant percentage DID tell their spouse. Here are the figures: in "very good" marriages 73% of patients told their spouse (11 out of 15). In "average or poor" marriages, however, 12 out of 13 told their spouse (92%). Of course, in order for suspension arrangements to be put in place, someone must take steps for that to happen. This requires awareness that death may soon occur.

There's also another problem applying much more to rapidly developing illnesses such as heart attack than to lingering deaths such as cancer. This is the problem of "undue propriety". Heart attacks often occur to patients at home during inconvenient hours (like 3:00 AM). Many patients are reluctant to call their doctor or seek any help at such times. The thought is "let's wait till morning". In fact, ALCOR has responded well in such cases once called. It's important that everyone understand that the job of a cryonics society is to be on call at ALL times. No cryonics society can respond if it is not called.

These results have implications for cryonicists. First, we will have to accept a period of delay in which a patient and family mull over the symptoms before they approach a cryonics society, EVEN IF the patient is already a suspension member. Second, even if they are cryonicists we should not rely EXCLUSIVELY on close family members.

One way we have of dealing with the problem is simply to keep in touch with other cryonicists. For isolated cryonicists this is harder, but even having one other cryonicist who is NOT closely related nearby ought to help a lot. That person can help out by stepping in with strong advice when necessary. In order to do so, of course, a friend in cryonics needs to know that there is a problem. This means that they should be informed of any critical event such as entry to hospital or even a significant illness.

Keep in touch with other cryonicists. Attend meetings. There's no use in sitting all alone in your room, come to the Cabaret.

In terms of reducing the delay time a major problem is how to recognize the symptoms of impending deanimation. Heart attacks are relatively clearcut. Of course one good sign of danger is very general and very simple. If someone is so incapacitated that they can't eat, drink, or go to the bathroom by themselves, they're probably in a bad way. COLLAPSE isn't a good sign. What cryonicists as bystanders must understand is just how much people close to the patient will want to minimize the serious nature of such signs.

One thing we need is widespread understanding among cryonicists of "warning bells": signs of impending death. These will vary with the disease, the patient, and the state of medical technology. Our understanding will continually become outdated by further advances in care. However for what it's worth, here are some results from a literature search I've made on this problem.

Heart Disease

First, heart disease. This is currently the largest single cause of death. After someone enters a hospital for suspected heart attack there are some good papers on how to find out likely outcomes. In *N ENGL J MED* (302(17), 943-8 (1980)) A.G. Mulley and others present their results from studying patients in intensive care units (ICUs). Mulley et al found criteria by which they could sort patients into three different risk groups after only 24 hours in intensive care.



Out of 360 patients admitted to the ICU, 47% did not have evidence of serious heart attack after careful examination in the ICU. The three criteria Mulley et al used were the presence of serious complications, elevation of levels of one enzyme (**creatinine phosphokinase**, an indicator of muscle damage), and evidence on the ECG of dead tissue extending through the wall of the heart. This 47% of patients had excellent prognosis. None died. The ICU played its biggest role in allowing monitoring and assessment, just in case.

The other 53% of patients, of course, had much more serious problems. We can turn this study around and say that friends and particularly the cryonics society should enquire about these three criteria and whether they apply to a patient. This study suggests that admission to an ICU should ALWAYS be an

occasion to consult your cryonics society. It's probably not ALONE sufficient reason to mobilize a team, but should certainly be grounds to start thinking seriously about that possibility. In terms of premonitory signs of serious problems, if you are the friend of a patient it's not a good idea to rely on your own judgement. Consult with his cryonics society.

For risk of sudden death due to heart conditions one subsidiary question has developed a lot over the last five years. This is the question of whether or not we can predict which patients are likely to suffer sudden arrest of heartbeat. The first work on this problem was very promising (W. Ruberman et al, **NEJM**, 297, 750 (1977)). It seemed that we could develop practical measures predicting the danger. Unfortunately the only technique which currently predicts danger of sudden cardiac arrest (electrical stimulation of the heart) isn't yet practical for routine use on all heart patients. The other tests have a lot of **statistical** validity, but can't draw a sharp enough line between patients at risk and those not at risk. We can't expect to rely on it (cf. M. Lesch and R.F. Keyhoe, **NEJM** (editorial), 310, 255 (1984)).

A second subsidiary question now has better answers, though still not perfect. It is possible to distinguish between survivors of a heart attack in terms of their risk of death within the next 1 to 5 years. This won't really tell us when to mobilize, but it ought to tell us that someone needs careful watching. Several articles present specific abnormalities which if present mean a greatly increased risk of death (K.I. Saunamaki and J.D. Andersen, **EUR HEART J**, 11, 752 (1983); S. Pohjola, P. Siltanen, and M. Romo, **AM HEART J**, 98(1), 32 (1979)). Of course, the positive side of such indications is that if they are **absent** then risk of death is much less! The major indications of death risk consisted of two; **ventricular arrhythmias** found after exercise; and a small (rather than large) increase in joint pressure and rate after exercise (PRP, or pressure-rate-product).

Strokes

Strokes are a second major cause of death. Unfortunately strokes give us some of the most serious problems, since victims of stroke often remain on a respirator for prolonged periods. The major indicators of likelihood of a **FUTURE** stroke are, in general, a brief loss of sensory, thinking, or muscular control. This might include such things as temporary hearing loss, nausea, numbness, paralysis, or loss of control of a limb or side, falling without known cause, temporary amnesia or inability to recognize faces, double vision, dizziness, and other symptoms. In general, any symptom caused by a temporary loss of blood supply to a particular brain region suggests a danger of stroke. There are treatments for such conditions, in particular treatments to lower blood pressure.

There are also less obvious indicators of stroke risk. M.E. Stuart and others (**LANCET**, 27, 479 (August, 1983)). If any of the above symptoms



happen to you, you have had a TRANSIENT ISCHEMIC ATTACK. Stewart et al present evidence in their paper that levels of **beta thromboglobulin**, a blood protein suggesting the presence of blood clots, will predict future likelihood of strokes. Once someone has a stroke, something can also be said about their likelihood of survival. A study by D.T. Wade and others (**AGE-AGEING**, 13(2), 76-82 (1984)) finds that 3 factors are related to longterm survival. Age (of course) but also the severity of the stroke (as measured by whether the stroke victim could walk afterwards) and the existence of cardiovascular disease.

Once you've had a stroke, of course, you may very well end up in a coma. A review in the **BRITISH MEDICAL J** (283, 3 (1981)) gives us statistics on likelihood of recovery of a patient from coma. The figures are not good. If we define a **coma** as "an unresponsive sleeplike state with no evidence of awareness of self or environment from which patients could not be aroused" then if patients do not come out of coma in 3 days they probably won't survive at all. These authors report that out of 124 such patients only 7 recovered to any reasonable state. Out of the 500 total patients studied only 1/3rd of them survived for a week. We would need a neurologist to evaluate the state of patients in a stroke. However it would be easy to let hope for recovery blind us to facts. Since prolonged maintenance at body temperature will severely damage the brain, we'll have to guard against such hope.

Cancer

Cancer of course isn't usually sudden. This may make it worse for cryonics, since at any given time there's no reason to expect someone to die **immediately**. Even if the doctors say your friend has 6 months to live, if he seems fine there's always the hope that he will last for another month, or two, or perhaps even another year. Our real ability to predict death in cancer cases is far too indefinite. In fact, some cancers may have become chronic conditions. A recent ALCOR patient survived for 10 years with her cancer. Many readers can probably recall similar cases from their own experience.



If anything this is a strong reason why you should have your cryonics arrangements in place BEFORE you are diagnosed with cancer rather than afterwards. Even if in remission you may not be a death's door, but you still won't be in a fit state to sign up.

The elementary major sign of impending death for cancer patients is entrance into the hospital combined with an inability to care for oneself. For several cancer conditions, however, doctors have worked out statistics on prognosis. Unfortunately they don't tell us about imminent death, they just tell us how likely it is that someone will not survive for 5 years. Furthermore, prognosis varies with the cancer. We can't generalize. Finally, it's important to know that the TREATMENTS for cancer are themselves quite

toxic. Patients can die of their treatment, too.

It may be a sign of the times that (judging from volume of papers) doctors seem to know most about prognosis in **lung cancer**. Since far fewer cryonicists smoke than in the normal population, this information isn't much good. However there are tests of immune response to **colon cancer** which distinguish patients more likely to survive (A.K. House and A.G. Watt, **GUT**, 20(10), 868-74 (1979); E.D. Holyoke and M.H. Goldrosen, **INT ADV SURG ONCOL**, 1, 85-111 (1978)). There are also criteria (based on the type of tumor) which distinguish patients likely to survive **breast cancer** from those not (cf. J.M. Dixon et al, **BRITISH J SURG**, 72(6), 445-8 (1985)). None of these methods warn us that death is imminent. They only tell us it's likely in a few months.

Someone with cancer who has already arranged for suspension can use this time to make last-minute rearrangements which may facilitate their suspension. This may include such things as selling their house (or other illiquid property) so as to free up capital, and perhaps even moving closer to a suspension center. Spouses of such a patient might try to achieve similar aims in managing the patient's affairs. It may also be reasonable to stockpile suspension supplies nearby in case they are not already available.

Of all conditions cancer **seems** the one in which those without suspension arrangements in place have the greatest opportunity to put them in place. I do not really understand why their record has been so poor. Perhaps they want to maintain hope of recovery for so long, and the disease, like a seducer, gives them many chances to do so.

Progress in cryonics

To some unknown degree cryonics patients aren't really like others. Our habits are different, so that we'll suffer from different diseases. Our psychological responses will certainly differ. Some might say, for instance, that comparing cryonics heart patients with ordinary heart patients has got to be wrong, since the latter suffer from an ingrained feeling of helplessness while we do not. As our collective experience grows we'll likely acquire much more information on how WE will respond to life-threatening illness.

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Ashleigh Brilliant

Interview With Jerry Leaf

One of the greatest dangers in life is to adopt a too simplistic view of the world. Simple explanations of life have a tremendous appeal, because they offer to boil down the whole complex panorama of existence into an easy bromide. To some extent, the "great panora theory of history" is such a simplification. Men are not only shapers of their times, they are shaped by them. It is a complex interaction. Nevertheless, we, the editors of CRYONICS feel justified in saying that Jerry Leaf is arguably the most important man in cryonics since Robert Ettinger. He has shaped cryonics more completely and surely than any man who has come before him.

Almost singlehandedly Jerry has transformed cryonics, at least cryonics in Southern California, into a credible, professional operation. He has also, more than any other man improved the quality of care delivered to suspension patients. But perhaps most importantly he has brought with him to cryonics a degree of integrity and high values which were sorely lacking before. Jerry's integrity, coupled with his total commitment to the use of reason and the scientific method have forever changed cryonics and attracted the best and brightest from around the world to make their home in Orange County and to become a part of the Cryovita (and thus ALCOR) family. Both of us, the editors of CRYONICS, are here doing the job we're doing, almost exclusively because of Jerry Leaf and the values and skills he represents.

However, integrity, values, skill, competence -- while these things describe Jerry, and while they are necessary and even critical ingredients in the makings of a world shaper -- they are not enough. It takes more -- it takes sensitivity, fairness and humanity to attract and hold **people** and to gain their loyalty and love. Jerry is blessed with these things in abundance. Though blessed is the wrong word to use, since it implies that "it just happened". To know Jerry is to feel completely and at once that you are in the presence of a man who has taken nothing, but who has made and shaped himself completely. This interview will hopefully provide a glimpse of that tremendous sense of self control, and of the immense reservoir of concern and competence which accompanies it.

CM: Very few of our readers know much about your background, about what caused you to get involved in cryonics. Could you tell us a little about yourself and your personal motivations for involvement in cryonics?

JL: My motivations go back to the beginnings of the 1960's. They began in the jungles of Southeast Asia. I was involved in a special operations group deployed out of Western Europe. We were assigned a highly sensitive mission in South Vietnam, the kind that were eventually handled by special teams called Phoenix Groups. We were further used as a test case for operations across the border into North Vietnam. Part of what we learned was used to develop what became known as MACV-SOG, a top secret organization involving the South Vietnamese and American Special Forces and the CIA in mid 1964. It was during these missions into North Vietnam that our casualty rate began to rise,

eventually exceeding 50% before our return to Western Europe.

There is a special kind of chemistry and feeling that is shared by people who face death together over a period of time. I came away from these missions with the face of death having a very specific meaning; it was defined by a roll call of men we carried out of North Vietnam. They went home; there were no MIA's. I lived because of these friends, and it was the worst feeling not to be able to reciprocate.

I left my fear of death somewhere in the jungles of Vietnam. To this day I have absolutely no fear of death, only the fear of not being able to save someone else that I care about. It's not that I don't want life for myself, because I do very much. I just don't feel anything about nonexistence. I only have the positive feeling towards life. I want more of it.



Jerry Leaf in Guatamala in 1959. 18 years old.

This caused me to begin to think about the fragility of life and what could be done to prevent the loss of people that you cared about. People whose lives were in extreme jeopardy -- or even beyond the ability of current medical science to recover.

When I came back (we were quietly reinserted into Germany after the Southeast Asian operations) and I was cycled back to the US for a period of time (during which time I was involved in additional covert operations here) I began to become increasingly concerned over the issue of life and death -- over the tremendous importance and preciousness of life. I began to ask questions about life itself -- I started studying biology and philosophy in college and I became particularly interested in suspended animation. In 1966 I heard about a lecture that was being given by Robert Nelson of the Cryonics Society of California (CSC). I attended that lecture and it stimulated me to contact the cryonics groups that were in operation at that time: CSC, the Cryonics Society of New York, the Cryonics Society of Michigan and a group in France. I contacted all of them by mail and tried to keep in touch with some of them over the years when I was going to college.

I was attending college in Southern California at the time. I was married in 1965 and stayed on in Southern California for two more years at which time I completed a B.A. degree in philosophy. Afterwards I moved to Nevada to pursue a graduate education in biology. I was there almost 2 years. I left the graduate

program because of inadequate instrumentation and support which I needed to pursue low temperature biology. At the time I was in a special program to get a degree in low temperature biology. The university there is primarily oriented toward ecological studies — and still is. After awhile I began to realize that I knew more about low temperature biology from my independent studies than they did! That, coupled with the lack of equipment available for graduate research caused me to make the decision to return to Southern California.

CM: Why did you do this? Did you plan to pursue graduate studies in cryobiology here?

JL: No, I had pretty well determined at that point that the kind of research which needed to be done and which I was interested in doing would require equipment and facilities which would simply not be available to me in a University environment. No publicly supported institution would be likely to support the kind of work I knew needed to be done. The Southern California area represented a lucrative market in surplus equipment -- because of the many medical centers, high technology manufacturers and Universities in the area. I began to acquire equipment for my own use.

I began working at UCLA in the operating rooms with the idea in mind of setting up to do research myself in my own laboratory. I recontacted Southern California cryonics by attending a meeting sponsored by Trans Time. This was an attempt by Trans Time to cut into the Southern California cryonics market of Manrise Corp. At that time, I agreed to do the first Total Body Washout (TBW) of a dog, to be conducted at Trans Time's facilities in Emeryville. Shortly thereafter, I met with Fred and Linda Chamberlain of ALCOR/Manrise and agreed to help them with dog work if they were interested.

I did the first cryonics dog TBW up at Trans Time in 1977 in which the dog lived for 17 hours. All the equipment and supplies I took up in my van, except for some material which I relied on them to provide. That was partially a disastrous decision I made (laughter) because the main things I relied upon them to provide were inadequate. This was my first experience in seeing what was actually available for cryonics. I was really surprized at the inadequacy of their equipment and at their misconceptions about how to carry out extracorporeal perfusion. The degree of their isolation from the mainstream of medical knowledge was particularly surprizing. They had very little insight into what was going on in clinical medicine. They had a little insight into low temperature biology and physiology, but they had essentially no equipment that I considered to be useful at the time for actually accomplishing extracorporeal circulation of blood or cryoprotective agents in a manner which would insure proper perfusion by any clinical standards.

CM: How did Cryovita Laboratories come about?

JL: After I came back from doing the experiment with Trans Time I got involved down here with Fred and Linda Chamberlain of ALCOR/Manrise and we did a study in which we carried out cryoprotective perfusion of a dog simulating the protocol which had been applied to a previous ALCOR neurosuspension patient. The purpose of this experiment was to evaluate the ultrastructural effect of the suspension procedure on the brain. Electron microscopy was later performed on the animal's brain to evaluate structural integrity.

All of this brought into sharp focus the need to develop real facilities

for research. At that time I was operating out of my garage. There was so much equipment stuffed into that two car garage that any kind of meaningful work was impossible. Also, in order to do animal research I realized I would need to be licensed by the Department of Agriculture. That meant M-2 zoning for the facility, so I moved from my garage into the industrial facility which Cryovita and ALCOR currently occupy, in 1978.

I established Cryovita as a corporation for licensing purposes and for tax purposes -- and of course for common sense reasons of limiting my liability. The fundamental motives were to provide a more adequate environment for research operations and for patient perfusion services that I perceived as being unavailable through Trans Time or Manrise.

Shortly thereafter I agreed to do perfusions for Trans Time. In the interim, Manrise, the Southern California "for-profit" entity had been sold to Trans Time by the Chamberlains. I ended up being the subcontractor to Trans Time doing perfusion's for both ALCOR and the Bay Area Cryonics Society.

CM: Since Manrise had merged with Trans Time at that point, why didn't you merge with Trans Time too?

JL: Well, I decided that rather than merging with Trans Time I should remain a completely independent entity capable of making my own decisions about who to become involved with, who to remain involved with, and to have the ability to make decisions in protocol with more influence on Trans Time. If I were just a stockholder in a larger corporation controlled by many stockholders -- even if I were the principal stockholder -- I wouldn't have the ability to influence the Trans Time board in what I considered to be technical decision making in areas in which they had no expertise and I did.

CM: Do you have any regrets about having made that decision and about having taken on the tremendous personal and financial load which Cryovita has represented to you?

JL: No. As a matter of fact I think the decision to remain independent has proven to be the correct one. For a number of years I enjoyed a considerable influence on what the perfusion protocols and level of technical expertise would be in perfusing Trans Time patients -- which was essentially all the patients being done over that period of years. It was an opportunity for me to influence the technological developments during those years and introduce substantial improvements in patient care. It also provided me with an opportunity to be involved directly in the perfusion of cryonics patients and to become involved in training people to do suspensions. It was a tremendous educational experience for me, and it provided me with an opportunity to provide trained people down here in Southern California who would be directly in support of patient care and research. It was essentially an ALCOR team direct by Cryovita Laboratories. The nucleus of that team is still doing research at Cryovita.

CM: Up until about a year ago Cryovita was providing services to TT. What caused the contract not to be renewed.

JL: We were expending over \$20,000 per year to operate Cryovita with most of that money going solely in support of patient perfusion operations. Trans Time had always plead poverty and compensated Cryovita for these services in modest amounts of money, but mostly with stock. The last three years of the contract



with Trans Time we were paid entirely with stock because I was concerned that they wouldn't have enough cash flow to keep their doors open.

I was happy to provide them with help during these rough times. For years I accepted this arrangement because I wanted to see them make a go of it. But then I began to notice that windfalls and benefits which came their way as well as research money and other cash flow was not trickling down here. Not even in **small** part. It became clear that they were content to let me and the other Southern California people absorb the tremendous cost of providing perfusion services to them — indefinitely. So, when we said that these services were going to **cost something**, about \$3,500 a year, not even enough to begin to cover their share of the costs, the negotiations

began to linger. We finally agreed upon a combination of cash and equipment, but never signed the contract.

CM: Why not?

JL: As I said before, the technological decisions as to how to treat suspension patients were largely left in my hands, and they were very sensitive to any input I had. However, there were some people in Northern California who were not happy with this. They felt that the quality of perfusion was secondary to taking some kind of immediate action — even if that consisted of walking into a grocery store and buying table salt and culinary ingredients and pumping these through someone with an embalming pump! If someone wants to do something exclusive of cryobiology and the medical sciences, they don't need my services. I offered to provide training for Trans Time/BACS personnel, but they would not provide even the modest levels of funding required. Capability was set on the shelf for future consideration.

CM: Surely you must be joking about the grocery store scenario?

JL: No. This is something which had existed as a matter of contention in cryonics for a number of years before I came along. I just brought that difference into sharp focus because I represented a greater extreme of technical accomplishment than the others who had held this position previously. I think these background issues of cost vs. quality were partly responsible for their decision not to pursue services with Cryovita.

Some real differences between Trans Time's operations and what I considered Cryovita's proper operation began to gel when we had difficulties with relatives who had placed a patient into suspension. They seemed not to be aware the nature of the process and what kinds of injury and damage these patients would be subjected to as a result of the preservation process. In one instance Trans Time failed to notify a relative about a serious error they made in the care of a patient and that information was communicated second hand, and many weeks after the incident.

As a consequence of an inability to communicate with people in a way that was mollifying of their doubts they began to incur litigation and threats of litigation. This resulted in the loss of at least two of the core team members here in Southern California with these people stating that they could not justify continuing to participate in suspensions if it jeopardized their livelihoods and the the livelihoods of their families. Of course, the Nelson disaster in Chatsworth only increased tensions and concerns over litigation. It also caused me to become increasingly sensitive to the issues of informed consent and public image.

CM: Why was this?

JL: I had given interviews to the press during this period in an attempt to show the difference between Nelson's operation and the rest of cryonics. These interviews were edited in such a way as to make them useless to defend the difference between existing cryonics organizations and Nelson's CSC. This problem was only made worse by the misuse of photographic and video materials that were taken here at Cryovita Laboratories, with my permission, for the use of Trans Time in promoting cryonics when the TV news people discussed the Chatsworth disaster while showing images of a modern cryonics laboratory.

What occurred was that Trans Time had been selling these materials — in the beginning they sold them with inadequate controls to people not only in the mainstream news media, but people who were making documentaries on whatever... The consequence was that material depicting Cryovita was used in a "film" entitled FACES OF DEATH. This was a film I considered to be of an extremely negative character in as much as it packaged human death, misadventure and death related procedures in a vulgar and exploitive way. It showed cryonics as one of those death related procedures in a context which I found completely unacceptable. It showed cryonics patients inadequately covered in terms of their privacy, which I considered unacceptable for surviving relatives to see. It didn't cover their nakedness for example, it identified them by name, and it showed team members both in Northern and Southern California whose permission was not obtained for this kind of thing — including me. I considered that to be totally inappropriate to the purposes for which I allowed Trans Time to make video recordings and photographs in my facilities.

Consequently, before any contract could be signed between Trans Time and Cryovita, I required that I have control over any material, photographic or video, made at my facilities. I agreed to to allow Trans Time to use this material for promotion on an individual, case by case basis. I further asked that they not release any of the material which had been previously made at Cryovita to anyone without first contacting me for my permission. Apparently, Trans Time decided that they had made so much money from the previous sales of video material produced at Cryovita that they were unwilling to release that control. So, there was no longer, at that point, the possibility of my signing a contract with them.

I have to believe their motivation was never high, and when this issue was raised it was the end. As far as I know, this issue of public image and how you are represented to the media is something that no organization will give up — and Cryovita is as sensitive about that as they are. I felt I owed an ethical responsibility to team members, the relatives of patients, the patients themselves and of course to myself, to protect the use of film footage and photos made at Cryovita. So long as Trans Time would not agree that I would

have equal control over my images — the same control they would have over their own — there could be no contract.

CM: A mutual veto on use of images was unacceptable to them?

JL: That's correct.

CM: As you know, ALCOR has undergone quite a metamorphosis and change since the days when you first became involved. You have been a very active participant in that change. To what do you attribute those changes?

JL: The way things were divided up between Trans Time and Cryovita for patient services and support was as follows: Trans Time subcontracted perfusion services to Cryovita with the understanding that whenever it would be feasible to transport a patient to Cryovita that would be done. Over that period there was only one case where a patient was perfused in Northern California — a case where the patient lived relatively close to the Emeryville facility and there was plenty of notice for Trans Time to prepare for that case. I flew up to Emeryville to do the surgery and direct the perfusion.

Cryovita did not develop rescue/response capability to any great degree. There were no full time people available down here at that time, and the overall level of activity was very low. It was all I could do to maintain readiness at Cryovita to handle perfusions -- and this was all I was obligated to do. All our work in training was focused on getting team members some level of skill in perfusion techniques.

Until the Northern California patient I alluded to earlier came along there was little training for transport operations in either Northern or Southern California. In 1980 I had the occasion to make personal contact with Mike Federowicz, who I had corresponded with before. Mike had transported a Trans Time patient to Southern California and then stayed on to help with a second suspension which came on the heels of the first. Mike had been working in a cryonics group in Indianapolis, Indiana for a number of years. At that time I tried to open the door as far as doing what I could to persuade him that Southern California offered an attractive alternative to the difficulties he was experiencing in Indiana. I needed someone else out here to work with who had a background in clinical medicine, such as Mike did, and he himself had begun to move toward clinical models of perfusion -- using roller pumps and so on. I felt that he and I working together would allow us both to accomplish a lot more than if we were working alone. He was the only one else in the world who seemed to be aware of the fact that something needed to be done to upgrade the level of care — and to realize that that meant medical technology.

When Mike came out here in 1981, (he remained "signed up" with his own organization, the Institute for Advanced Biological Studies which he had brought with him from Indianapolis) he came into closer involvement with ALCOR. He began to question the adequacy of services being provided by ALCOR. There was no one in the presidency of ALCOR who understood clinical medicine or who had the time to actually promote growth of ALCOR.

Since ALCOR was totally dependent upon Trans Time for services at that point, Mike began to urge changes at that level. Up at Lake Tahoe, shortly after his arrival here, he lobbied Art Quaipe, unsuccessfully, for the Trans Time purchase of an A-2542 storage dewar. Mike felt that neuropatients should be

stored in such a dewar for reasons of safety, economy and logistics. He also strongly urged institution of regular training for transport and perfusion, as well as a better communications system for emergency responsiveness.

I think the beginning of the shift came shortly after the 1981 Lake Tahoe Conference when an ALCOR member, who was also a Trans Time client and who was dissatisfied with Trans Time's services, proposed that he purchase the A-2542 and that ALCOR pursue his father's care at Cryovita.

CM: Was Trans Time responsive to these requests for increased levels of training and services?

JL: Mike and I felt that we needed to have a truly complete capability in Northern and Southern California. We needed to have people locally who had rescue skills and we needed liquid nitrogen available locally to allow us to conduct low temperature biological studies on freezing viability and ultrastructure.

Since we hadn't developed patient storage and transport capabilities here in Southern California it was perceived that ALCOR was really not able to respond in the event of an emergency. Also, it had already been shown that there was an inflexibility in Trans Time's storage of patients -- since they owned the patient dewars and thus had a "lock" or "hold" on the patients. It was Trans Time's policy to charge an amount of money during the initial phase of cryonics services which was equal to the purchase price of the dewar space used by that patient -- but not to let the ownership interest pass to the nonprofit organization which actually had responsibility for the patient. In order to move the patient the nonprofit organization would have to come up with thousands or tens of thousands of dollars to purchase storage equipment which, in a real sense they'd already paid for! It became crystal clear that the non-profit organizations, who had final responsibility for patient care, could not move their patients from one service company to another, regardless of the possibility of finding less expensive or better services elsewhere, unless they owned the patient storage dewars.

There was always a lot of talk about the importance of having free market competition and more than one cryonics service company so that if one company went out of business others would be there to provide the needed services. But the actual practice of BACS was to destroy their own ability to use the free market to secure alternate services. There was a situation with interlocking directorates between Trans Time and BACS and it certainly reeked of a conflict of interest with regard to patient storage. I believed that the patient's interest should always come first.

Mike felt that in order for it to be economically feasible for ALCOR to control its own patients, and to pursue services elsewhere if necessary, ALCOR had to own the dewars. That was impossible with Trans Time and that was a major factor in ALCOR's deciding to provide its own patient storage.

There was also an inadequate amount of money being spent by Trans Time to train transport teams down here. In fact there was no money being spent. There was also no money being spent to maintain suspension team training. So ALCOR, I think largely as a consequence of Mike's frustration over these issues -- and I supported him a lot in that -- decided that they would increasingly have to take over the responsibility for emergency response services and storage services.

If they were going to do that, it was only a matter of time before it came to everyone's attention that they might as well have their own independent contract with Cryovita for necessary perfusion equipment and services.

CM: Why was this so?

JL: Well, at that time ALCOR was paying Trans Time for emergency responsibility and perfusion services, but ALCOR was essentially providing those services. It didn't make sense that we should have all of the responsibilities and none of the benefits of emergency responsibility fees after costs. There wasn't enough cash flow to support two facilities. I never expected Cryovita Laboratories to be supported through cryonics, but to have no plan to support activities in Southern California was a bit too much. So, when Mike was made president of ALCOR he moved to change that relationship from one of dependence on Trans Time to one of complete independence for ALCOR.

At that time, as now, Cryovita was completely independent so that it could provide perfusion services to ALCOR or to any organization that it chose to deal with. At that time that included Trans Time and the Cryonics Society of South Florida.

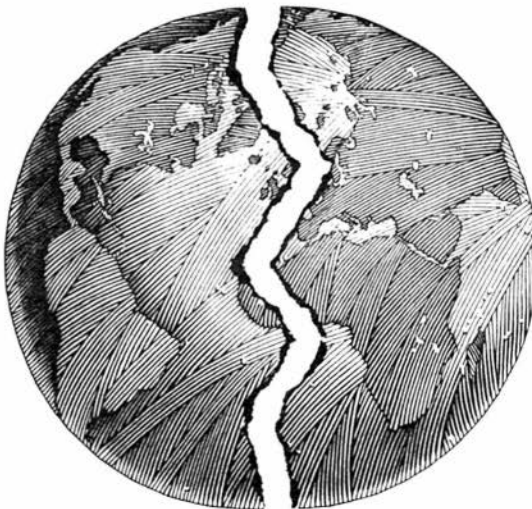
END OF PART I

A World Gone Wrong

by Mike Darwin

A few days I ago spoke to a high school chemistry class on cryonics and molecular technology. I like speaking to people about cryonics and I was particularly looking forward to the opportunity to talk with young people about the challenges and choices that lie ahead of us.

The lecture, or more precisely my interaction with the students and their teacher which followed, left me angry, shaken, and severely depressed. These kids, virtually every one of them, could best be described as subhuman. I say this, not because they were not receptive to my presentation and not because they were concerned about or hostile to cryonics and/or molecular technology. In fact, either of those two responses would have given me some positive feeling, some reason to hope. The shocking fact





is, these 16- and 17-year-olds weren't really concerned about **anything**. After this experience I will no longer be surprised in the least when I hear that 8% of the children in this country between the ages of 12 and 18 have attempted to commit suicide. I am certainly not surprised to find that an ever growing number of people in this age range are succeeding in such attempts.

What was wrong with those students? A lot. They were full of a kind of indifferent hostility and loathing not only to the notion of cryonics, but to the notion of **any positive human value or achievement**. One girl in the class asked me why I killed animals to do research. I told her that while it is regrettable that we have to take animal lives and cause suffering, it is necessary so that we can survive, and my life and the lives of the people I love are more valuable than those of any animal. I asked the girl: "You want to live, don't you?" Her answer was: "Not really, I mean it doesn't make a lot of difference to me one way or another. What's the point, really? At least animals want to live. They don't know any better."

Out of a class of 15 students, only one had any positive, life affirming values — or any values at all. One young man was very persistent in pointing out that what we were trying to do was going to be difficult, and might not work, and therefore shouldn't be attempted. He concluded his remarks by asking me, "What do you think the 'big deal' is. Nuclear war is the big issue. Everyone is going to die from that anyway, so what's the point?"

After class I remained a while debating with the teacher and a few of the students who didn't appear to have anywhere to go. I asked them, all of them, what their standard of value was and what they thought about cryonics. Two of three students said their standard of value was "getting high." The third said he thought helping other people is what is most important in life. The teacher echoed the sentiments of the third student. He explained to me that he thought my presentation was "off base" because I came on as if I knew what I was doing was right. He pointed out that his students came from a wide cross-section of backgrounds and that he felt the common thread in those backgrounds, and in his teaching, was a strong feeling of social responsibility. He said that the

issues he felt we should be focused on and concerned about were the rape of the South American rain forests and the threat of nuclear annihilation. "As long as people are starving," he pointed out, "cryonics is premature."

I refrained from pointing out that he wasn't exactly wearing rags himself and that if he felt so strongly about the plight of the third world he could probably have stood to lose a few pounds to ease global hunger himself. We did **argue** for awhile on more general issues such as his assumptions about nuclear winter and the exploitation of the masses by the wicked industrialists. If this is typical of what's out there, we're in for real trouble.

My depression was further deepened by the arrival of the May 31st issue of **SCIENCE NEWS**. The cover story is one entitled "A Mouse Tale of Overcrowding" documenting the research work of National Institute of Mental Health "scientist" John B. Calhoun. In a series of studies costing \$3.5 million, Calhoun has reached some startling "conclusions" about what lies ahead for humanity. If you're ready for a good laugh -- or cry, I'll share some of Dr. Calhoun's more revealing insights with you.

It seems that if you take mice or rats and put them in a room, feed and water them freely, and allow them to breed at will, they will eventually reach some kind of "critical mass" and die out altogether. What happens is that the animals experience population doubling up to a point which is 2.5 to 4.0 times greater than the "optimum". When this critical point is reached, the animals develop sociopathologies such as nipping and biting, and slinging each other around by their tails. Eventually they cease breeding, and then die out.

What relevance does all this have to human beings? Well, the good Dr. Calhoun is right at hand with the answer:

"The modern human population, which started out about 43,000 years ago, has grown rapidly only in the last two centuries," says Calhoun. According to a computer simulation he and a colleague developed, "a 200 year long world population transition period began around 1975, when density reached approximately two times optimum. Assuming a 27-year generational span for humans, the point of no return (2.5 to 4.0 generations after 1975) would fall between 2042 and 2083." At that point according, to Calhoun and the United Nations, world population will be nearly 9 billion.

But Dr. Calhoun informs us not to fear, for with proper social reconditioning and vigorous birth control:

"About 200 years later," Calhoun suggests, "the population will level off at its early 20th century total of approximately 2 **billion**." (Emphasis mine.)

Margaret (sloppy and gullible) Mead who was familiar with Calhoun's work often referred to him as "my favorite wild man", a comment Calhoun is reported to recall with pride. "When you deal with complex issues such as population density changes, you have to think that way." Calhoun is quoted as saying. I would say that sums up the kind of mind Calhoun has quite nicely.

Who let these people out of their cages? Who gave Calhoun a Ph.D. and \$3.5 million of taxpayer's money? What is wrong with a world where people are incapable of consulting an encyclopedia and discovering that Japan has 20 times

the population density of the United States and that Monaco (a popular resort and vacation spot) has **1,000 times the population density of the U.S.**, with 16,000 people per square kilometer! People, by the way, seem to be doing just fine in both Japan and Monaco, and **their social systems aren't showing nearly the decay ours are.** (Bought any good quality competitive American cars, stereos, or microwave ovens lately?)

What about the exploitation of space, or the creation of more useable land mass or living areas right here on earth? After all, we're only occupying a tiny fraction of the available living area of the earth's surface right now, even with existing technological constraints. Does this idiot seriously expect that in the next 100 years or so we're going to make no technological progress which would allow us to expand into less hospitable areas or extract currently inaccessible resources? And, perhaps most importantly, on what does this man base his 1975 "two times optimum" population density assumption? Then, of course there are his limits of confidence or degree of spread in predicting his so-called "point of no return". He says this occurs somewhere between 2.5 and 4.0 times the optimum population density. With population increasing **exponentially** that's an enormous spread. The only thing I can say about such "data" is that at least it all falls on a plane!

Can anyone take this kind of research seriously? Apparently so, and that brings me to yet another depressing article. The May 30th issue of the premiere American science magazine, **SCIENCE**, contains an editorial by editor William Carey, based on a recent report by the Worldwatch Institute (L.R. Brown et al., **State of the World 1986, A Worldwatch Institute Report on Progress Toward a Sustainable Society**, Norton, New York, 1986) which tells us, among other things, that the world is on the edge of doom due to "vanishing forests, soil depletion, falling water tables, ruined grasslands, pressures of population on food sources and economic assets, and the effects of all these interlocked problems on political options and stabilities." However, we are told that, "On the bright side, China emerges as a model for economic development..." and that, "The case for a 'sustainable society' on the global scale has an irrefutable political and indeed moral logic."

And what does **SCIENCE** propose we do to solve these problems? "Where the Worldwatch study points us wisely is toward much stronger and better supported interdisciplinary monitoring of indicators that bear on the chances for progressing toward a sustainable society. This much, at least, can be agreed to." What we are not told is what a sustainable society is, what the indicators which bear "monitoring" are and just who or what is agreeing to all this. What the rest of the gobbledegook in the editorial means is anybody's guess. This is science? This isn't even common sense! It isn't even readable, in the sense that it can't be meaningfully interpreted!

With this kind of "philosophical" and "intellectual" current prevalent amongst the "intellectuals" in this country it is no wonder that the high school students I spoke with felt no particular desire for life or for challenge. Exposed to educators with values like these (and these values seem to typify most of the educators, at every level, whom I've met over the past few years) how can they have any feelings of worth or any framework of values or beliefs which would give them a reason for wanting to live or to accomplish anything?

When I reflect on the fact that researchers such as Dr. Fahy are on the

edge of developing suspended animation for whole organs — and they cannot even get the minimum of funding required to pursue such work at a reasonable pace, I am outraged. When I read that fools such as John Calhoun have been given over \$3 million to conduct largely irrelevant research such as that discussed above, I am sickened.

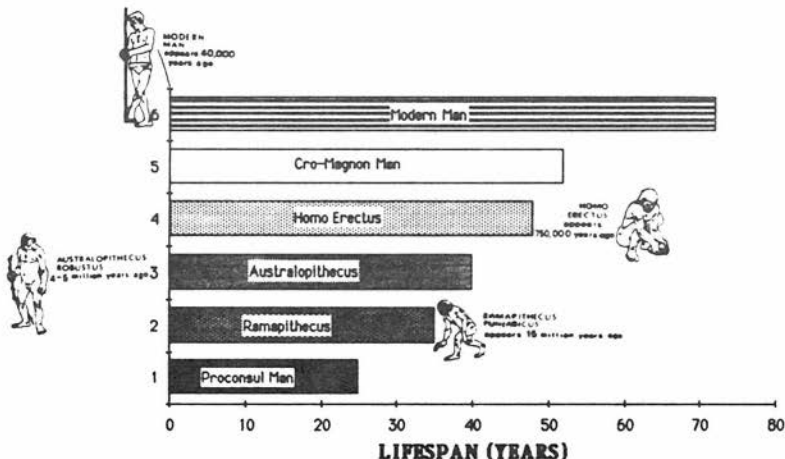
Sickened and frightened. Because the values reflected in the comments of the students I spoke with, in the SCIENCE NEWS article about Calhoun, and in the Carey editorial in SCIENCE do not bode well for our future. Hopefully, there is someplace left in the world where better values remain and are in use. Hopefully there are enough concerned and motivated people in **this** country or elsewhere to turn the tide and undo a world gone wrong. Because, if there aren't, then the **very least** of our problems in reaching the future are going to be the technical hurdles represented by reversing the aging process and undoing freezing injury.

Science Updates by Thomas Donaldson-

OUR ANCESTORS LIVED MUCH SHORTER LIVES THAN WE

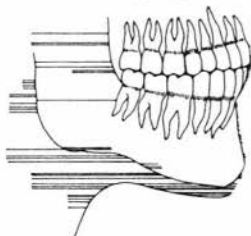
Discussions of human lifespan often assume it is some kind of metaphysical GIVEN. Even if there were reasons why our lifespans should remain at 70-odd years, we'd have to explain the choice of 70 years. Why 70? Why not 700? And if such a reason DID exist, then it would be open to us to change circumstances so that 700 rather than 70 were the the favored magic number of years. So the whole thesis that our lives **ought** somehow to have their present lengths falls to pieces from inconsistency.

The fact is that human lifespans, just like the human brain or the shape of our feet and hands, must have evolved. Apes have much shorter lifespans. Ergo, our ancestors must also have had shorter lifespans. Some reasons must have



existed why our lifespans SHOULD increase. Why shouldn't those reasons still be operating?

A recent paper in *NATURE* (317, 525 (1985)) by Timothy Bromage and Christopher Dean at the University College of London and the Department of Anthropology of the University of Toronto presents and discusses evidence that ancestors much closer to us than the apes (although certainly not as close as historical people) had longevities no more than 2/3rds of our own.



Up to now, anthropologists have estimated the ages of fossils of young hominids by comparing the state of their teeth with those of equivalent human children. For instance, by counting the numbers of erupted and unerupted teeth we can estimate the age of a child skeleton. Often for fossil hominids we have nothing but the teeth, whose state of growth will tell us about ages.

What Bromage and Dean have done is to use another more absolute measure. Teeth grow in layers. Rather like trees, our teeth under the microscope have layers resulting from daily variations. In fact, teeth have two different kinds of layers, the **prism cross-striations** with periodicity of one day and the **striae of Retzius** with periodicity of about one week. We ought to be able to measure the exact times teeth have taken to develop using these striations.

Bromage and Dean report their studies of teeth from *Australopithecus* and very early *Homo*. In the case of one early *Homo* specimen, they found a chronological age of 5.3 years corresponded to about 7.1 present human years. *Australopithecus* teeth attained the development of a 4.5 year old child in 3.3 years.

Gorillas and chimpanzees develop faster than human beings by approximately this fraction. The fraction of the time they spend in childhood relative to their total lifespan is the same as in humans. Apes have biological ages that equate to roughly 2/3rds of the equivalent human biological ages, as I mentioned above. We can therefore surmise that these early varieties of man (and also of *Australopithecus*, a closely related species which did not survive) had lifespans approximating more closely those of the apes than of present human beings.

Not only is evolution of lifespan an obvious counterargument to any thesis that our current lifespans are "best" but it may show something interesting about aging itself. Apes and human beings share many genetic traits, so much so that relative to a nonprimate, gorillas, humans, and chimpanzees arguably belong in the same genus. Genetic controls on lifespans of these three species cannot differ by very much, either. In some sense, therefore, the change to increase our lifespans must be a simple one. Whether that means it will be easy to perform medically depends very much on whether (like the shape of our hands) it depends on complex linkages of a great many genes or whether it depends on only a few.

RECENT WORK ON BRAIN DAMAGE

Certainly no one yet has found a way to reliably recover people after prolonged lack of blood flow to their brain at normal temperatures. However,

work on this problem continues. Recently four papers have presented some new, interesting facts about causes of brain damage. Their interest comes not because they directly tell us about cures, but because of what they suggest about the mechanisms of injury.

In **ANNALS OF NEUROLOGY** (18, 281-290 (1985)) G. Nevander, B.K. Siesjo, and others present some very interesting indirect evidence that it isn't really lack of oxygen which makes brain cells so hard to recover. That is, the effects of oxygen lack on brain cells don't come from a simple deprivation of energy.

Nevander, Siesjo, and their coworkers produced **seizures** in rats by flurothyl, a gas which immediately upon inhalation will cause seizures which resolve almost immediately after it is withdrawn. They made sure that their test animals received enough oxygen by artificially ventilating them. They could cause seizures lasting as long as 2 hours with flurothyl. After treating their animals with flurothyl they allowed them to recover for one week and then sectioned their brains to assess damage to neurons. They found widespread signs of dead tissue, more and more extensive the longer the seizures had lasted. Prolonged seizures of this type, 60 to 120 minutes, damaged the neocortex.

One problem with previous studies of this kind consists of difficulties in verifying that neuron damage had in fact occurred. Often damage to neurons takes some time to develop: the neuron may seem initially normal, but deteriorates with time. Furthermore, structural changes seen soon after ischemia can sometimes fully reverse (B. Soderfeldt et al, **ACTA NEUROPATH**, 62 87-97 (1983); U. Ito et al, **ACTA NEUROPATH**, 32, 209-223 (1975)). This means that we must allow an animal to survive for a while in order to assess neuron damage. Previous experiments did not do this.

The authors of this study feel it indicates that some kind of activation is necessary before any treatment destroys neurons. Necessary isn't the same as sufficient: some brain regions with relatively high metabolic levels will survive 120 minutes of seizure. Activation IS a prerequisite. After deprivation of oxygen, neurons may start a spastic firing which itself causes the damage, rather than any direct energy starvation. Such a hypothesis would actually help explain the apparently normal state of neurons just after a period of deprivation.

What does activation consist of? Events just after a lack of oxygen support to the brain clearly must be complex. An interesting paper in the same issue (**ANN NEUROLOGY**, 18 329-336 (1985)) by R. Busto et al present some interesting evidence relating to this question. This experiment has even less direct application than the preceding one, but still is very interesting from a theoretical point of view.

Busto et al deprived one side of the forebrain of rats of **norepinephrine** (NE for short). Norepinephrine is a nerve transmitter chemical. These authors deprived their rat forebrains of it by cutting nerves leading to the forebrain and which use this transmitter chemical. (Of course this is the least applicable of all methods for brain cell protection!).

They cut these nerves within the brain and then waited for 45 minutes so that the animal stabilized. They then subjected both sides of the animals' brains to ischemia for 45 minutes. They waited for varying periods from 0 to



chemical levels increased in the control brain side. Levels in the other side didn't increase so much, until finally both sides had similar levels.

NE therefore causes neurons to use much more energy than otherwise during ischemia. The authors don't know, however, just what goes on in neurons without NE during ischemia and how it differs from events in normal neurons. The previous paper suggests that major injury only develops AFTER ischemia, not immediately during it. NE however must affect those reactions which set the stage for later deterioration.

NE is a natural brain chemical which injures neurons after ischemia. A third paper published recently in *SCIENCE* (229, 1397 (1985)) continues this theme of brain injury as due to overreaction of normal hormones. R.M. Sapolsky and W.A. Pulsinelli present evidence that the **adrenal** hormones may cause much of the injury due to depriving neurons of oxygen and nutrients. Sapolsky and Pulsinelli treated rats AFTER first subjecting their brains to 20 minutes of ischemia. They removed the adrenals of all of their animals immediately after restoring blood flow to their brains. Half of their animals received extra corticosterone, the adrenal hormone, to make up for removal. The other half received no treatment other than free choice of salty water (without adrenals, we need salty water to survive).

Sapolsky and Pulsinelli of course had to remove the adrenals from their animals because otherwise the animals would undergo a normal stress reaction raising corticosterone levels, exactly what they wished to prevent.

Higher levels of corticosterone led to much more extensive brain damage. For instance, 100% of animals without corticosterone retained their hippocampus undamaged. In animals with cortisone, half had mild damage and 10% had severe.

The authors discuss several ways in which corticosterone promoted injury. Their best explanation is that they attach to receptors on the neurons, causing

180 minutes of circulation after ischemia to allow the animals to recover. They then froze their brains with liquid nitrogen to assess their chemistry at leisure afterwards.

This treatment depleted one side of the animals' brain in NE and left the other as a control. In the normal control side ischemia severely depleted energy chemicals such as ATP. Most important, the brain side depleted in NE showed much less depletion in energy chemicals.

Absence of NE did not help the NE side to recover after ischemia. During recovery, ATP and other energy

some kind of injurious reaction. However this explanation has faults, the most prominent fault is that areas rich in receptors don't always show the most damage. Exact reasons remain up in the air.

The most important implications of this study are clinical. This work strongly suggests trying antagonists to corticosteroids as a treatment for ischemia. The most important lack of the paper, of course, is that it reports no such attempts.

The last, most directly useful recent paper on brain damage in ischemia contains a proposal for a new drug. Furthermore, results of this paper suggest something about the physiology of brain damage. Andrew Tang, of Upjohn Pharmaceuticals, presents in **LIFE SCIENCES** (37, 1475-1482 (1985)) his studies of a new experimental drug, U-50488E.

Naloxone is a close relative of this drug. Naloxone itself acts by blocking the normal receptors for brain opiates. Our brains contain and use chemicals similar to opium. It is because of this that opium has such effects. Naloxone will prevent this because it prevents the opium from acting.

However our brain contains several different receptors for opiate chemicals, and several different opiate chemicals to match up with them. Scientists now distinguish at least 4 different systems of receptors, the mu, kappa, delta, and sigma receptors. Opiate chemicals in our brains link to these when they produce physiological effects, but the effect produced differs with each one. Naloxone links with all receptors. Hence it produces much less specific effects. The new drug links to the kappa receptor alone.

Previous attempts with naloxone to aid recovery from brain and nervous injury haven't worked out as well as hoped. Naloxone will help mitigate spinal cord injury (A.I. Faden et al, **SCIENCE**, 211 493-494 (1981)). It will also reduce the damage after cutting off blood flow to selected portions of the brain (D.S. Baskin et al, **LIFE SCI**, 31, 69-71 (1982)). However, other scientists couldn't repeat these results (J.W. Holaday and R.J. D'Amato, **LIFE SCI**, 31, 385-392 (1982)).

Tang reports that this new drug will protect against the effect of clipping the carotid artery in gerbils. The carotids, just as in human beings, provide much of the blood flow to the brain. Cutting off this blood will obviously cause massive brain injury. Tang only treated his animals with the new drug BEFORE he cut off blood flow, not after. However, he does report a clear protective effect. Clipping the carotids usually kills the animals. With pretreatment the drug raised the number of survivors from 2 out of 8 to 7 out of 8 gerbils. In rats, all 8 of the pretreated animals survived, while only 3 survived without pretreatment.

Several other anesthetics which also link to the kappa receptors will have similar effects. These drugs include **ethylketocyclazocine** and **bremazocine**.

Naloxone simply does not protect against this kind of injury in gerbils. This paper therefore supports a general opiate connection but tells us that it's much more complex than we would like. As we might guess from its name, U-50488E is an experimental drug. Tang reports that he is actively working on it for possible therapeutic use.

SOMETHING ACTIVELY PREVENTS NERVE CELL REGENERATION

Mammals lack a lot of the ability to repair injuries to their nervous system which other animals such as fish or amphibians possess. A persistent hope of scientists studying regeneration of nervous tissue has been that they might discover just why this is so. Once we understood this mammalian inhibition of repair we could hope to **release** it. Human patients could then accomplish the same feats of recovery as salamanders, which will recover even from massive brain damage.

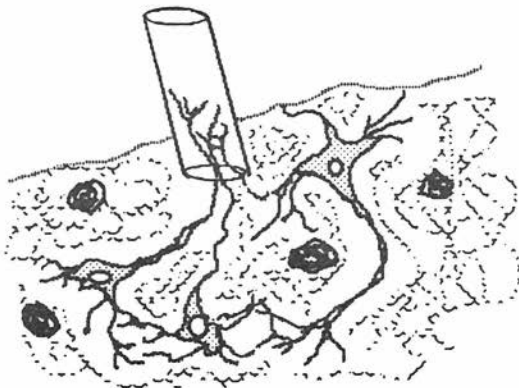
One important issue to such a hope is the question of just how inborn within our nerve cells this failure of regeneration may be. Is this fault coded within our nerve cells or perhaps is it the milieu in which they must grow which prevents them from repair?

An interesting paper in **EXPERIMENTAL NEUROLOGY** (89, 634-644 (1985)) by N.A. Azzam and M.W. Brightman at Georgetown University and the NIH respectively presents some evidence that nerve cell regeneration in mammals really fails because of milieu rather than an inbuilt lack.

Azzam and Brightman put a stainless steel tube in the path of severed nerve cells within the brain of rats. The nerve cells lay in the **corpus callosum**, which is the structure joining the two halves of the brain. The tube extended outside the skull of the rat. They plugged its end to prevent infection, drying out, and so on. To allow the brain tissue to recover, they plugged the lower end too for a week, and then removed the lower plug.

After a time the inflammatory cells resulting from initial reaction to this implant went away. They found that after 8 to 16 weeks, these tubes contained many growing axons from the severed nerve cells, together with glial cells supporting them. They report that the tip of this growing tissue resembled the tip of nerve tissue growing in culture, with evidence of nerve cell budding. Some axons were also forming a myelin sheath, just as they would if uninjured.

"They found that after 8 to 16 weeks, these tubes contained many growing axons from the severed nerve cells..."



This regrowth of axons was quite modest. Axons grew within the tube for distances of about 1.3 mm. Nerve cells can grow for a longer distance if they have other target tissue toward which they can grow. On the other hand, the milieu within the central nervous system can prevent them from growing. One particular type of brain cell which is NOT a neuron, the **astrocyte**, seem to impede regrowth of nervous tissue within the brain. **Peripheral** nerve tissue, unlike central nerve tissue, is surrounded by a sheath consisting of special cells, the Schwann cells. Severed peripheral nerve cells will regrow

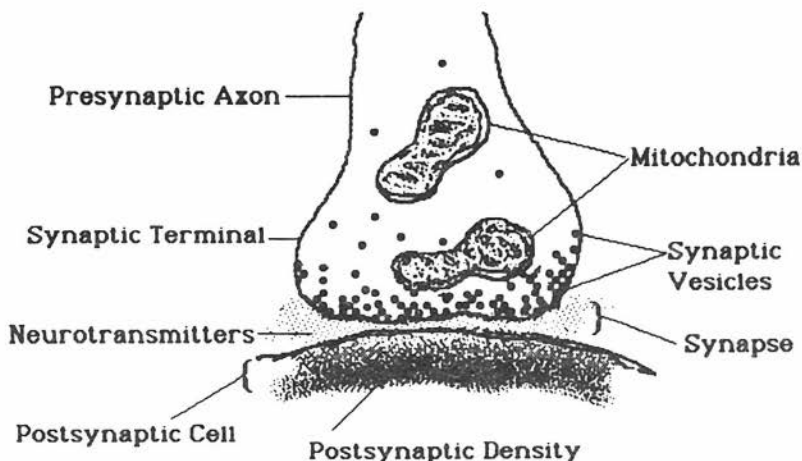
much more readily than central nerve cells. Even more interesting, the Schwann cells, transplanted into the brain, can promote regrowth of central nerve axons.

Since the distance nerve cells will grow into the tube is relatively short, this paper isn't presenting any ideas for therapy. What it suggests, however, is a means of studying the influences on nerve cell repair, both external and internal. It's important that the nerve cells will actually grow and organize into the tube in the absence of external influences to prevent that. It's also important to see just how limited this repair may be. For instance, the authors don't report any formation of new neurons.

The authors support their observations about nerve cell regrowth with extensive micrographs which we cannot reproduce here.

A PROTEIN CONNECTED WITH MEMORY?

At present no one knows how memory is stored. Some evidence does exist that learning involves an increase in the number of connections between neurons. Neurons transmit impulses through the **synapses**, the locations on neuron walls where two neurons meet. On the receiving side, synapses contain characteristic thickenings of the cell membrane. This thickening is called the **postsynaptic density**.



If memory involves some kind of control of transmission of nerve impulses, then this control probably occurs at the region where neurons meet, which means in the postsynaptic densities. Just last year, in *SCIENCE*, (224, 1057 (1984)), Gary Lynch and Michael Baudry presented some very interesting evidence that calcium ions were involved in memory. Their evidence suggested that an enzyme, **calpain**, which becomes active if the level of calcium ions increases, breaks down a structural protein of the neuron wall called **fodrin**. At about the same time, Acosta-Urquidi and others (*SCIENCE*, 224, 1254 (1984)) presented evidence for another possible process involved in memory, this time in the mollusc *Aplysia*. Their mechanism involved attachment of phosphate groups to a protein in the cell wall.

A recent paper by J.W. Gurt, although it draws no direct connection with memory, can't help but raise speculations along the same lines. Gurt describes his experiments (*J NEUROCHEM*, 45, 1128-1135 (1985)) with a protein which he KNOWS to be associated with the postsynaptic densities because it is from postsynaptic densities that he derives it. His protein as yet has no common name, it is simply GP180, or glycoprotein 180. High levels of calcium ions will cause attachment of phosphate chemicals to this protein. The enzyme **calmodulin** promoted attachment. Gurt describes several chemical tests he performed to verify that his protein did indeed respond to calcium and calmodulin by acquiring phosphate.

Gurt himself believes that GP180 may be involved in growth and development. A fine line separates development from memory. Attachment of phosphate to these proteins may modify the properties of the postsynaptic densities containing them.

JULY-AUGUST 1986 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.

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The JULY meeting will be at the home of:

(SUN, 13 JUL 1986)	Paul Genteman
(SECOND SUNDAY)	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 and someone will come down to let you in.

The AUGUST meeting will be at the home of:

(SUN, 3 AUG 1986)	Allen Lopp
	13354 Veracruz St. Cerritos, CA

DIRECTIONS: Take the Artesia Freeway (State 91) to Cerritos (Between the San Gabriel Freeway (I-605) and the Santa Ana Freeway (I-5)), and get off at Carmenita Road going north. Veracruz is the third street on the left after 183rd St. 13354 is on the southwest corner of Carmenita and Veracruz. Park in the lot of the Thrifty Drugstore directly across the street.

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