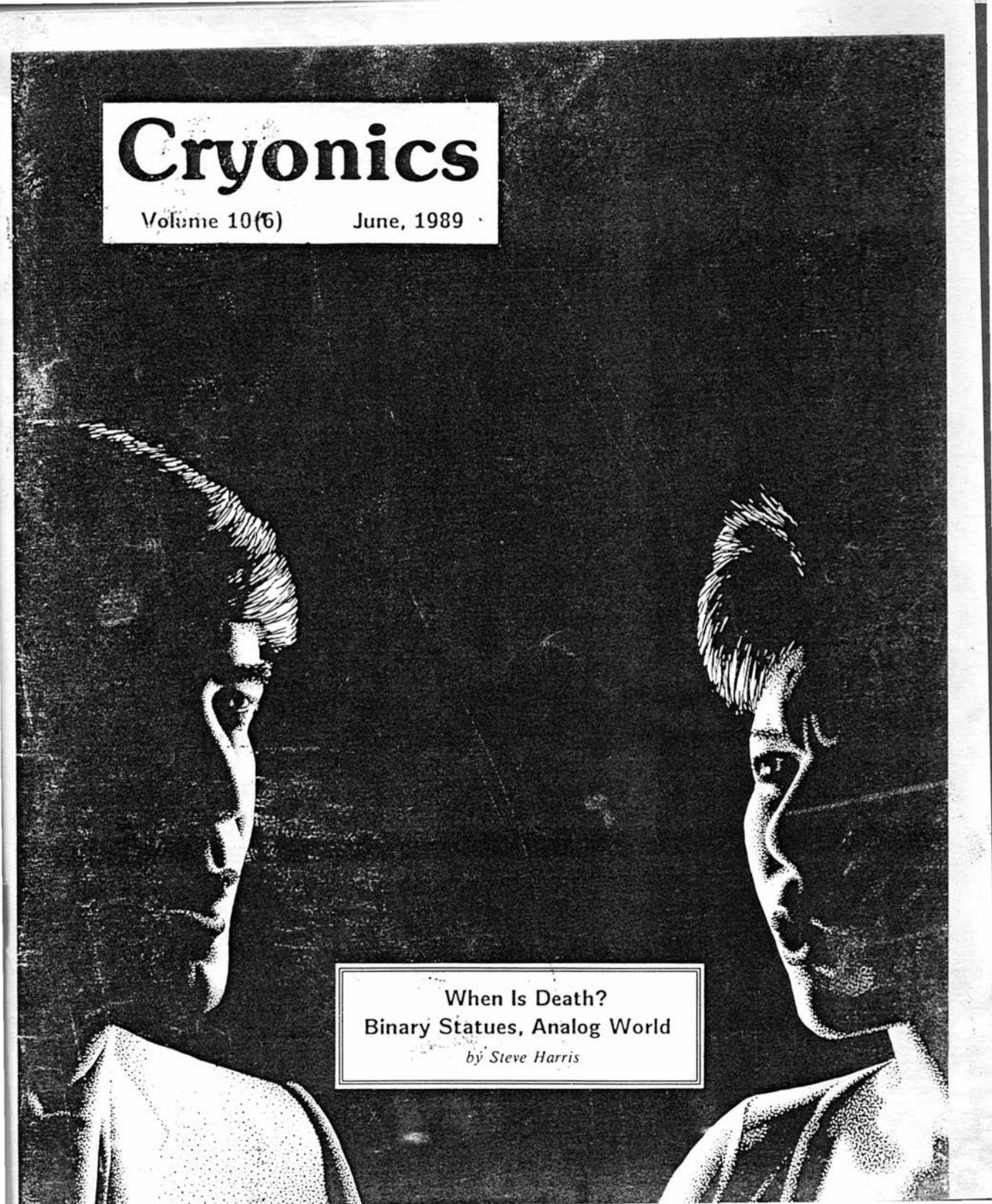


# Cryonics

Volume 10(6)

June, 1989



When Is Death?  
Binary Statues, Analog World

*by Steve Harris*

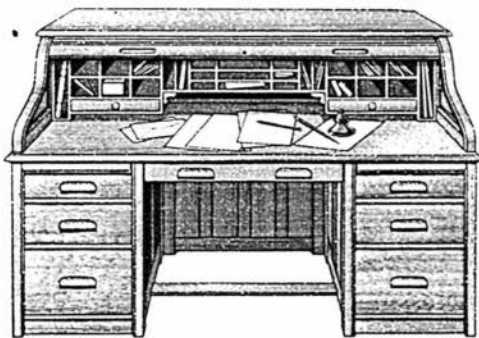
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## EDITORIAL MATTERS



This month Linda Chamberlain addresses the question of bringing back and reorienting cryonic suspension patients. Who will perform this task for us? Her answer: We will! Thomas Donaldson looks both to the past and the future, and lampoons the Prophets Of Technology who preach that, "comes the revolution in (pick any of the following -- Industrialization; Nuclear Power; Automation; Artificial Intelligence; Nanotechnology; etc.) *The Millennium Will Be At Hand.*" Cath Woolf looks at the same problem from a different and more personal

perspective. She wants everything tomorrow's technological cornucopia will have to offer too, but has grave suspicions about the packaging. Steve Harris takes us a ways into the problems of forcing the real world to fit Aristotelian EITHER-OR logic. His example is familiar ground for cryonicists -- the legal definition of death versus the reality of the process. Brenda Peters reports her work at the Space Development Conference in Chicago. Its participants want to shape the future, and we may be able to allow them to enjoy the fruits of their efforts! And we get a visit from *Saint Assembler*, who was last seen making the rounds in verse at the Space Development Conference.

\* \* \*

### Errata

Mike Perry's article, "Further thoughts on the probability that cryonics will succeed" (*Cryonics* May '89) sometimes refers to "six social conditions" and sometimes to "seven". The correct number throughout is seven, i.e., including the condition that cryonic revival is "cheap enough." This was added to the list while the paper was in preparation, and some of the corresponding changes didn't get made. All of the probability calculations were done assuming the seven conditions. Thus, the table on page 50 giving estimates of probability will not be affected by this correction.

F&SF Correction: Contrary to the report in *Fantasy & Science Fiction* (April, '89) Dixie was *not* "frozen" or cooled down to 0°C (the point at which pure water freezes) but only chilled to about 4°C. And she *did* end up with some deficits, mainly partial deafness caused by heavy antibiotic dosage after her warming-up, and some minor coordination problems. She is a sweet and lovable pet, though, and needs a home (see announcement in our *Personals* section).

\* \* \* \* \*

## NEW PRODUCTS

Alcor has several new literature products available: A newspaper clipping collection documenting the Dora Kent case, a similar collection of clippings documenting the Riverside County Coroner's blunders, and the Declarations of Scientists in support of cryonics and the Dora Kent case.

The scientific declarations are excellent and are very persuasive arguments for the scientific reasonableness of cryonics. This is the *complete* set of declarations including

a copy of the historic restraining order issued by Judge Miceli on February 1st.

Each of these is available from Alcor for \$20.00

\* \* \* \* \*

## VIASPAN AND HES

As we reported in the April issue of *Cryonics* our source for hydroxyethyl starch (HES) has been cut off. Efforts are now underway to locate an alternate source, and we have not given up hope yet -- there seems to be some prospect of obtaining HES from Europe.

### The Nature of The Problem

Since we last wrote about this problem we have come to understand it a lot better. Not only are we having difficulty getting HES, so are Drs. Southard and Belzer of the University of Wisconsin Medical Center: the developers of the UW organ preservation solution. As some of our readers may recall, UW solution is the revolutionary new organ preservation solution recently licensed by Southard and Belzer to DuPont Pharmaceuticals (the makers of HES). HES is in such tight supply that Southard and Belzer are unable to obtain any to continue their research on cardiac preservation solutions.

The root of the problem seems to be DuPont's inability to produce the material fast enough to meet expanding demand, coupled with a very disorganized and inefficient management. Part of the problem can apparently be traced to the release of UW Solution as a commercially available product -- further straining DuPont's already limited supply.

### Advantages

The silver lining to the situation, the commercial availability of UW solution, has finally materialized. UW Solution is now available under the trade name *Viaspan* from DuPont Pharmaceuticals and Cryovita Laboratories has received a 10-liter case of Viaspan.

The advantages of having a solution like Viaspan *commercially* available are almost too numerous to catalog. For one thing it means that we don't have to laboriously prepare solution in the field just before we need it, using up valuable time in the process. It also means that our Remote Stand-by kit can weigh a lot less and be a lot less complicated: we don't need to take dry chemicals, bottles of water, mixing reservoirs and tools, pH meters and so on with us. Much more importantly, it means that perfusate can be made available and be ready for use *instantly* without skilled personnel having to prepare them. Since Viaspan is sterile we don't have to cart along a pump and 0.2 micron filter to sterilize and remove particulates from it before injection. Additionally, the perfusate can be stored pre-chilled on ice, eliminating the need for a high capacity heat exchanger. (On-site mixing requires that the water be at ambient temperature (70°F) in order to get the dry chemicals to dissolve.)

All of this raises the possibility of developing a highly portable, simple



**BELZER UW-CSS  
COLD STORAGE SOLUTION**

and easy-to-use "flush" unit that could be deployed with Alcor Coordinators who, with modest training, could work in conjunction with a mortician (who would perform the surgery to raise the femoral vessels) to carry out blood washout of patients in the field. Such a unit could be very inexpensive to manufacture and could be made very straightforward to use.

**Disadvantages**

However, there are some problems with Viaspan. The biggest of these is its cost: \$198 per liter! The second is the fact that it must be refrigerated. And even with refrigeration its shelf life is only a year.

Lest DuPont be accused of profiteering it should be pointed out that a couple of years ago when we made up six liters of UW solution for a dog experiment it cost us nearly \$1000 just for the ingredients purchased from chemical supply houses! Considering the overhead involved in preparation, packaging, distribution, liability, and government regulation, we're amazed the price is as low as it is.

Sometime in the next few weeks to months Alcor and Cryovita plan to evaluate Viaspan in a dog perfusion model to insure that it performs as well as our previous tissue preservative solution. If the results of this test are positive, we will begin using Viaspan on Alcor Remote Standby cases in the future.

**Thanks**

Finally, our thanks to Alan Sinclair and several others who called with suggestions and offers of help regarding obtaining HES. The effort was appreciated and one or more of the leads may be helpful in solving the problem.

\* \* \* \* \*

**ALCOR AND LIFEFACT**

Several years ago Saul Kent began a challenging and formidable task: the job of laying out, in greater detail, the legal and financial arrangements for *resuscitation* of patients from cryonic suspension. Not only was this task both challenging and formidable it was also very important. When Steve Bridge and Mike Darwin put together the first draft of the *Alcor Cryonic Suspension Agreement* nearly 15 years ago, it was always their plan to eventually produce a companion document dealing with resuscitation.



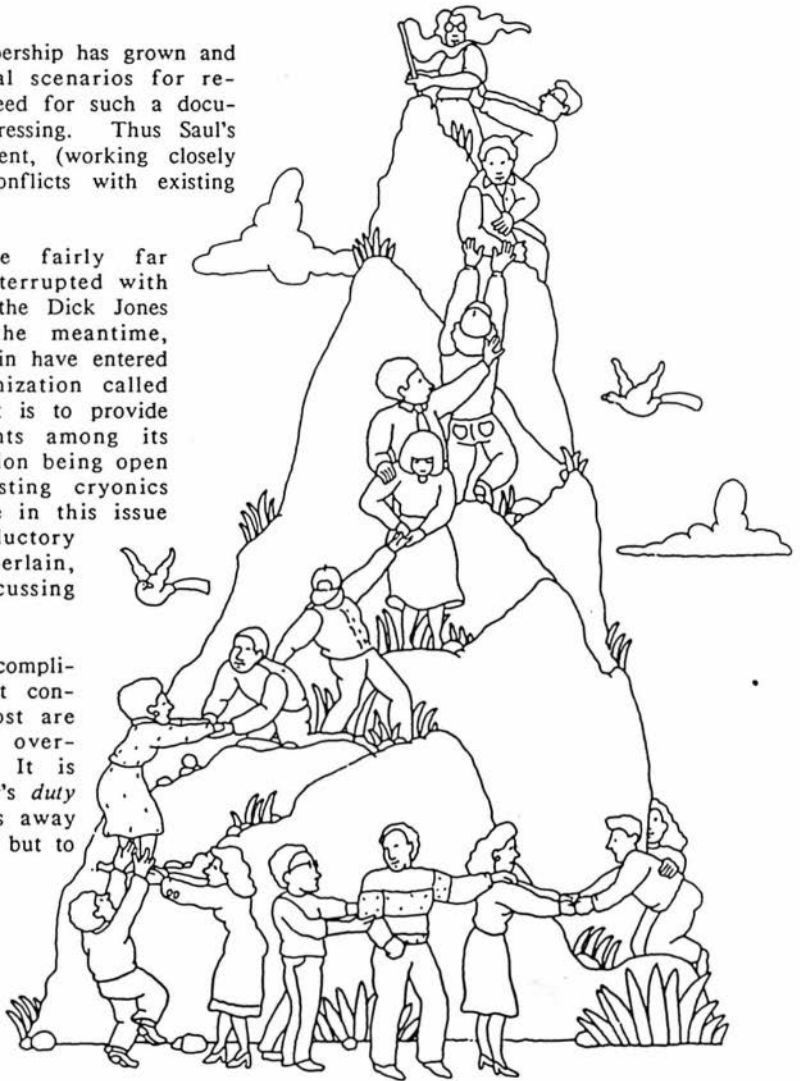
This wasn't done at the time for good reasons: The uncertain legal status of cryonics and the obvious unenforceability of a detailed contract for services which could only broadly be foreseen argued for delaying this aspect of legal preparation. All of the legal advice obtained at that time, and since, has served to confirm these conclusions.

## Growing Need

Nevertheless, as membership has grown and very general technological scenarios for revival have emerged, the need for such a document has become more pressing. Thus Saul's effort to create a document, (working closely with Alcor so that no conflicts with existing paperwork would arise).

Saul's efforts were fairly far along when they were interrupted with the Dora Kent case and the Dick Jones estate litigation. In the meantime, Linda and Fred Chamberlain have entered this area with an organization called *Lifepact*, whose purpose it is to provide for reanimation covenants among its members, with participation being open to members of all existing cryonics organizations. Elsewhere in this issue of *Cryonics* is an introductory article by Linda Chamberlain, *Lifepact* President, discussing the *Lifepact* organization.

*Lifepact* has raised complicated issues and important concerns. First and foremost are the areas of potentially overlapping responsibility. It is and always has been Alcor's *duty* not just to store patients away for revival -- someday -- but to actively work to develop, plan and carry out the member's revival. We have long encouraged members to provide extra financial and other resources to fund reanimation, and the *Alcor Cryonic Suspension Agreement* makes it clear that Alcor is committed to carry out revival of its members as soon as it becomes technically possible to do so. And it is important to point out that revival isn't just confined to "dumping the member on the street stark naked." Resuscitation includes the full spectrum of services required to restore the member to an integrated, *functional* state.



## Full Service

My conversations with both the Directors of Alcor and many of its members (especially its activist members) indicates that the level of confidence in Alcor's ability to carry

out revival and rehabilitation are at least as high as confidence in Alcor's ability to keep members in suspension long enough to allow that to happen. Everyone is agreed, including Alcor management and Directors, that much additional effort needs to be put into *exactly how* to provide more assurance, and more detail into structured agreements dealing with resuscitation. But this must be done carefully and with much thought to our legal environment.

I feel very strongly that Alcor should not become just a waiting room to tomorrow. Alcor has had a long tradition of aggressively addressing every aspect of cryonics -- including the support of, and dissemination of information about, nanotechnology and detailed technical scenarios for revival (an important first step in making such resuscitation technologies possible!). Fragmentation of responsibility for the four phases of cryonics (transport, cryoprotective perfusion, storage, and revival) could weaken organizations and will likely provide important areas for disagreement and contention in the future.

The Alcor Cryonic Suspension Agreement details the authority of Alcor in carrying out both the cryonic suspension and the revival (should that become possible) of the member. Alcor has sole responsibility for these areas of action. Some members may wish to provide for a back-up to Alcor in the event of Alcor's failure. The existing Agreement allows for this and some members may wish to use Lifepact in this capacity.

**Alcor's Policy Regarding Lifepact Agreements**

*However, it must be emphasized that Lifepact agreements cannot be used as documents giving anything but back-up responsibility for the member's cryogenic care or resuscitation..*

It is Alcor's policy that members signing agreements which affect their cryonic suspension arrangements must allow an Alcor Administrator to review the agreement to assure no conflict occurs with the members' existing Alcor Cryonic Suspension Agreement or other documents relevant to the member's cryonic suspension. If an Alcor member requests that such agreement be kept confidential, then Alcor must have an independent review by legal counsel, to be paid for by the member, to insure that no conflict exists.

Alcor has been and is hard at work on providing for the concerns raised by Lifepact within the framework of Alcor. To this end we solicit input from all of our suspension members. We will monitor the evolution of Lifepact's agreements and work with legal counsel to address any issues comprehensively and reliably. We urge members to work with us to help make Alcor more responsive, more flexible and better able to meet your needs.

Carlos Mondragón, President

\* \* \* \* \*

**MEMBERSHIP STATUS**

Alcor now has 131 Suspension Members, 245 Associate Members, and 12 members in suspension.

**ALCOR AD ASTRA!**

by Brenda Peters

*Dear Editor,*

*May 26-29, 1989, Memorial Day Weekend, will see the 8th Annual INTERNATIONAL SPACE DEVELOPMENT CONFERENCE being held at the Hyatt Regency O'Hare Hotel in Chicago, Illinois. Alcor plans to be there in full force. Many of us feel those men and women who work in the space industry and who yearn to participate in the industrialization and colonization of space are most likely going to need cryonics to see their dreams realized.*

*We feel there may be a great many prospective Alcor members among this group. At least there ought to be. So, I've enlisted the help of Keith Henson (living legend in the space movement), Mark Voelker, Kurt Schoedel, Brian Wowk, Curtis Henderson (living legend in the cryonics movement), Gerard Arthus, David Brandt-Erichsen (who came up with the initial brainstorm, along with Dave Pizer), and, I hope, others to man a booth/exhibit for Alcor and the Venturists and to talk cryonics and nanotechnology all day, and all night if necessary, in a hospitality suite/function room.*

*We're going armed with hundreds of handouts (the best literature that we've ever had available to us), mountains of enthusiasm, a sum total of decades of experience and a promise to those who may wish to attend but, who for various reasons cannot: If anyone walks into that conference who doesn't know what cryonics is all about, they'll know when they leave. And if they don't see what a perfectly reasonable idea it is, and make suspension arrangements with Alcor immediately, we'll leave them with plenty to think about until next year, when the conference is being held in Anaheim. And guess who's going to be there to refresh their memories (and hopefully preserve them, as well).*

*Anyone who may want to donate funds to help sponsor this, please send them to Alcor, making sure to mention that they are to be used for this purpose (remember, it's tax deductible). Anyone wishing to help out in any way (and we welcome suggestions) please contact me through Alcor. Anyone wishing to attend the conference, the registration fee is \$90 (full-time students half-price) and you may obtain information by writing to SPACE DEVELOPMENT CONFERENCE, LTD., P.O. BOX 64397, Chicago, IL 60664-397, U.S.A.*

\* \* \*

The previous Letter to the Editor was not printed in the last issue of *Cryonics*. If it makes it into the next issue, I would add the following: *I accomplished what I set out to do. . . .* Alcor's reception at the Space Development Conference was a very warm and gratifying one.

We enjoyed the space enthusiasts and I dare say, they enjoyed us. The cryonics meme was running rampant throughout the conference, and debates were hot and heavy. Conversations often ran into the wee small hours of the morning and interest continued to be high during the entire four days of the conference.

It has often been difficult to get people to take cryonics seriously. All too frequently the response has been a shrug, glazed indifference, or even active hostility. This was most emphatically not the case in Chicago. People were listening to what we had to say. Many were enthusiastic and those who were not were at least respectful. Most importantly, for the first time real issues and technological scenarios for cell repair and resuscitation were earnestly discussed.

The Alcor hospitality suite was an unqualified success. Upwards of 150 people wandered in and out during the course of two evenings of serious partying/discussion, and





*Brenda Peters with Astronaut Charlie Walker  
at the Alcor booth at the Space Development Conference.*

\* \* \*

the Sunday night session lasted until the sun came up, when I had to pack to leave.

Two people handed Mike Darwin checks to start the signup process and several others indicated to us that they were either already in the process of signing up or were intending to do so shortly.

Alcor distributed thousands of pieces of literature at this conference and Alcor representatives met with a variety of influential people in the space movement, including NASA astronauts, science fiction writers, and NASA biomedical personnel. Of all the conferences I've attended, this was by far the most successful and satisfying.

One of things that was apparent from the start was the easy communication between Alcor and Space Development activists. They share our way of looking at the world and they share our frustration at being unable to get to there from here. *And they want to get to there from here.* And what's more, we need for them to do so.

Many of the people involved in Alcor first dreamed of going into space before they ever heard of cryonics. Fred Chamberlain, the co-founder of Alcor, was a Jet Propulsion Laboratory engineer who helped to design the sun sensor on the Viking Spacecraft. Mike Darwin's first ambition as a child was to live and work and space.

There is ample common ground and ample opportunity for us to help the space movement, as well as for them to help us.

Next year the National Space Society's annual conference will be held in Anaheim,

California and we are very much looking forward to it! We plan to have an even greater presence there and to offer tours of the Alcor facility and a detailed exhibit at the Conference. For more information on the *Space Development Conference of 1990*, contact me (registration is only \$30 prior to August 1, 1989).

The communication of a radical, new, innovative idea is accomplishing the near-impossible. We did just that in Chicago. But not without plenty of help. So I must give credit where credit is due: our audience was in no small way responsible for our success. They are a special, elite group of highly intelligent, future-oriented people.

I must also offer a personal thank you to some of the Alcor people who made the event such a successful and gratifying one: to Michael Darwin for shining brightly enough to be one's own personal guiding star on a warm summer's night. The ancient mariners who used Alcor (the star), as a test of clear vision and far-sightedness, would have envied Michael's ability to present a clear image of Alcor's methods and goals, and to help us envision the exciting and enticing possibility of living in the spacefaring future.

Thank you also to Keith Henson (the co-founder of the L-5 Society) for being the icon that he is, for being his imaginative, avante garde, inimitable self. Thank you to Keith for his innovative and inspiring support, limitless enthusiasm, and consistent lack of sleep.

Thank you to Brian Wowk for his half of our beautiful new book, *Alcor Threshold to Tomorrow*, for his tireless attempts to get me to the Hancock Building (100 floors up), where I desperately wanted to have dinner (but alas, responsibilities would not allow). Thanks to Brian for his brilliant explanations of nanotechnology and for his relentless debates with mystics and unscientific people whom he refused to give up on!

Thank you to David Brandt-Erichsen for his initial idea of attending the conference, for his generous financial support, and for personally introducing me to not just one, but two astronauts! Thank you to Dave Pizer, Jerry Leaf, Hugh Hixon, Kurt Schoedel, Bill Seidel, and Mark Voelker, each for his individual expertise and generous efforts toward making our presentation an effective one.

A special thank you to Jim Bennett of the *American Rocket Company* (AMROC) and the *Foresight Institute* for his energy, wisdom, and support which meant a very great deal indeed. And a very special and heartfelt thanks to the members of the *International Space Development Conference*, the *National Space Society*, and *Space Studies Institute*, Princeton, all of whom were superb in their efficacy and cooperation. I feel that I made some special new friends in Chicago and thank Margaret, Terry, Rand, Craig, and Dennis from OASIS, the Los Angeles chapter of the NSS, Randy and Rick from the SSI, and Andy from San Diego NSS for their support.

One last thank you is in order. Curtis Henderson drove all the way from New York to attend the conference. It was a thrill and a delight for all of us to have Curtis, one of the first men in the world to embrace the idea of an extended lifespan for mankind, as a direct result of his interest in space, and to attempt to do something about it by founding the *Cryonics Society of New York*, decades ago. Janet Pinckney also made the long trip from New York and has been a life extension enthusiast for many years.

And finally, I would say that I was not in the least surprised by the reception Alcor and cryonics had in Chicago. I have to shrug my shoulders like John Galt did. Those who are truly free and forward thinking individuals cannot, in good conscience walk away from life, and the opportunity to live it according to their own ideals, especially when they know they are right.

## A Trip Report On The California State Coroner's Convention in Sacramento

by Ralph Merkle (with Keith Henson)

The California State Coroner's Convention was from March 12 through 17 in Sacramento at the Sheraton Sunrise Hotel. There were roughly 80 attendees with representatives from most of the coroner's offices in California.

A total of six cryonicists attended the convention, with members from both Alcor and ACS. Four of us arrived Tuesday, March 14th around 5:00 PM. After checking in, we started socializing at a hospitality suite set up by MORTECH, a post-mortem equipment supply company. Larry Gillespie, the conference organizer, proved to be cheerful and sociable. After introducing ourselves to him (we had previously talked on the telephone) he introduced us to representatives from other counties, and we were off to a pleasant evening discussing nanotechnology, sky hooks, computers, the use of modern genetic techniques in forensic pathology, the definition of death, and (of course) cryonics. The general atmosphere was one of interest, and people were basically sympathetic. The hi-tech conversations were viewed as interesting (most people working in coroner's offices do not use E-mail, and are not always up on the advanced technology of the present -- let alone the projected technologies of the future). The basic impression, however, was one of overwhelming lack of knowledge about cryonics (other than a few lurid headlines). Several people mentioned that the talk on cryonics (scheduled for the next morning) would be timely and of general interest.

Mike Darwin gave the talk on cryonics the next day, from 9:00 to 10:00 AM. He presented a large amount of information about cryonics in a short time, and the general response was "very informative!" Some people didn't like the presentation (or the subject), but the most frequent response seemed to be "If you guys want to try it, that's okay." There were a few notable exceptions -- primarily people who were involved in litigation with Alcor (e.g., members of the Riverside coroner's office and David Mitchell). The question and answer period was lively, and clearly could have continued had there been more time. Most questions were simply seeking information, some were hostile. One woman with experience in the cryopreservation of tissue (not for cryonic suspensions) asserted rather belligerently that the costs for liquid nitrogen were very high -- she knew, she dealt with it! This produced a barrage of facts from Mike about the cost per liter of liquid nitrogen (both currently, and the lower costs that larger bulk purchases would allow), the boil-off rates from various dewars, the overhead costs incurred, the amortization period of dewars (they have to be replaced periodically) and the like. This produced rather a good impression.

Following the talk, we passed out 40 information packets (all we had). I examined one and was pleasantly surprised to find (mixed in with several other things) a new introduction to cryonics: *Alcor Threshold To Tomorrow*. (January, 1989, available from Alcor -- once they finish the second printing -- for \$5.00 each. Well worth the price). It is definitely the best introduction to cryonics I have ever seen, presenting the pros, cons, current status, and future prospects with clarity and accuracy.

Interestingly, though no one said so explicitly, it was fairly clear that Carrillo (the coroner of Riverside) was -- to put the matter tastefully -- not viewed with respect. It appears that Alcor unwittingly selected the most inopportune county in which to set up shop.



*Keith Henson provided the following additional comments:*

During the MORTECH reception, I found myself talking to Mickey Worthington, one of the Riverside coroners. Mickey treated me like another coroner (who else would be at a coroner's convention?) and I did not disabuse him of this idea. I made the comment, "Heard you folks have been having problems." Surprisingly, Mickey said the Liberace affair had been the worst of their troubles. This would be hard to understand until you consider the flak they must have taken from Liberace's many fans for abducting his body from the Forest Lawn mortuary and returning it in a number of sacks. Also, most of his fans probably did not want to hear the facts of Liberace's illness or lifestyle.

Mickey was not pleased that Mike Darwin (one of the "bad people") would be addressing the convention the following day. (Mickey had helped put cuffs on six of the people at the Alcor facility during the raid -- one of those arrested was Mike. A false arrest suit for 1.6 million dollars is now pending against the coroner and several others responsible for the raid and the arrests).

Next on Mickey's list was "the headless woman" affair. Mickey felt they had so much trouble with that case because "bad people" were involved. He mentioned they had taken a day and a half to search Alcor. I asked what they had found, and Mickey mentioned stolen property from UCLA. When I asked if anyone had gone to jail, Mickey said no, that much of the "stolen property" was record-keeping errors on the part of UCLA. Mickey was none-the-less sure that the people at Alcor had done something which would land them in jail.

Next day I introduced myself as an Alcor member to both Mickey and Ray (Carrillo). Ray said that it was nice to meet me "as a human being" (as opposed to a dark force that bugged them to release the Dora Kent paperwork?).

\* \* \* \* \*

## Why Cloning Hasn't Worked

by Hugh Hixon

For many years, cloning has been sort of a buzzword for dealing with major parts of any putative reanimation process, particularly in the context of neurosuspension. The concept is fairly simple: Most of the types of cells on the body contain nuclei and DNA, and, as far as anyone is aware, it is the same DNA that you were conceived with, in terms of information. Therefore, it should be possible to somehow take the DNA in any available cell of yours, and create an identical twin, in terms of physical structure. Or a new body, or limbs, etc.

There has been persuasive direct evidence for this expectation. In the mid-1950's, British biologist J.B. Guerdon actually cloned *Xenopus laevis*, the African clawed frog that has been the mainstay of a great deal of experimental biology. Developing cellular microsurgery techniques, Guerdon extracted an intact nucleus from an intestinal cell of an early-stage frog tadpole, inserted it in a fertilized frog egg whose original nucleus had been destroyed, and got a new frog.

Similarly, cloning has been a mainstay of horticulture, in some cases practically since the dawn of agriculture, as twigs are cut from a parent plant and grown into a complete plant. In recent years, the advent of a more knowledgeable biotechnology has considerably expanded the range of cloning technology in plants, and made cloning much more of a household word.

Animals, however, have stubbornly resisted manipulation much beyond the scope of Guerdon's original work. This in spite of the pressure derived from the obvious advances it would make possible in the animal husbandry industry. Our inability to clone new individuals from differentiated body cells has made us very aware of the complexity of the developmental process which we are attempting to purposefully modify to our benefit.

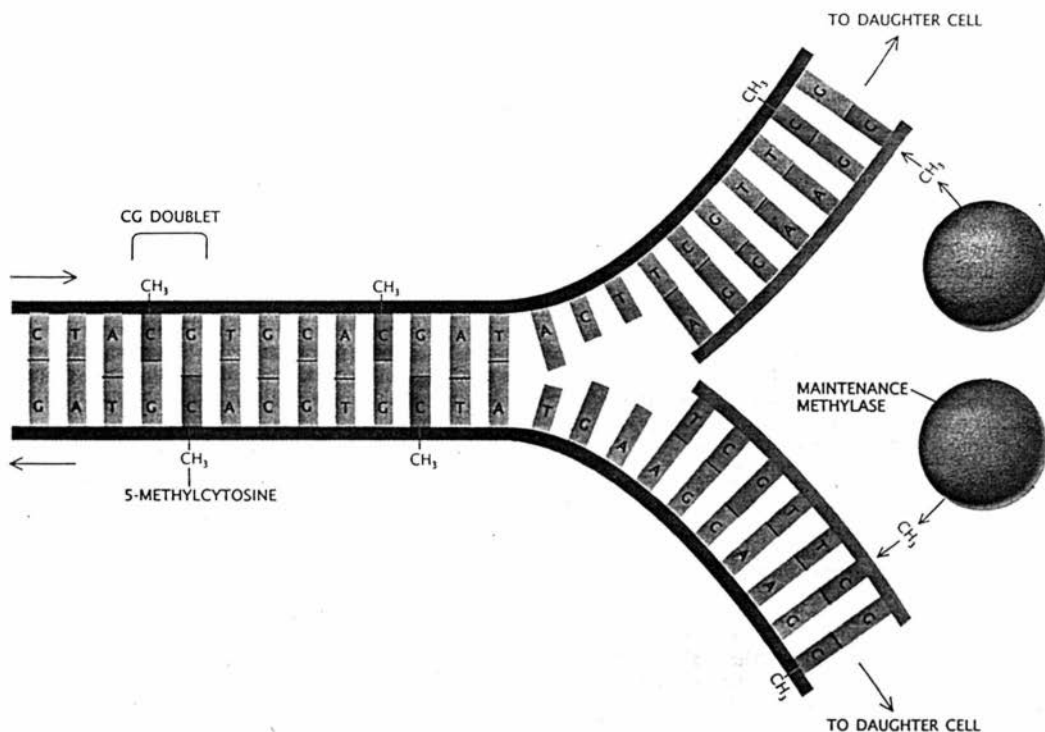
### A Different Kind of Inheritance

Because of the obvious benefits of a cloning technology, and often too, for the sheer curiosity of the thing, there has been a great deal of scientific work done to figure out the mechanism(s) of development. Recently, there have been several summary articles in the popular scientific literature (*Scientific American*, 260(6), 60 (June, 1989); *Science News*, 135, 312 (May 20, 1989)) of work that exposes one of the major mechanisms of DNA control: *DNA methylation*.

It has been known for a long time that the molecules that constitute the genetic code are sometimes found in a modified condition (I have a 1970 textbook that mentions this.) and it has been suspected that they might have something to do with the controls on the developmental process.

The specific chemical reaction for this control is the methylation of the DNA base *cytosine*, to *5-methyl cytosine*. When this is done (or undone), at the region of a gene where the duplicating transcriptase enzyme attaches to DNA to begin transcribing it into m-RNA for the manufacture of proteins, the affinity of the starting region of the gene for the transcriptase is modified. To put it simply, the methylation switches the expression of the gene on or off. The recent work on this control mechanism has outlined how it is applied in nature, and because the modifications are inheritable, a new term has come into use: *epigenetic inheritance*.

Among the more interesting things about epigenetic inheritance are:



1) The cell lines in the developing embryo that result in the reproductive organs have the methyl groups which are attached during early development stripped off and a new set of methyl groups attached to reflect their role as germ cells, thus "initializing" the DNA of the sperm and egg (much like initializing a computer program).

2) The initialization step involves specifically labeling the DNA as from a male or female, and two sets of male or female chromosomes (presumably a full genetic complement) transplanted into a fertilized egg cannot develop, although a transplanted male-female set will do so.

3) Unless specifically blocked, the methylation of the DNA is transmitted at each cell division. This is the epigenetic inheritance.

4) Epigenetic inheritance is quite ubiquitous. Yeasts, for example, have two lines of epigenetic inheritance. (One hesitates to refer to the *sex* of a yeast cell, but that is the nearest equivalent.)

5) Frequently, a gene that is present from both parents may be masked from one of them. Thus, the expression of a gene of this type depends not on the gender of the individual, but on the gender of the parent contributing the gene.

6) If aging is considered part of the developmental process, then the blocking and/or reversal of the aging process may involve reversing these switches.

These mechanisms raise a potential problem for the resuscitation of both whole body

and neurosuspension patients: will it be possible to work backwards in the developmental sequence to the starting conditions of you as a young adult or as an embryo? It is reasonable to argue that if all you know is the final state of a complex sequence of genetic expression such as mammalian development, it may not be possible to figure out the initial state, as there may be a near-infinite number of possibilities for it.

There are a number of attitudes one can take on this. The first is, that if you are set on being restored *exactly* to your previous youthful state, you may have some serious problems. The second is, that you realize that the whole enterprise is a risk and you'll take what you can get. The third is, that in the natural course of events of a long life, you expect to change, and this will be merely the first of many in a long and eventful life. The fourth is, that there is room for improvements, and you want them. You've already gotten started; what you want to do is *get on with it!*

### What It Means

In any event, I have opinions on this, and the net of them is that I think that epigenetic inheritance isn't going to make a lot of difference in the revival of suspension patients. For example:

1) The matter of identical twins. From their existence, it is obvious that the developmental control sequence is very tightly controlled.

2) The appearance of things like gills in the development of the human embryo, exactly matched by the embryonic development of animals not particularly closely related to us. This indicates that the development sequence is genetically very conservative and does not branch. Virtually any change in such a complex sequence will result in a dead monster.

3) The regeneration of body parts; i.e., fingertips in children, and legs and tails and other things in lower animals. This indicates that to a limited degree at least, the developmental sequence can be set back and allowed to run to completion again, and that when it does so, it takes the same path.

4) If this control mechanism *were* variable, say particularly if it was affected by environmental conditions, it would constitute a form of Lamarckian inheritance. There is *some* evidence that this does happen, but if it occurred as a routine thing, Lamarckian evolution would quickly displace all organisms depending solely on Darwinian evolution. This is obviously not the case.

### Discussion

So what is the practical implication of this discovery? Does it make cloning and regeneration difficult or impossible? At first glance the answer would seem to be "no". But even if the answer is "yes" the question has to be asked "how important is that anyway?" For some people it may be very important to awaken with *exactly* the body (not the brain) that they had before (in terms of its genetic make-up). However, for others, the genetic roll of the dice they were given the first time around will *not* be what they want the second time if they have a choice. Many, if not most of us would want to make improvements in our appearance, in our health, and in other aspects of how we function. In other words, change is in the wind for many of us no matter what the path to the future is (whole body or neurosuspension).

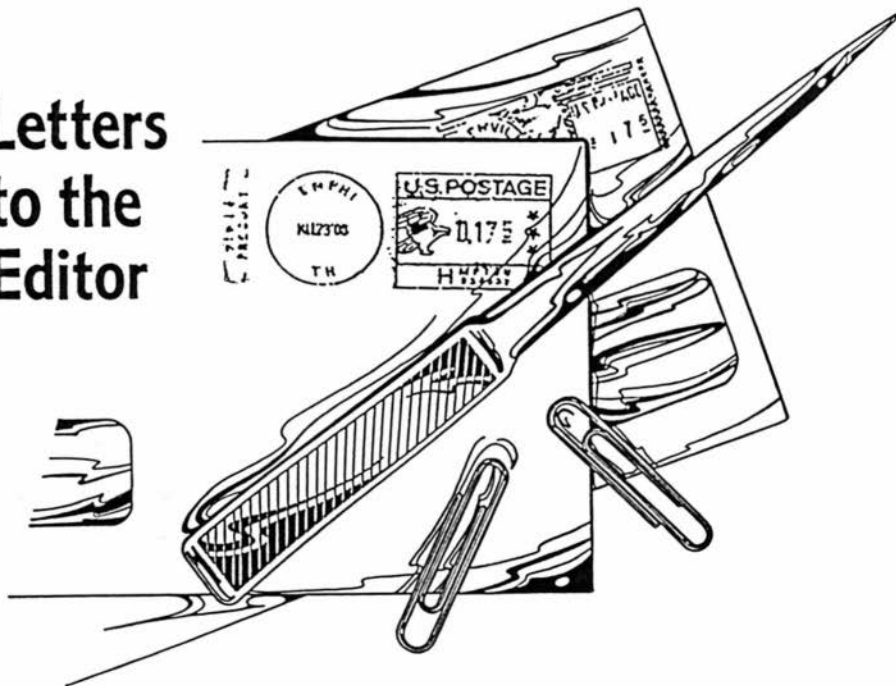
Finally, the gene controlling the starting conditions of DNA methylation -- the gene that determines whether paternal or maternal chromosomes will be switched on or off -- must operate in a fairly consistent way. It should be possible to determine the starting conditions from it without too much difficulty.

### Conclusion

The upshot of this work is that it is both useful and interesting, pulling aside as it does the veil of the developmental process. It is obviously an important milestone on the road to comprehensive tissue regeneration technology that will be needed to restore any suspension patient to life and health. There could be some problem in terms of exact restoration of the body of a suspension patient, but a first glance conclusion from the available evidence makes this not very likely. However risky this problem is though, it is unlikely to bother a lot of us who have elected suspension, as we have already taken a rather radical approach to conserving our lives.

\* \* \* \* \*

## Letters to the Editor



To the Editors:

According to the wire services (May 30, 1989) physicians attending the annual meeting of the American Society of Transplant Physicians "...will be discussing ways to get more Americans ... to donate ... organs."

Recently, H. Jackson Zinn, former president of the American Cryonics Society, suggested the possibility of an arrangement whereby one would agree, if and when they die, to donate their healthy organs for transplantation in exchange for a neuropreservation for



to donate their healthy organs for transplantation in exchange for a neuropreservation for themselves.

The primary reason why Associate Members like myself apparently outnumber Suspension Members by about two to one is financial. Should Mr. Zinn's suggestion prove to be practical, it would make cryonics affordable, for everyone.

Even if one or more cryonics organizations were to propose discussion of this idea to the Society of Transplant Physicians and other such groups, and they were to decline the offer, it would still advance, I believe, positive public understanding of cryonics and neuropreservation.

For these reasons, I think Mr. Zinn's suggestion should be pursued.

For the future,  
Peter H. Christiansen  
Pleasant Hill, CA

\* \* \*

Dear Peter,

*Jack's suggestion is not a new one and Alcor made substantial efforts in this area early in 1986. We even went so far as to contact a variety of transplant agencies and tissue banks. A fairly comprehensive summary of our experience in this area was written up in The Question Column in the April, 1986 issue of Cryonics. Still, this idea will not die. Perhaps the best way to deal with this is to reprint the Question Column since nothing in this regard has changed. In fact, at the recent California State Coroner's Convention at which I spoke, I had the opportunity to talk at length with a number of tissue banking professionals and the response of all was the same: we're not interested. Read on to find out why (their reasons are actually pretty good):*

\* \* \*

This question is a tough one, and a complicated one to answer as well. In principle, there is no reason why organs and tissues not being "taken along" can't be donated for use by someone else, right now. In practice, this turns out to almost never be possible. Why?

First, in order to donate major organs such as a heart, lungs, kidneys, or liver, you must be "brain dead." This means that death must have occurred as a result of trauma to the brain by injury, accident, or disease (in the latter case such as by a stroke of cerebral hemorrhage). In cases of so-called "brain death" there is no blood flow to the brain and cryonics procedures must start as soon as legally possible. A further delay to allow for removal of tissues and organs would be unacceptable. Indeed, in most such instances a medical surrogate or medical power of attorney would have acted before "brain death" criteria (which consists of 24 hours of no blood flow to the brain or 24 hours of no brain electrical activity) were met. The action would be to withdraw supportive medical care (such as a respirator) as soon as possible so that cardiac and respiratory arrest would occur promptly after a no-flow condition to the brain was detected. In order to be pronounced brain-dead, and available for organ harvesting, a no-flow condition would have to have existed for 24 hours at normal body temperature. For cryonics purposes this would be a disaster. It would be comparable to lying dead in a heated pool for a full day before being found!

*respiratory arrest in case of severe cerebral injury and a resultant condition of no blood flow to the brain.*

What about skin, corneas, and bone? These can be harvested long after circulation and breathing have stopped. The problem here is that we cannot delay the start of perfusion and introduction of cryoprotectants in order to allow the tissue harvesting team to collect the skin and bone. We contacted the *Southern California Tissue Bank* to ask if they would be willing to harvest skin and bone from a neurosuspension patient after perfusion and cephalic isolation were complete. They were unwilling to do this for a variety of reasons: First of all, the tissue must be collected within 24 hours of "death." This can be problematic because it may take us up to 24 hours to collect, stabilize, transport, and perfuse a patient from the time legal death is pronounced. Even if this goal could be met, the tissue bank was unwilling to use skin and bone which had been subjected to a blood washout using our perfusate and technique. A break in sterile technique during our procedures could be life-threatening to a patient receiving the graft. The logistics get rather sticky here, and liability is a major question. Since our procedures differ from the "norms," (i.e., an untouched "dead" body) they'd just as soon avoid us altogether.

The problems with corneas are much the same, but an added set of complications is that the eyes must be completely removed, which is unacceptable from a whole host of standpoints, including delays and potentially serious disruption of circulation to the brain due to leakage of perfusate from severed optic vessels.

There are also a number of other basic excluding factors which realistically limit anyone's likelihood for being a tissue or organ donor. Those excluding factors are:

1) Sepsis (blood infection); 2) Diffuse infections or inflammation of the skin; 3) Acute respiratory infection or pneumonia; 4) Drug addiction; 5) Jaundice; 6) Toxic hepatitis; 7) Viral hepatitis; 8) Syphilis or antibody to syphilis; 9) Any cancer or malignancy; 10) History of any cancer; 11) Collagen diseases; 12) Burns of greater than 20% of body surface area; 13) Autoimmune diseases; 14) Receiving radiation therapy; 15) Cancer chemotherapy; 16) Poisoning; 17) Controlled drug overdose; 18) Malnourishment; 19) Leprosy; 20) Meningitis or encephalitis; 21) Inflammatory diseases; 22) AIDS or antibody to the AIDS virus; 23) Other known communicable diseases; 24) Death of unknown etiology.

Additionally, donors must be between the ages of 18 and 74. As you can see from the list of excluding criteria above, only a relatively small subset of all those dying are potential donors for any organ or tissue. At this time, it's difficult enough just to get properly frozen at the time of legal death without trying to worry about and factor in the tremendous logistic problems of tissue donation. For these reasons, we strongly advise against making any arrangements for tissue donation, and we will not cooperate with such arrangements where they interfere with good cryonic care.

#### Other Considerations

It is obvious that one's condition at the time of pronouncement of legal death is not something that can be predicted very far in advance, so that organs contracted for at age 30, in return for a neuropreservation at age 70, are a wild speculation, to put it mildly. And what if you are happy and well at age 74?! This seems inherently to be a rather shaky method of suspension funding.

*More relevant, at this time there are laws which prevent someone from selling (or receiving any consideration for) their organs for transplant, and this is what is being proposed here.*

## LIFE PACT: AN INTRODUCTION

by Linda Chamberlain

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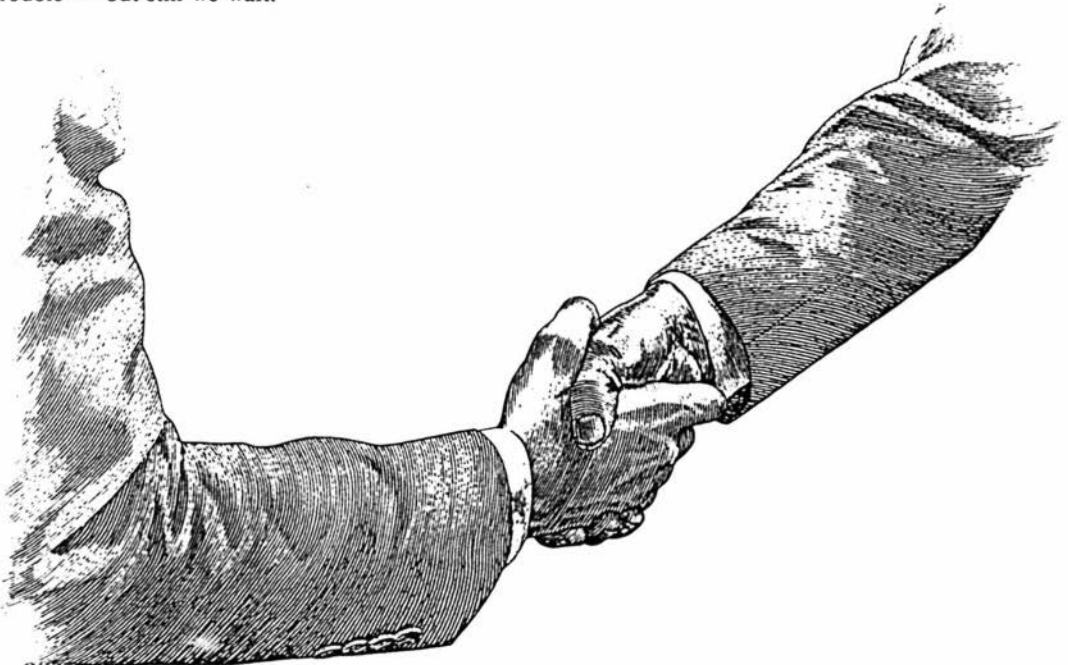
A frequent question from those new to cryonics is: Why should people of the future want to reanimate those of us frozen back in the twentieth century?

It's a good question. Often asked with chilled skepticism, it reflects an anxiety that no answer exists, fear that no serious thought has been given to finding a solution, and reluctance to brave the psychological challenges or the financial burden of cryonic suspension unless a persuasive answer is offered. The asker becomes, if anything, even more apprehensive if the response is a string of lukewarm, unsatisfying platitudes.

### *The Positions For "Trouble Free" Reanimation And Rehabilitation.*

There's the argument that future society will have developed a spirit of universal benevolence in order for the species to have survived... but the history of humankind's last two thousand years does not leave all questioners atingle with enthusiasm for such an answer. We are just as likely to awaken in a world storm-tossed with political and military challenges and technological threats, as in a benign world of peace and calm in which the problems of rehabilitating twentieth century cryonicists are the only dilemmas.

Then, there's the offering that the wonders of nanotechnology will have made reanimation extraordinarily easy and insignificant of cost -- immediately after World War II many scientists expected nuclear energy to become so inexpensive it would render our world unimaginably rich. They enthusiastically painted a world free of all strife and trouble -- but still we wait.



Even if it becomes simple and cheap to repair those who are frozen, it remains simpler still to let them be, to let them stay frozen. Even if reanimation becomes trivial, rehabilitation could be time consuming, a costly pursuit for other humans. Did you say we will have "artificial people", androids, to take care of that? But if the androids possess the intelligence to help us in the way we need, they may be able to seek other outlets more rewarding or perhaps engage in wars to liberate themselves. If they are so docile and unimaginative that such would not occur to them, they may not be ideally suited to help us back onto our feet.

Another hope is that those of the future will be fascinated with our first-hand tales of a pre-life-extension era. No doubt they will go to any length to revive us, sit us down around a campfire (simulated by a miniaturized fusion reactor?), and, spellbound, listen breathlessly while we spin our tales of horror about living in a deathist society! More exciting than a Steven King novel! But, wait, the world in which we awake will have probes going deep into Jupiter's atmosphere, to every corner of its many "moons", to other stars. Uploading technologies will be evolving, and an exodus into non-biological forms will be on the horizon if not already taking place. There will be these and so many other things of incredible interest to pursue that listening to the tales of those who had to fight smog and freeway traffic will be unbearably lackluster.

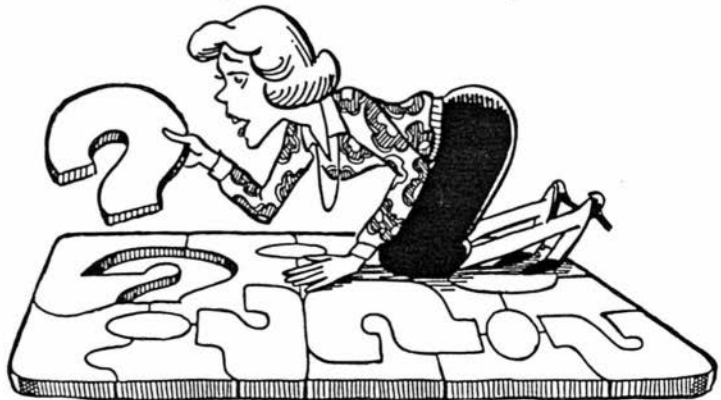
#### *Present Status Of Preplanning For Reanimation And Rehabilitation.*

Some cryonicists, as a backup, have provided rewards, as part of their trusts, for persons who bring them back. The legal rules against perpetuities, of course, make this difficult for even the most clever planner. But even if such problems did not exist, imagine the difficulties of providing an incentive to those living in a century we can barely imagine, where such advances as nanotechnology may create a culture where the coin of the realm renders our offerings insignificant to those future citizens. It is appropriate that we offer *something* to *someone*, but what should it be? Where will our friends of the future place value? Providing today for what will be valuable tomorrow is no easy task.

#### *The Compelling Case For Solving This Problem Now.*

Is there, then, no stronger, more persuasive answer to this question? Is there no truly seductive incentive for our friends of the future to *want* to see us reanimated, rehabilitated and re-educated? The answer is: yes. But the answer requires more than a philosophical argument.

There is, in all of the above positions, an implied attitude of "Let's take care of getting ourselves frozen and the future will take care of itself." The fable of the astronomer who fell into a hole and broke his neck while gazing at the sky is the basis for the moral "Take care of the little things, and the big things will take care of them-



selves." But if we all looked at our feet and no one pondered the sky there would be no astronomers, and if we do not concern ourselves with how we are to be reanimated, how we are to be rehabilitated, there is a good chance we will be disappointed in the outcome.

This is not to belittle the efforts of the current cryonics societies. The goal and the task of creating the technologies needed to get us suspended, to get us aboard the vehicle headed for the future, is no small or easy mission. But they cannot be expected to do everything for us. And though many of us have always assumed our cryonics societies would sooner or later take on this mammoth task, why should we put one more burden on their already weary shoulders? And what if a cryonics society should crumble under the tremendous burden? It has happened before. The future may see many new organizations formed around the world; perhaps they will not all survive. And what of their suspended members?

And why rely solely on the goodwill or the curiosity or the abundance of those in our future? Why leave our fate in their hands when we can focus our own energies and our own resources, now, to develop our own reentry system. If we sit like couch-potatoes, depending blithely on the attitudes, social mores and legal structures of the future, we may become cryo-potatoes, waiting a lot longer than we would want, perhaps arriving at a port of entry less inspiring than if we had taken pains to design it in advance.

We need to develop, now, a system designed to assure we will be reanimated as soon as possible, in friendly, supportive, comfortable surroundings. We need to involve ourselves in organizing a covenant for a successful and satisfying rehabilitation, re-education, and reentry into the culture and the technologies of our future. We need to build a network which works from both ends of the reanimation tunnel, linking together even those who take a short, easy trip via suspended animation many decades hence as well as those of us who struggle with the first, faltering steps of it now.

This is a complex matter, and there will necessarily be many different facets, but if each aspect is treated as a piece of an enormous, elegant puzzle, an overall pattern will become increasingly visible, financially within our grasp, and psychologically fortifying for those of us who build the structure.

#### *L I F E P A C T: A Covenant For Reanimation.*

Cryonics organizations are growing rapidly. With time this expansion will become explosive. Presently, a sense of community links members within each cryonics group as they attend monthly meetings, annual get-togethers, and the like. But unless great care is taken to keep this sense of community alive, growth could result in depersonalizing valuable inter-relationships.

A lifepact between individuals -- a promise to assist in getting each other frozen, to work toward an early and comfortable reanimation and reentry into society -- is something which exists already -- if unspoken in some cases -- between spouses, close friends, and long time cryonics associates. Part of Lifepact's charter will be to help mature, formalize, and give legal power to these interpersonal assurances.

But what of the person without family, close friendships, or long-term working relationships from which to form personal lifepacts? What of the person who joins a cryonics society after learning of a terminal illness, who does not have time to create such relationships? What about average viewers of talk-shows who lack the courage to embrace the concept of cryonic suspension because they lack confidence in the assurances that future generations will welcome them warmly, because they fear being strangers in a

strange land, because they cannot imagine why anyone in the future would want to bring them -- complete strangers -- back to life?"

Lifepact, a proposed organization, solves this problem. Lifepact members will not depend on the mercy or the curiosity or the affluence of those in the future... Lifepact members will be welcomed back by other Lifepact members.

Members make a lifepact, a contingent contract, with the Lifepact organization: in return for the care, attention, and assistance they receive, they guarantee to repay Lifepact for the cost of their reanimation and rehabilitation, and/or to work in assisting other Lifepact members not yet reanimated. The crux of the lifepact is simple: members (who themselves have been reanimated and rehabilitated) have an obligation to reach out, to assist other Lifepact members still in suspension.



Some cryonicists may choose to formulate personal lifepacts in addition to contracting with the Lifepact organization. There will be many scenarios and numerous variations developed over the years ahead, but no person being frozen today need be alone and forgotten. The Lifepact organization will provide the means by which those in the future will have the incentive -- a debt to be repaid -- to reach back through time and offer helping hands to others still suspended.

One can argue about the speculative nature of an endeavor to be sustained in the future by the commitments of those who are yet to be reanimated, but most will agree that such a system offers a greater chance of workability than some vague hope that "those of the future will take pity on and reanimate us".

This, then, is the essence of Lifepact. It unites those of us who wish to develop an organization, now, comprised of members of all cryonics organizations, working cooperatively to take care of our future needs for reanimation, rehabilitation, and reentry into society.

#### *What, Specifically, Will Lifepact Do?*

The above mentions an enormous picture puzzle with an overall pattern. There isn't room in an introductory article like this for exhaustive detail, but the following is a summary of what will be covered in greater detail in a booklet, now in preparation.

1. *Membership Documentation Development.* "Full" members will have executed an agreement with Lifepact as briefly outlined above. In a way, until such a lifepact is ready to be signed, there can be no full members. Nonetheless, in the interests of stepping around a "chicken and egg" dilemma, we will proceed to form the organization and then create the documentation.

No single lifepact will be acceptable to all members, and many variations will need to be made available. Members who require more guarantees and greater assurances will

understand that those demanding less may find themselves reanimated sooner, but Lifepact members will be offered flexibility in these agreements to ensure individual satisfaction as to such things as reanimation criteria, assurances for limitations on memory and identity loss, safeguards against feelings of undue servitude or unjust treatment, and options for repayment to be chosen upon reanimation, to suggest only a few.

2. *Data Gathering.* Rehabilitation will be easy for some and hard for others. Only part of the problem will be related to native adaptability. The reanimation process may leave us with extensive losses of memory and a great deal to be regained in the way of physical and mental capacities, or grief for those left behind. This is the reason the rehabilitation process must receive so much attention.

It will be advisable for Lifepact members to set down in writing as complete a personal history as possible. In addition to helping fill gaps in memory, this will aid Lifepact in matching those being reanimated with those further into the adaptation process, so those helping with rehabilitation in payment of their own recoveries may be paired with those most like themselves. Extensive questionnaires will be useful, and psychological tests may be helpful where these can be administered.

3. *Support Groups.* Those whose partners, children, or parents have been suspended will find meaningful associations with others in the same situation. They are in vastly different positions from those whose loved ones have died, who must take the attitude, "Get over it! Life goes on!" These Lifepact members will find a commonality of interest in how those to whom they are close will adjust, awakening to wonders we ourselves can hardly conceive. The ones on the brink of being suspended will find satisfaction in knowing there is a group within which those still living can work toward a time when they will be back together again.

4. *Revocable Donations Of Personal Property To A Museum-Library.* The question of "taking it with you" comes up again and again in the context of cryonics. There are many personal items which would facilitate adjusting to a strange new land, and financial resources, if they can be conveyed into the future along with us, will always be useful. From the above title of this section, it is apparent that this has nothing at all to do with trusts. Fred Chamberlain spoke on this at a Lake Tahoe Life Extension Festival years ago, but a complete treatment, with forms to make it workable, was never published. The booklet mentioned above will give all the details.

In the simplest terms, one donates items of an appropriate kind for use in a Lifepact Museum or Lifepact Library. Lifepact promises to retain possession of such items in perpetuity, and the donation is designated "revocable at any time while I am alive." Some items can be marked "not to be opened before some given date" on the basis of the personal information or the nature of the ideas contained, so in this way one might be able to convey highly personal items into the future and recover possession of them with no exposure at all.

5. *Favorable Publicity For Cryonics.* When America was first being colonized, only the bravest took to the new frontier. Most stayed home, fearful of stepping from the ship unable to speak the language, uneducated in the way of life, without trade or means of making their way in the new world. Even hardships and squalor, due to their familiarity, were preferable to the waiting, lurking unknowns.

This same psychological barrier holds people back from seeking the frontier of the future. Like vacationers preferring to travel as part of an organized tour, with a guide who speaks the language and knows the local customs, more people will find venturing into the future a comfortable and exciting plunge if a warm and congenial welcome is

anticipated. If reeducation and reentry are among friends, in a supportive environment, more people will embrace the idea of making such a trip.

Lifepact is a "People helping people" organization, a "helping hands across time" philosophy. All cryonics talk-show participants can stress these positive and supportive aspects of their memberships in Lifepact in addition to discussing their particular cryonics organizations. The image of



such an organization will act to dispel the distrust that audiences so often harbor, capturing the imaginations of more viewers.

*How Will Lifepact Interact With Existing Cryonics Organizations?*

Lifepact, like cryonic suspension organizations, will need great stability to endure over decades, over centuries. It can profit from the energies and ideas of members from all cryonics societies. Widespread support by cryonicists can also bring immediate benefits to their suspension organizations.

(a) Lifepact will attract new members to cryonics societies by appealing to those who otherwise would see cryonic suspension as risky, a "one way ticket with no hotel or dinner reservations on arrival". Lifepact gives vitality to what, without it, might appear a cold and uninviting journey, with no "welcome mat" at the destination.

(b) Lifepact allows cryonics organizations to give their members confidence that concrete approaches are being developed for reanimation and rehabilitation, without the cost of diverting energies from current efforts to perfect freezing and storage technologies. Lifepact will be an independent organization so that it may serve members of all existing cryonic suspension organizations.

(c) The Lifepact concept will support cryonicists in their efforts to convey the concept of being suspended to journey into the future by reassuring the listener -- whether it be a one-on-one conversation between friends, or a talk-show viewed by millions -- that they need not face the future alone or helpless.

There need be no conflict between the efforts of the suspension organization and those of Lifepact, which will not engage in suspension activities but be concerned solely with establishing and managing lifepacts for repayment of the unknowable costs of reanimation and rehabilitation. The payment, as stated above, is promised to be made by the member after being reanimated and rehabilitated. Many possible scenarios will exist in the future. The three listed here are just for illustration.

(a) If a cryonics organization of the future can take care of members' reanimations and rehabilitations without need of additional funding, then Lifepact's contracts with members of that organization will solely have been "backups".



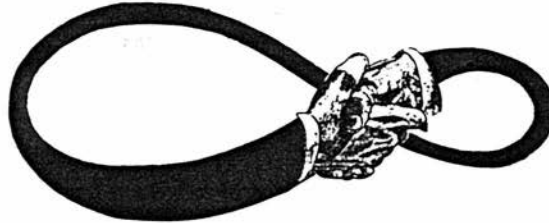
(b) If a cryonics organization, at some future time, has the technological capability for reanimation/rehabilitation but lacks the funds, Lifepact may be able to serve as the bridge through which funds are provided and later repaid.

(c) If a cryonics organization has been able to maintain its members in storage but does not possess the capabilities for reanimation, Lifepact may be able to finance this, perhaps contracting the work to cryonics organizations which are better equipped.

Lifepact and cryonics societies will be partners in reanimating and rehabilitating suspendees who are also Lifepact members. Lifepact will not be a competitor in any sense, rather it will be a partner, ally, co-supporter of cryonics organizations and of individuals.

If you have been searching for this answer, concerned about your chances for being reanimated, mindful of the problems associated with reentry into society after being suspended, Lifepact offers you a realistic approach. Join us in building the future!

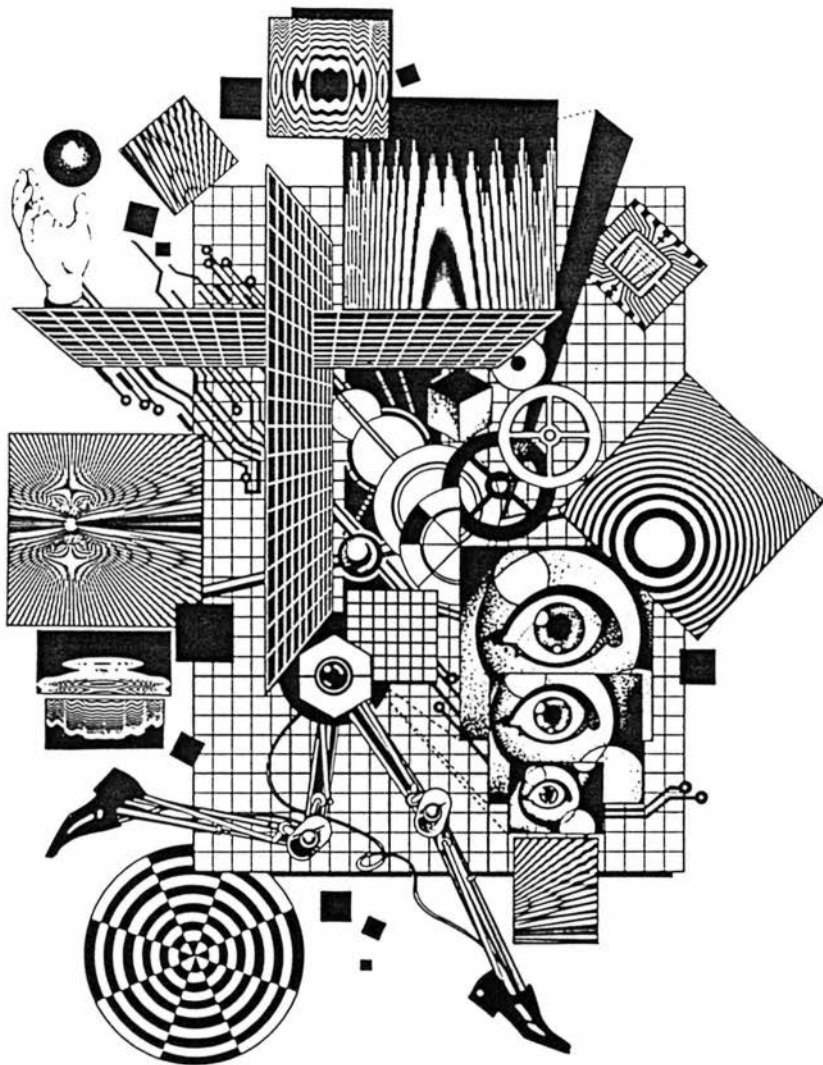
Write to Lifepact, P. O. Box 18698, South Lake Tahoe, CA 95706, or call Linda and Fred Chamberlain at (916) 541-1331 days, (916) 577-4746 evenings.



\* \* \* \* \*

**All great ideas are controversial,  
or have been at one time.**

**-- Georges Seldes**



## THE APOCALYPSE HAS BEEN CALLED OFF

by Thomas Donaldson  
cartoons by Cath Woolf

Many who read this will think it is an attack on nanotechnology. Many will also think it is an attack on the idea of redesigning ourselves. I specifically disagree with these opinions. Certainly we will find ways to hyperminiaturize our machines, and the abolition of aging would itself constitute a self-redesign. What concerns me here is not these, but an attitude which often accompanies these two, both within cryonics and without.

Avid readers will recognize this idea at once. It is the technological equivalent of apocalyptic Christianity. Science ultimately stems from Christianity, and apocalyptic Christianity and apocalyptic science or technology may even be identical. A manifestation of apocalyptic Christianity occurred in the Middle Ages, in the decade preceding the end of the first millenium, when peasant movements, aflame with ecstatic fervor, marched against the nobles to bring the Millenium, and after that the End Of Time. It happened in the U.S., in the last century, when the Seventh Day Adventists began. Marxist Communism is a political variant. Now, however, we are more scientific. We don't depend on God any more. Instead, our salvation, peace among men, a glorious reign of plenty, a "new Heaven and a new Earth", unfolds with this or that *technological* development.

I say "Apocalypse" deliberately. The Millenium was only the 1000-year period before God wrapped everything up. It's part of the Apocalyptic Myth. The remainder is the End Of Time, which is the solution of all problems and our assumption into Heaven.

I personally am old enough to remember when many people walked about declaring that Nuclear Power would bring this hoped for end of struggle, doubt, and conflict. I believe after Nuclear Power the next wave of apocalyptic fervor was about Automation. Following Automation, we then had Computers and Artificial Intelligence. Now we see Nanotechnology (not the same as nanotechnology!) taking over the cause. And so on, and on.

And we have seen how these issues really developed. Nuclear power is widely established in the world. Some nations have not adopted it as much as others. And because it has become *real* rather than *imaginary*, it has arrived with a full boatload of associated problems. (Is there anything real which does not have problems? The existence of problems, doubt, dissension, and complexity is a mark of reality.)

Automation had an interesting career. In America, convinced by devotees of Automation of a glorious future of factories without workers, much of heavy industry was wrecked. In Japan, automation was adopted eagerly (and to a still higher degree than here). Cars, VCRs, and television sets poured from Japanese factories and into American homes.

Apocalyptic Technologists, at engineering schools across the country, moved onward from these achievements. The most characteristic trait of this idea is that it always latches onto some technical development *not yet achieved*. Since it's not yet real, we may attribute all kinds of virtues to it. Those who try to imagine what it would really be like can be shouted down. They will necessarily come up with problems, doubt, dissension, struggle, and complexity (what did I say about reality?). "Mere naysayers", say the Advocates Of Change. "This Technology will answer all our problems. The last claims were only the result of delusion, while now we have the True Elixir (or will have, in just a very few years)."

No one can prove that some future, as yet undeveloped, technology will not solve all our problems. How could one prove that? Those expecting a Definitive Refutation will be disappointed. What I will do instead is to discuss various degrees of impossibility and raise some questions.

### Human Desires and Impossibility

Everyone can think of goals we can achieve with technology. If we want to discuss apocalyptic Technology, what is much more important is what technology cannot achieve. You think impossibilities are hard to find? Not at all. Here we have an inventor who has built an airplane able to reach the 3rd Celestial Sphere... you know, the one in the

Ptolemaic Theory. Beside him is an inventor who has constructed an impervious container to hold phlogiston. Beside *him* is an inventor who has a nanotechnological device to read a patient's phrenology.

That's only (à la Dante's *Inferno*) the First Circle of Impossibility, the things that are truly impossible. Even here, though, we have issues. Many people would like means to make themselves more intelligent. But we do not really understand intelligence, or how our brains operate.

We have tests which call themselves tests of intelligence. These tests were very useful in bureaucratically classifying people. But problems come when we try to see how "intelligence" works. If we want to increase it, we'll have to work that out. This is a serious problem because we actually have *no evidence at all* that intelligence as commonly conceived of is actually a real trait.

Among other issues, the idea abstracts a notion of "intelligence" separate from personality and values. Intelligent people are questing. They get interested in things. They display a persistence in solving problems (But not all problems, only some. And that too is important.). Can we separate that interest or persistence from their intelligence? When someone seeks more intelligence, do they want their whole personality changed too? No, they want to take a pill and suddenly do better on tests. Or else, they want to upload into a machine, and suddenly understand more. These goals may very well be just as impossible as reaching the Third Celestial Sphere.

Perhaps you thought that I was merely being fantastic when I discussed inventions to touch the Heavenly Spheres or hold phlogiston. But at one time, all the Scientifically Literate People believed in these concepts. We, of course, have reached such understanding that we would never commit such errors now.

But there is a Second Circle of Impossibility below that one, of logical conflicts. Our desires aren't always consistent. We may spend our whole lives trying to achieve a balance. Some achieve it and others do not, through luck, persistence, and probably also the good fortune that their genes gave them desires for which a balance existed. Others may not be so lucky. And a balance isn't the same as satisfaction or attainment. It's a state in which I'm not *too* unhappy, and sometimes even happy.

Most important, technology is an expression of our selves. If we have conflicts in what we want, every technology we create will contain those conflicts too.

There are many other instances, but here is a story to show what I mean:

*A man I knew, like most men, was powerfully attracted to women. He would describe the hips and the upturned nose, the flick of the hair, the swinging movements of his latest fixation. Why didn't he just go up to her and say "Hello"? Well, Edward Wilson, the sociobiologist, describes it very well. He also wanted, very powerfully, to keep himself separate from others. He had a problem. (This problem is solved in humans and other animals by the rituals of courtship, but that's a side issue).*

*One day he heard of (not nanotechnology, because*





the word didn't exist then) Biological Control, the notion that someday we could build an entire person. He seized upon this with delight. He would solve his Girl Problem by constructing for himself his Ideal Girl. Surely that would solve the problem!

And so we imagine how he proceeded, making a beautiful Galatea for himself. For about a month this worked very well. He practiced amatory exercises upon his Galatea. She was delighted with everything he did. She followed him around adoringly, memorizing his every word. In the second month her insistence upon bedroom exercises began to annoy him slightly (of course, all the Men out there would never become tired of bedroom exercises, would they?). She came up to him constantly wanting affection. By the third month he asked her crossly: "Aren't you interested in anything else? Don't you have anything else to do than follow me around?" To which she replied: "My love, just tell me what to become interested in, and I shall do it. Your interests are my interests!" By the fourth month, in a fit of frustration, he had suggested she develop an interest in racing cars. She became a world-class expert in racing cars, and came to him constantly to adore him, tell him her latest discoveries in the minutiae of 1911 racing cars, and ask for affection.

It was about a year later that I found him, alone, in a cafe, watching the

waitress. I sat down with him. "Ah," he said. "Look at her hips. Look at the way her hair moves when she walks."

Put crudely, my friend had seized upon Biological Control for its great masturbatory potential. Certainly, Biological Control (or as they now say, Nanotechnology) does have great potential for masturbation. But my friend's problem was not about masturbation. He wanted to find another, different woman, *independent* of him in a way no woman created by him could ever be. And this woman at the same time would want to sleep with him, and want his company, and a lot more.

I hope that nanotechnology led him to self-understanding. (Technology often can do that, too. It may even be a major use of technology).

We have many fundamental desires which conflict. There is *no* arrangement which can satisfy us completely because complete satisfaction is not possible. We want, not just a sexual partner, but a partner of the opposite sex, who is *not* ourselves.

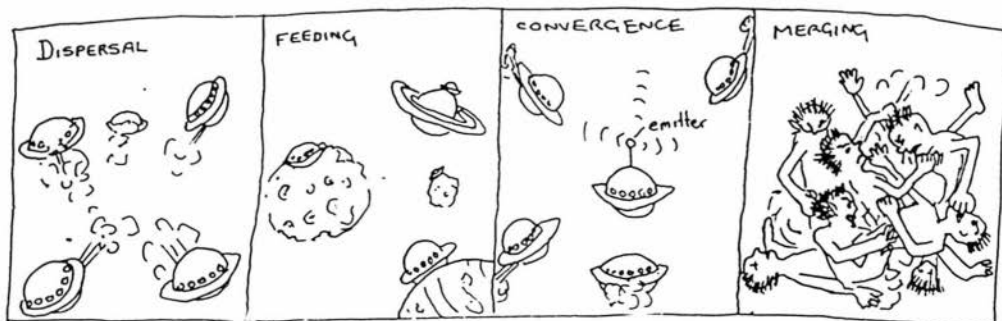
I have heard, but only through rumors, of another incident in the exploration of nanotechnology.

*Someone, call him "H", made 100,000 copies of himself to explore the Galaxy. They would all merge together again at the other side. Once the copies were made, they sailed out in an immense fleet, like the Chinese to explore Africa. For a long time we heard nothing, snatches of stories probably transmogrified along the way. We heard of many adventures endured, through the stars, by "H" (or his copies?), meetings with alien civilizations or their ruins, events on board the ships, strange discoveries near alien suns. Finally, one million years had passed and the time for the appointed meeting was near. As "H" converged on the meeting place, he (they) began to communicate. We have only faint messages. Our best computers translate all these messages (they had changed into 100,000 languages, all unique) into only one:*

*"What! Merge my memories and self with that thing! No, never, anything but that!"*

*We know that the star chosen for the meeting went supernova very shortly after the meeting date. We know of only one "H" now, who had not met the others because of a rare (nanotechnological) malfunction of his ship. He says that when he started to speak and see the others, they had all turned into humiliating caricatures of himself. They gave him many mortifying thoughts, like apes do to some people today.*

### LIFE CYCLE OF THE GALACTIC SLIME MOULD



*Sometimes, he almost weeps for the knowledge lost, the wonders his relatives must have seen.*

*In his explorations of far suns, "H" (or his copies?) had acquired knowledge. Knowledge isn't just bare data. It's important because it changes us, and the more it changes us the more important it is. And knowledge acquired personally changes us much more than someone else's report.*

*"H", however, believes that his disappointing experience came from inadequate technology. He eagerly plans another voyage into the Galaxy, with less primitive technology. "Boy, was I a fool", he says. "I'm going to do it right this time."*

More broadly, we want company from others but not identity with them. These desires expand into our desires for personal property, for respect from others, for communication with others. But others are also *others*, who are in competition with us for all those things we want. We don't live in selfless cooperation with everyone exactly because of our conflicting drives, to be at one with others and to remain apart.

These facts also create a science of economics. Is it possible for human beings to ever create a situation without scarcity? That is, could we by nanotechnology or other means create such plenty that no one would covet his neighbor's goods, everyone could have everything they wanted without effort? No, not at all. The impossibility doesn't lie in the goods. It lies in the *people*.

The reason for this has little to do with technology. We set up fences between our properties, rows of houses, each one on its own land, because of our human desires. Yes, a redesign of human beings could indeed abolish these fences between us. It wouldn't even require nanotechnology producing great plenty, or even a little plenty, or even none at all. Why, all we have to do is give up our sense of separateness. We can then all live in equal hovels, eating equal gruel, and absent-mindedly sharing our spouses, property, and children.

The desire for this kind of communism was common to all the apocalyptic "Christianities" of the past. The latest one, Nanotechnology, declares a solution by creating an instant productivity: no thought, no work, but merely to ask for it is enough. But what about copyrights or patents? Nanotechnology cannot multiply a copyright or patent or a landscape. We already, right now, have property distinctions which no amount of material productivity would affect. It's not that nanotechnology has faults. It's just that property distinctions, lines of distinction, separation between people, are what human beings *do*.

That is just the Second Circle of Impossibility. There is a Third Circle of Impossibility, of infinite regressions.

A major proposal for our new-found power of controlling both living and nonliving matter consists of the possibility of remodeling ourselves. That is, just as in *Revelation*, 21:5, "Behold, I will make you all new". Computer people often put the technology differently: to upload ourselves into new and somehow augmented bodies or systems. Philosophically, however, the ideas are the same.

Immortality is a case of remodelling ourselves. This issue is not a simple impossibility. Any sensible person (i.e. -- not an apocalyptic Technologist) will notice the self-application, from which comes a possibility of infinite regress. *Who is remodelling whom?* There is a serious problem here.

To an apocalyptic Christian this problem does not exist. The "new Heaven and new Earth", making the whole world new, occurs because of Christ, who does not stop to ask our opinions of his remodelling. They believe utterly (or at least say so) in his choices. The "scientific" apocalyptic Technologists have seized upon nanotechnology to make these choices for us. Nanotechnological Computers will simply examine us and then make their changes. Since Nanotechnological Computers can do no wrong, we also can believe utterly in their choices. Well, that is certainly one way to deal with the infinite regress.

The real difficulty is the choices. And choice isn't just an upper level function managers do. It's all-pervasive. The reason for this is reality, which constantly presents even the lowly with issues not included in their instructions. That is the difficulty to creating Robot Instructions. They must somehow encapsulate our choices, before they are made. But reality is not a simulation, it contains events we *did not* expect. Rather than just designing a tool for human use, we are plunged into scientific and metaphysical depths. We must understand the universe and all its complexities, to characterize all possible experiences our Robot will meet. And all this, for a Robot to fetch a cup for us from the next room! For a Robot to make biological or nanotechnological changes to ourselves, what then?

We could make the Robots completely autonomous, so that they could make all their own choices. Good. They will form into unions, insist on their rights, argue with us about procedures, engage in active office politics among themselves, defect into their own companies, sell secrets to competitors (or our Enemy!), plot with other managers to depose us from our jobs, lose all interest in transforming us . . . what we will have will be employees, not Robots. It's not clear what we will have gained. An employee is not a tool.

Whatever change we make, we'll want to wrestle with it emotionally. Many cryonicists can remember, long ago, when they first encountered immortality. And they had to wrestle with that, too. "Immortality? As a real thing, not just a myth? What would that *mean*?" That is only the first choice.

Looking even more closely at our design, there will constantly be design alternatives, each one with subtle differences to the final result. Even worse, these alternatives aren't all spread out for us on a table for us to pick and choose. We would discover them (or the robots would?) along the way. Many of these possibilities will require not simulation, but explicit experimentation in *reality* to work out their effects. For most real choices we'll probably only really know if we want them by seeing what happens to those who pick them.

Even simple genetic modification shows how choices are all-pervasive. We can see a multiplicity of people around us, all different. Everybody is a bundle of design choices, made up of genes affecting many traits and never purely positive or negative in effect. Even a single gene change requires a choice. In the apocalyptic Technologist's picture, Nanotechnology will create new materials not forcing such choices on us. (Do they then force new and even more complex choices on us? What victory!)

A parody going around of "The Night before Christmas" [found later in this issue. - Ed.] has small nanotechnological devices creating "a new heaven and a new Earth", in an evening. And then they disappear inside us, to remodel *us*. The author may not have known it, but he was describing the Gray Goo problem, just as it would develop in detail. It's not that the Goo is undifferentiated. The trouble with Gray Goo is that it never consults us, when consultation is constantly needed. Multicolored Goo is hardly better than a flat Gray.

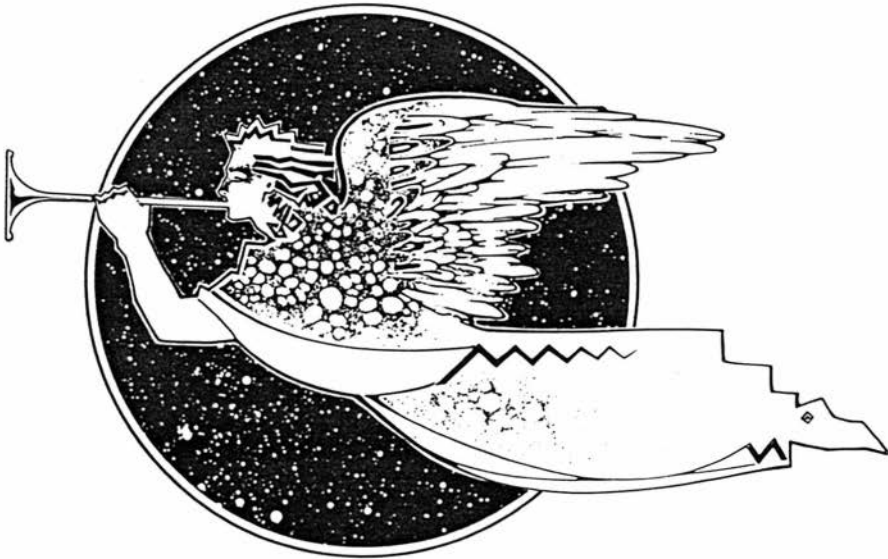


What have these comments to do with cryonics?

First, some cryonicists *are* apocalyptic Technologists. They know who they are. But many other people, both inside and outside cryonics, are not. Apocalyptic ideas aren't the best face we can provide to convince these people. Why not just stand on street corners in robes and preach the End Of The World with bearded intensity?

But that isn't an argument on the merits. I'd be the first to say so. This essay explains why I believe that the Technologists are wrong when they speak of a Singularity, wrong when they say that hyperpowerful nanocomputers will solve all our problems for us, and wrong in their appreciation either of people or history. It's likely that apocalyptic Technologists will always be wrong, themselves. It's a trait of personality, not just a belief. But those who aren't need a voice. This article tries to provide one.

Technology is usually a necessary *but not a sufficient* part of any solution to our problems. We must participate, not distantly but *up real close*. And finally, technologies often don't solve problems at all. They transmute them into *better problems*, again requiring our active choices. What is a better problem? Do you want the problems of mortality or immortality? After our revival, we'll still wrestle with who we are and where we are going: what some call the Meaning Of Life. Even thousands of years from now, we'll recognize an essential continuity with our problems today.



\* \* \*

*Afterword:*

*I would like to add a comment to the above article, not directly touching on cryonics. This comment is about Christianity.*

*Very many of us come from a Christian background. I do myself. I became an atheist very early in my teens. But our background is very important. It can fool us as to what we really believe. I have noticed, too much, both in cryonics and out, a strong desire to*

*interpret nanotechnology (and before it there were others) in the exact terms of Christian myth. It's as if a person carries out a renaming exercise ( God == Nanotechnology, Apocalypse == Singularity, Drexler == Christ (sorry Eric!)). God's name is certainly not a central part of Christian doctrine. This person is a Christian, rather than the atheist he thinks he is. His differences from Christianity are sectarian, not philosophical.*

*Personally I believe no conflict exists between Christianity and cryonics, although many churches will meet with disaster (and deserve to!) for tying their message so much to death. It's not wrong to be Christian. But it is dishonest to oneself and others to think that just renaming everything, and having a slightly different theory of how God works, frees one from Christianity to light.*

-- Thomas Donaldson

\* \* \* \* \*

**"Will that be Thousand Island, Blue Cheese,  
or Italian, Ma'am?"  
OR  
"Masters of the Universe?"**

by Cath Woolf

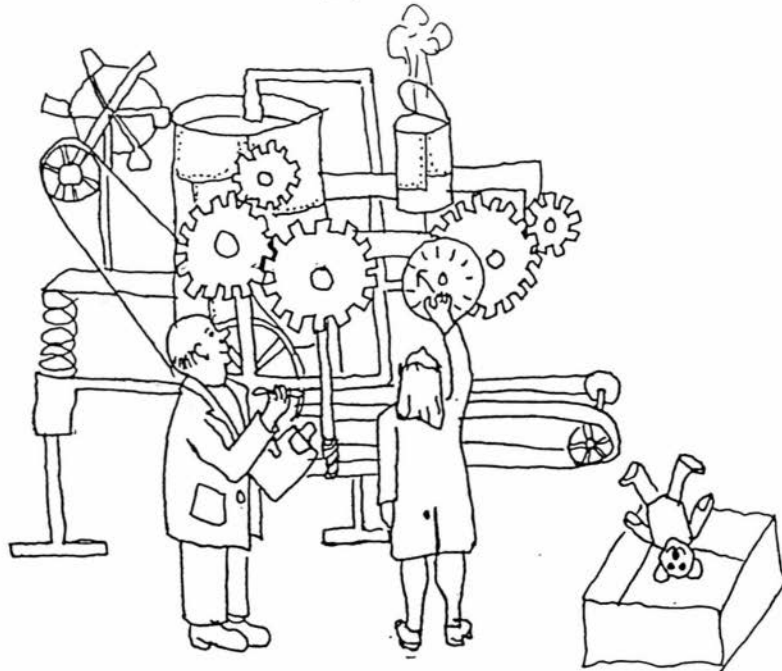
On the 19th July, 1988 I reached my third year as a resident in the United States. During this time, I have met many other cryonicists and become acquainted with a number of the technophiles of Silicon Valley. Far from convincing me of the value of their dreams of a high-tech future, I have become disturbed by what I perceive to be their view of technology.

Don't brand me as anti-technology. To polarise the issue in this way is to obscure and degrade the debate. Firstly, some technologies are inspiring and liberating, such as personal computers or space technology, others debase our individuality, such as a lot of the systems and machinery of mass-production, which is coupled with very inadequate thought about the design of the end product. We cannot isolate technology from the uses to which it is put, or the basic way it is designed to be used.

What disturbs me about the technophiles is the underlying assumption that they seem to make that social progress is an automatic concomitant of technological progress. But social progress is never defined by them except in terms of immense personal wealth, power over matter, and acquisition of information. What is done with all of this is never discussed.

Another thing that disturbs me is the mindset. Firstly, much of the technology discussed involves control over something -- matter, energy, weather, or some human activity. As an individual this worries me as it implies a controller and a controllee, innately in conflict with my ideals of freedom. No doubt what is done will be done by some "democratic" decision. So many technophiles work on large corporate or government-funded projects, especially defense projects, that this comes as no surprise. Technology does not exist outside of needs, corporate, government, or individual, and most of these big high-tech endeavours are not being conducted on behalf of the individual, despite assurances to the contrary.

The second aspect of the mindset is its consumerist orientation. This shows itself in such off-hand remarks as "Upon revival, we will be offered the choice of the advanced



silicon (or diamond) model body, or the Robert Redford model body, etc.". This is vending-machine mentality -- technology being used to give us a pre-set number of choices. The concept of a technology that would enable *me* to design *my own body* is not uppermost in their vision. It is also paternalistic -- they are the benefactors offering the choices and we are the grateful choosers.

Even now a distressing amount of technology is oriented toward control or delivering pre-set choices, probably in the name of efficiency. I realise that this is partly the outcome of a strategy to raise the standard of living of the bulk of humanity, but surely we can start to let go of this approach now. Up till now, the quality of services has often been rated according to the number of choices offered. I'm not sure why, but in American society, often the choices seem to be the same ones, hence the title of this piece.

Often it is said in discussions with technophiles that the same technology that enables government and business to exert control enables the individual to avoid it. Maybe I'm paranoid, but I think that the institutions are winning. The common occurrence in 19th Century literature of the person who disappears to make a fresh start elsewhere is a relic -- look at the hounding of alleged Nazis. I know I'm not alone in being concerned about all the information storage and retrieval that is occurring without our ownership of the information about ourselves. Often the relinquishing of privacy is achieved through offers of convenience. Mrs. Bloggs goes to the supermarket and her groceries are electronically checked out and she pays with her ATM card -- theoretically the bank and the supermarket now know what she buys. Of course, it may all be innocent, but I am troubled by the lack of any stated controls in the whole procedure. When I see "For your convenience" I always assume I am being stereotyped, managed, and am losing some privacy for someone else's convenience.

I think if I really wanted to work on something important I would use a library (no online search) and hold quiet person-to-person conversations in safe places. Sure we can

all get smart with our computers to obscure our activities, a really efficient use of technology! Who decides what to include in our data bases, anyway?

So, these are my concerns. We really ought to be thinking more about what we want to do with ourselves. I profess an old-fashioned Enlightenment view about fulfillment of the individual as a creative, thinking, and *expressive* human. Any gadget that allows me to create an environment entirely in accord with my own aesthetic principles I would welcome. I admire Vanessa Bell of the Bloomsbury group in early 20th Century England. (The group also included Keynes and Virginia Woolf). She was a painter who created a whole house and garden herself -- every item of crockery, furniture, curtains, and rugs.

My use of the word "aesthetic" here is intentional. I am not concerned with "taste", which is a consumerist notion that typifies a this-goes-with-that decorative style, producing an effect that is generally bland and in accord with fashion. I'm concerned with creating, the thoughtful and expressive application of technology.

After over three years of observing and listening to technophiles and reading articles about the wonders technology has produced in terms of goods, quality of life, etc., and I look around me and see the reality of Silicon Valley -- the banal, boring homogeneity of the high-tech center of the planet, I come to the conclusion that something is wrong.

Creativity has been usurped by choice-making. Individuality is sacrificed to convenience and efficiency (and not the individual's). We are becoming passive. To say that current technology is woefully crude is a copout. To say that all of the engineers are too busy creating the world of the future to care about their environment is downright distressing and paternalistic. If we can't foster individuality, creativity, and privacy with our current technology *now* it will be that much harder to do it in the future, especially with the trend in increasing government and corporate funding in science and technology. You can be sure that government and big business do not want a creative and free-thinking people.

At a recent party, a technophile asked me if I had vast wealth what would I want to do with it. I replied that I'd like immortality, a large garden, quiet, no interference, and large quantities of pencils and paper. This stopped him for a minute, but then he said a high-tech future would be just the thing for idiosyncratic people like me!

It is ironic that a lot of high-tech inventions are complex and idiot-proof and are dedicated to making banal objects. But what Rembrandt could do with pen and paper 300 years ago still moves me. Something is wrong, I know it is. Let's stop talking about high technology -- I want to coin a phrase -- let's talk about *deep* technology.



## BINARY STATUTES, ANALOG WORLD

### Berke's Paradox and the Law

by Steven B. Harris

As Mayor of the Munchkin City  
In the county of the Land of Oz,  
I welcome you most *regally* .....

But we've got to verify it *legally*  
To see (to see)  
If she (if she)  
Is morally, ethically,  
Spiritually, physically,  
Positively, absolutely,

UNdeniably  
AND reliably

DEAD.....

-- The Munchkins

As coroner I must aver  
I've thoroughly examined her --  
And she's not only *merely* dead,  
She's really most *sincerely* dead.

-- The Coroner of Oz

\* \* \*

*"Though no man can draw a stroke between the confines of day and night,  
yet light and darkness are upon the whole tolerably distinguishable."*

-- Edmund Berke

\* \* \*

The conundrum which struck the political philosopher Edmund Berke more than two centuries ago remains with us today. The condition we term "night," does indeed turn into the condition we call "day," and it does so with no sharp dividing line between the two. And yet, we all agree nevertheless that "night" and "day" are clearly different states.

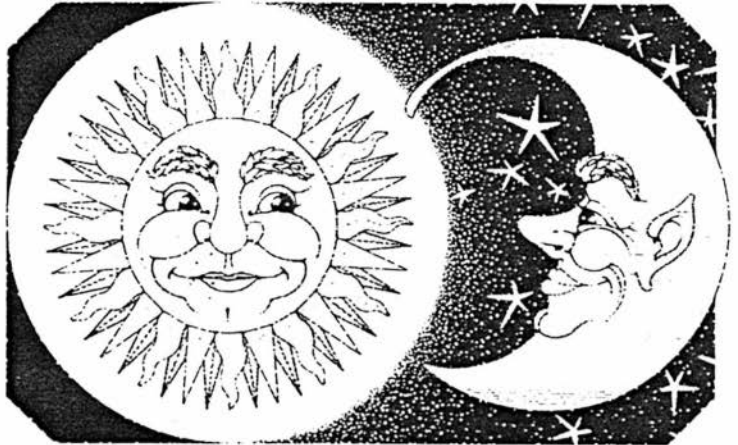
What is more, this sort of thing happens all the time. Our world contains numerous examples of processes in which "state A" is transformed smoothly and continuously into a somewhat different "state B." Wet becomes dry, for example. One kind of weather verges imperceptibly into another. Organisms grow and change form, and so on.

None of this is necessarily a bad thing, and in fact it is continuous change which keeps planet Earth from becoming boring. Transformation is interesting and pleasant to



watch, and it is even more pleasant to watch if it is observed passively with no attempt to classify what one is seeing. But when one begins to think....

This essay will argue that language and its penchant for classification is the tree of "knowledge" which forever disturbs the Eden of human tranquility. Whenever we humans talk, we mark out lines and boundaries in continuous natural processes. Our *words* do that for us. The boundaries which words create may or may not be there in actuality; we draw them in anyway, because classification and analysis are essential to the human thinking process.



- But line-drawing can also lead to trouble. This essay is about the kind of trouble to which it can lead.

#### Part I. Black and White -- and Gray.

Let us begin our discussion of the boundaries produced by language by considering a very ordinary transformation in the universe we live in: that of a black cup of coffee being sweetened. Since "black coffee" means, by definition, a cup of coffee with no sugar or cream in it, such a cup of coffee does not start out sweet. Nor does it become sweet if one adds a single sugar crystal and stirs. Nor if one adds two crystals. Or three. But if one has the patience to continue adding sugar crystals one by one, then by the time one has added the many thousands of crystals of sugar in several tablespoons of sugar, one will have arrived at a "coffee state" which will be judged sweet by any drinker whose palate is in working order.

So far, so good. The reader will notice that the cup of coffee has now become an example of the kind of state change of which we spoke in the introduction. State A (not sweet) has been transformed to state B (sweet). But now suppose we ask a naive question: At what point does the cup of coffee *become* sweet? There is no question that it does make the transition, but suppose what we want to know is *which sugar crystal does it?*

A little thought will show that the answer is not clear, for the issue is a very subjective one. The problem is that there are many intermediate quantities of sugar which, if added to a cup of black coffee and stirred, would produce considerable disagreement among drinkers as to whether that particular cup deserved the label of "sweet." The judgement of sweetness is, in fact, quite literally a matter of taste, and varies between persons. It would thus be fair to say that in the matter of sweetening a cup of coffee, NO particular sugar crystal does the deed. As sugar is added slowly to it, a cup of coffee does not become sweet as an *event*, but rather as a *process*. "Sweet" and "nonsweet" are tolerably distinguishable at the extremes, as Berke would have said, but "no man can draw a stroke between them" when one is changed slowly to the other.

*Judging a Cup of Coffee Objectively*

Or can they? Let us suppose now for the sake of argument that a certain society is unhappy with the state of affairs in the transformation of a black cup of coffee into a sweet cup of coffee. Perhaps it is a society of chronically anxious people -- the sort of people who are uncomfortable with ambiguity. If a society does not like the judgement of sweetness in a cup of coffee to be a subjective one, is there anything which can be done to make things more objective? More....scientific?

Without doubt, a society could certainly go through the *motions* of being scientific. It could, for instance, begin by defining "sweet" in terms of the sugar concentration in coffee. That would in turn allow an exact calculation of the point at which a given cup of coffee became "sweet" as sugar crystals were added, and it would even allow people to identify the exact crystal which pushed things "over the line." The only problem with



this formal approach, needless to say, is that the decision of where to define the "sweet" concentration in the first place would necessarily remain a matter of personal opinion. A line might be drawn and labeled "sweet," but it would have to be done subjectively. Thus, an anxious society would only end up back where it started.

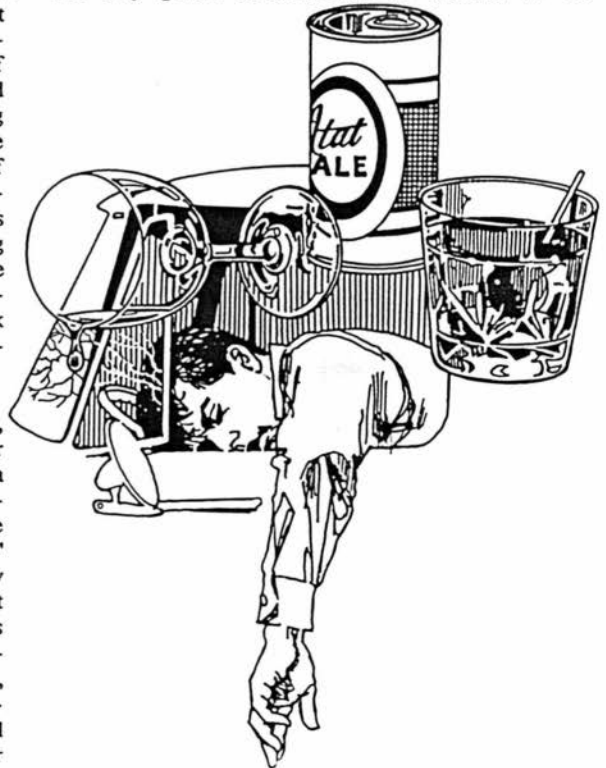
Or perhaps it would be more correct to say that *scientifically* it would end up where it started -- but perhaps not politically. Sweetening a cup of coffee, like most occupations, is subject to the addition of the *trappings* of science, even if it is not subject to the full methods. For unfortunately the more instruments one has and the more numbers one generates, the more objective any process may *seem*, whether it actually is or not. Thus, although it might not be possible to be more objective about the sweetness of a cup of coffee, it might indeed be possible to *fool* oneself and others that one is doing so. In anxious societies, after all, formality can be important.

### *Practical Applications*

Are there societies which would try to do such a thing, then? We now consider an actual case. For those who found the above example amusing, consider, in place of a cup of coffee, the fluids of a human body. In place of crystals of sugar, consider instead molecules of ethyl alcohol. And in place of the term "sweet," consider the term "intoxicated."

In short, consider the matter of drunken driving enforcement. Here, of course, society is faced with a terrible problem. For any given concentration of alcohol in the blood, the amount of driving impairment for different persons will vary significantly. Even the *average* amount of impairment will vary in a smooth and continuous fashion with increasing concentration of alcohol, so that there still remains the subjective task of deciding how much performance-impairment is acceptable, and how much is not. Unless one simply outlaws having any alcohol in the blood at all while operating a vehicle (as is intelligently done in Sweden), the idea of "drunk driving" is one in which there is subjectivity at every turn.

So what is a society to do? Well, needless to say, things become easier for all concerned if one can pick a semi-arbitrary blood alcohol concentration and *label* persons who fall to one side of the line as "intoxicated." Labels do make a difference -- in law they often determine at least what charges are filed. Thus, if a man is brought to court on a charge of "driving while intoxicated," for instance, the burden of proof falls on the defendant once the magic blood alcohol numbers have been given. In other





words, once the term "intoxicated" has been applied, the legal *defense* now has the burden of going through the arguments about subjective standards and gray areas, while all the time the jury is thinking about what a clever job the defense lawyer is doing in order to try to get off a guy who has been scientifically proved to have been *drunk*.

### *The Law in General*

For the benefit of all those readers who feel emotionally so strongly about the issue of drunk driving that they had difficulty with the preceding discussion, it should be pointed out that it is the nature of human law in *most* cases to draw lines in spectrums of continuous processes, and the legal definition of "drunk driving" is only one of a million examples. The laws of men are *binary*, for they recognize just two states: legal and illegal. Unfortunately, the nature of the world, by and large, is smoothly continuous, and that contrast leads to interesting situations.

One can get a parking ticket for parking 24 feet from a hydrant, for instance, but not 26 feet. One can be put in jail for buying liquor the day before one's 18th birthday, but not a day later, and so on. It isn't that anyone seriously believes that a parked car is significantly more a threat to fire safety at 24 feet from a hydrant than 26, or for that matter that any one is significantly more mature at exactly 18 years old than a day shy of that age. It is just that one has to draw the line somewhere.

And, of course, one does. The mild paradox of Edmund Berke which opened this essay has much application to the law. The most flagrant violations of the law are often obvious, yet at the same time objective places for marking lines of illegality often do not exist. Indeed, almost everyone passes through a phase sometime during the process of growing up where they first come to realize the basic unfairness of drawing binary legal lines in a continuous world. But just as surely, the resultant cynicism soon passes for people of normal intelligence once they come to realize a bit later that there really isn't a better way to do things as long as any laws at all are to be made.

In the real world, the legal system attempts to obviate the basic unfairness of "line-drawing" in a number of ways. These include 1) having multiple categories of gravity for offenses, 2) only prosecuting the more flagrant violations, and 3) having a system of lawyers skilled at making juries see the possibility of grey areas in the law. The result is a system that works on the whole, but which may be a nightmare in any individual case. For of course multiple categories of crime still do not perfectly mirror a continuous world; and sometimes overzealous police or politically motivated prosecutors decide to prosecute violations that are not so flagrant; and finally the presence of grey areas often means that the skill of the lawyer, rather than the guilt of the accused, determines the ultimate verdict.

## II. Law and Language.

The above discussion is meant to prime the reader for the major problem to be discussed in this essay. It is this: there are times when line-drawing is necessary and fair, others where it is necessary and unfair, and still others when it is both unnecessary and unfair but where the fact is not recognized because the lines have been mistaken for reality. The law is a profession dependant upon language, and as intimated earlier, one of the reasons why the utter subjectivity of most law is not more apparent is that the subjectivity of law is well hidden in the nature of language itself.

As noted in the introduction, when speaking about the universe we live in we run

immediately into difficulty when describing continuous transformation and change. The very act of labeling a state or an object with a particular *word*, is equivalent to drawing a mental line around it which some other words dare not cross. When one says "sweet," or "drunk" or "daytime," for instance, one is marking out a linguistic territory that has *borders*, even if those borders are ill-defined ones that may shade into a twilight zone of doubt when examined closely.

The act of "naming" things tends to encourage and foster the practice of putting mental borders on processes and states where there may in fact be none in reality. When this happens, and the map (language) is confused for the territory (reality), the arbitrary lines we draw may be erroneously taken for real. The resulting unedifying semantic debates about such things as whether or not a cup of coffee "really" is sweet, or the man "really" is drunk, or the person "really" is an adult, in the absence of any natural definitions of "sweet," or "drunk" or "adult," is one of mankind's more enduring pastimes and follies. It was a folly recognized in Buddhist philosophy 2,500 years ago, but one which seem destined to be with us forever.

S.I. Hayakawa, famous popular explainer of the study of semantics, has this to say about a related situation:

*The habit of trusting one's definitions...is one of the most stubborn remnants of primitivism to affect us. It does not matter if the verbal associations are beautifully systematic, as among the neo-Aristotelian reformers of modern education, or random, as among the uneducated. Words, and whatever words may suggest, are not the things they stand for, and education that fails to emphasize this fact is more than likely to leave students imprisoned and victimized by their linguistic conditioning, rather than enlightened and liberated by it.*

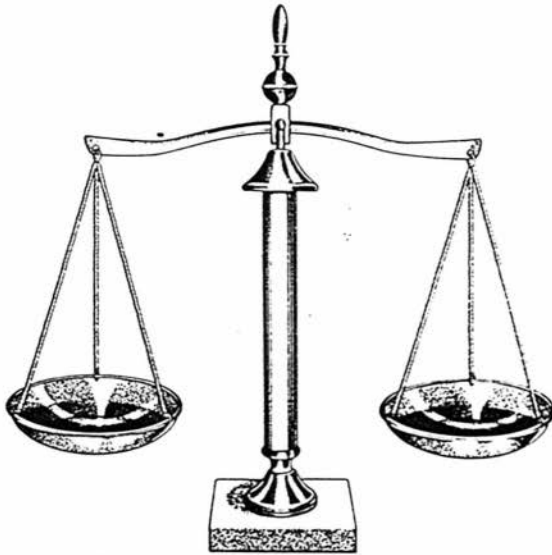
*To people so imprisoned, it inevitably appears that if certain individuals have a name in common -- say "criminals" -- they must have the "essential attribute" of "criminality" in common, while "noncriminals," of course, do not possess that "attribute." The profound sense that there is something different between people who have been in jail and those who have not is one of the most cherished beliefs both of the respectable rich and the respectable poor. Similarly, as mentioned earlier, Jews are supposed by many to have in common the attribute of "Jewishness," which distinguishes them from non-Jews. Now what is this "Jewishness"? Define it any way you like -- take Hitler's definition, or anyone else's -- and from that point on it is not necessary to examine Jews. You know what they are like without even looking, because you have what Aristotle called "knowledge of universals," which "is more precious than sense perceptions and than intuition."*

Hayakawa's invocation of Aristotle here is in recognition of the ancient idea in philosophy that mental attributes of things (such as man-made classifications) were to be given some of the same sort of respect as the more measurable and continuous attributes such as (for instance) dimension and texture. Aristotle's "universals" are created by the classificational lines and boundaries which language draws, and the essential question these linguistic boundaries create is always one of how objectively real they are.

Aristotle's ideas in this regard are actually rather mild in contrast to those of his teacher Plato, who had taken the idea even a step further and decided that the common classificational attributes of objects were to be given *all* the respect. Plato, in fact, had decided that the attributes of objects were the *only* reality there was, and that the individual objects themselves were merely shadows or illusions. Thus, for Plato (as an example) no individual *table* was real, but "*tableness*" as an ideal essence or attribute, had a real existence. Similarly, for Plato, there were no real horses, but only various

imperfect manifestations of an ideal "horsehood," and so on.

The Roman Catholic Church was eventually to find many of Plato's philosophical ideas useful. Thus, for example, in the Roman church, individual priests came to be seen as only imperfect manifestations of an ideal "priesthood," and so on. The early Christian church was also influenced (through early Christian writers such as John) by the philosophy of the Greek Stoics. The Stoic school held that the material universe was pervaded by a kind of ordering "force" (Logos), which was identified with mind, deity, soul, and (most importantly for our discussion) language. Following Platonism, then, many of the idealistic (linguistic) attributes of objects were given a separate metaphysical reality in Christian thought. Following the Stoics, language itself became somewhat deified ("the word" = "God"), and complicated liturgical formulas involving language were held to influence objective reality, such as the "transubstantiation" of sacraments, etc. Formal linguistic "line drawing" ceremonies ("spells") are important in both religion and magic. In fact, the magician's "hocus pocus" is really the *hoc est corpus* of the Roman Catholic eucharist in disguise.



#### *The Law Again*

Classical Roman Law (from which our law is derived) was constructed under the influence of certain aspects of Greek philosophy, and therefore contains many Stoic and Platonic ideas. Especially Platonic is Western law's infatuation with the separate "reality" created by words and labels, such as "intoxicated," "criminal," "adult," and so on.

Both religion and law in Western society have thus acted historically to perpetuate the myth that language and terminology may create some special objective change in the universe. In fact, if one is under the influence of Plato in this fashion (either directly or indirectly) one may be tempted to believe that one's mental classifications of things are

enforced by separate *metaphysical* characteristics of objects which correspond with the language that one uses.

Some examples of this are needed to illustrate. Let us examine now in detail what kinds of world views this philosophy can lead.

### III. Putting Lines in Biological Transformations

#### *Gestation*

As a first example, let us begin with a transformational process with which religion and the law must contend. Consider a fertilized human ovum, which has few of the characteristics ordinarily associated with a baby. To call a fertilized ovum a "baby" would be akin to calling a cornerstone a "building," or to calling two teaspoons of soda and a recipe, a "cake." These are things we do not do. However, it

is also true that an average of eight and a half months after conception, a living organism is normally born which is universally regarded by society as a baby and a human being. A smooth and continuous process has happened between these two events of conception and birth. "State A" has been transformed into "state B," with never a clear dividing line between the two. The cup of coffee has become sweet.

The law, which is zealous about protection of "persons," and "babies" of course has a problem here. If it is persons (babies) that one wishes to protect under the law, then one is forced to ask an embarrassing question: when is it *exactly* that the fertilized ovum becomes a baby or a person? At this point, it should be apparent to the reader that the question is essentially a matter of taste, as in the matter of the coffee. However, as also in the example of the coffee, many other approaches to the question have historically been taken by anxious persons and societies with an intolerance of ambiguity.

The Fundamentalist Christian churches, notably, have provided several "answers." In typical Platonic fashion the early Christians had come to see the "essence" of human beings in metaphysical terms. Aristotle had thought that humans possessed separate "souls" for each of the three linguistic quantities of "life," "locomotion/animalness," and "humanity" which he recognized in humans. The later Christians however, under the influence of Greek philosophy and myth, had long since pared the essence of humanity down to just one economical "spirit," which was thought to not only confer "humanity," but also personal identity. Accordingly, it seemed natural to assume that a fetus *objectively* became a "person" (a linguistic term) when it received a human spirit.

Interestingly the word "spirit" is associated with "breath" or "breath of life" in most ancient languages. In Hebrew and Greek, spirit and breath are the same word. [A little known fact is that the historical reason why people say the blessing "*Gesundheit*" (good health) to sneezers, is it was once thought that a sneezer momentarily blew out his own soul, putting himself temporarily at risk for demonic possession of his untenanted body]. Thus, it seemed natural to equate the drawing of the first breath of life with "personhood." This attitude prevailed in the early church, and throughout most of the Middle Ages miscarried fetuses which did not draw breath were not even buried in hallowed ground by Roman Catholics, but were simply discarded without a second thought.

Sometime later, of course, after conception was more thoroughly understood and therapeutic abortion became a controversial issue, the Roman Catholic Church announced that "ensoulment" occurred at the precise moment of fertilization. By this time however (and unfortunately for the Catholics church) the world had turned protestant and humanistic. Abortion was outlawed for a time, but eventually in 1973 it became legal everywhere in the United States.

## ABORTION:



### When Does Life Begin?

The result of this ruling was literally screams of bloody murder from certain factions, and a history of protest with which the reader will be familiar. Especially loud were protests from American Christian Fundamentalists, a religious category defined by its inability to live with ambiguity, as previously illustrated by its lobbying activities against the theory of evolution. What most disconcerted the antievolutionists in the case of Darwinism, interestingly, was precisely the idea that apelike primates could change gradually into humans, without any clear dividing line between the two. This "Berkean" paradox was too much for the fundamentalists, who craved to know the precise *moment* when the First Man appeared, and wanted to know his name and address.\*

In the United States the law, which was not controlled by the Catholic church, and which lacked a "soul detector," was at an impasse. To the law, pregnancy was a huge biological grey area, and so the law did what it usually does when faced with a large grey area: it proceeded to draw arbitrary lines. Specifically, in "Roe vs Wade" the U.S. Supreme Court drew legal lines at conception, three months after conception, six months after conception, and birth. During each of the three resultant intervals the State's interest was defined. The rationale for the six month demarkation was presumably that this was close to the time of theoretical viability outside the womb (and still is not too far away from it even in 1989). The three month line presumably had something to do with the time when any responsible person who was going to have an abortion should have had it already. But in any case, the Court did not explain its reasoning for any of the times given.

In doing this the Court interestingly came in for the same sorts of arguments that most people learn in adolescence to avoid when speaking of law, and such protests serve as a nice illustration of the basic frustration with binary law which lies just under the surface in all of us. Specifically, the three and six month legal lines were denounced by fundamentalists as "arbitrary"(!) -- as though arbitrariness were somehow not the nature of all laws when dealing with grey areas in transitional processes. There was also much protest about the fact that the law regarded fetal status as changing completely with the comparatively short process of birth -- a protest which under the circumstances was equivalent to protesting the fact that the law regards a person in violation just a few miles per hour over the speed limit, but not a few under. Even more incredibly, this sort of protest was made by people who wished the law to similarly change the legal status of genetic material after the comparatively short process of fertilization -- an illustration of the illogical lengths to which people will go when attempting to enforce a metaphysical agenda.

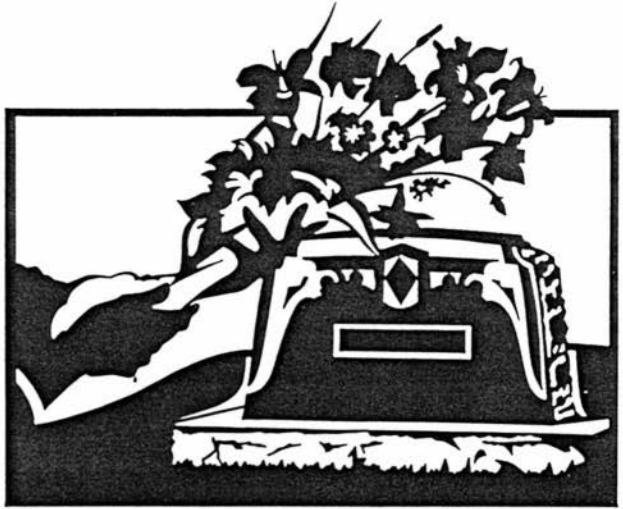
### Death

To this point we have discussed issues which have been in the news, and which impinge on cryonicists as citizens, but which do not affect cryonics *per se*. We now move on to a subject which affects cryonics directly and inescapably.

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\* I've been hard on the fundamentalists here, but scientists can be just as silly about drawing *linguistic* boundaries where there are none in reality. When someone finds a fossil skull with a brain volume of 700 cc's, for instance, there is enormous pressure to name it *Homo something* rather than *Australopithecus something*. After all, who wouldn't rather be the paleoarcheologist who found the oldest *man*, instead of just the one who found one more late *ape*? Archaeologists are forever talking about putting a baseball cap on such and such a creature, and taking it on the subway without having anyone scream; a measure of the crudity of thought-experiment to which one will descend to if the result will allow one to justify using the taxonomic term one wants to use.

It is seldom realized that the issue of death is potentially as politically explosive as the issue of abortion. The reason is that many scientifically sophisticated persons now realize that in the case of death we again deal not with an event, but with a smoothly continuous transformation process from state A to state B. Human beings come into existence a little bit at a time, as the abortion issue has taught us. Unfortunately for the long term future peace of mind of cryonicists, *humans go out of existence in the same way.*



A living organism is a package, or pattern of information. Certain atoms in the package may be changed (replaced) as metabolism goes on, but the organism retains its identity throughout this process, just as (for example) a volume of a novel would retain its identity even if its pages are replaced with photocopies. Today we know that certain living organisms can be dehydrated, or even frozen at nearly absolute zero (processes which stop all metabolism), and yet can still be revived as long as their building pattern is not damaged. "Life" is not metabolism, it is *information.*

The great difficulty in speaking of the destruction of organisms, is the word "death." If "life" is information, then "death" may be usefully defined as the complete loss of information. Thus, a man who has been cremated is pretty clearly dead, because the information is gone. But what shall we say about a child who has fallen through the ice on a river and "drowned" an hour ago? Or two hours ago, or ten hours ago? In all of these cases, most of the information is certainly still present, even though heartbeat and respiration have long since ceased. Although only the child in the first instance can be revived with the technology of 1989, to use this fact as part of a supposedly "objective" definition of "death" would be chauvinistic to our present age. A generation ago, after all, *none* of these children would have been revivable, and there is no reason to think that things will not change again in the future. In fact, we expect that they *will* change as resuscitation technology improves.

A human who has decayed to a skeleton is dead. There is an absolute objective difference between life and death, then, but the transition between them is ordinarily a slow one, with no clear dividing line. Again we are confronted with the paradox of Berke. And once again in the issue of death we must deal with people who have little tolerance for ambiguity, and who wish to use the institutions of language and religion and law to draw an arbitrary line in a continuous process.

The law's interest in the matter, of course, is obvious. If a society is unable to define the difference between life and death, it cannot even define the difference between murder and simple mutilation of a corpse. Historically, then, the law has been forced to draw a line in the process of cessation of vital functions, albeit a somewhat arbitrary one. A convenient place to do so up until the mid-twentieth century was at the point when "internal motion" (heartbeat and breathing) ceased, in what physicians of today call "clinical death." This point was convenient because it not only marked the limit of "viability" (hope of return to normal function), but also because it was associated with

the religious connotation of *breathing* as being associated with the presence of the spirit.

In the middle of the twentieth century, however, things began to become complicated. Doctors learned how to restart hearts with electrical cardioversion, and CPR and heart-lung machines now began to make it possible to maintain persons for variable lengths of time without any intrinsic heart or ventilatory function at all. Worse still, the concept of "brain death" was found inapplicable to acute situations, because it was found that the diagnosis could only be made in retrospect at a time when the brain had already been almost completely destroyed. Brain death thus did not help in line drawing unless people were satisfied with drawing the line well after the fact.

The law did what it could. In California, death was redefined as the "irreversible cessation of circulatory and respiratory function." Unfortunately the word "irreversible" promised difficulty, since it made the time of death highly variable among individuals whose hearts had stopped, and also because the diagnosis of death in theory could not be made for some time after clinical death without an attempt at resuscitation which was inappropriate for many people (folks with terminal illnesses, etc.) Thus, the California law was widely ignored by physicians, who continued to pronounce people (whom they did not wish to resuscitate) dead when their hearts stopped, just as they had always done.

## Head taken from live woman?

*Cryonics*

### A Tribune Wire Report

RIVERSIDE, Calif. — An elderly woman whose head was surgically removed by a cryonics firm may have been alive during the operation, coroner's investigators said Thursday.

Dora Kent, 83, was removed from a convalescent home Dec. 9 by her son and taken to the Alcor Life Extension Foundation, housed in a warehouse on the outskirts of Riverside, County Deputy Coroner Rick Bogan said.

She was denied food and medication for six days before she was decapitated and her head frozen, Bogan said.

"One of the problems is we don't know whether they started the procedure (to remove the head) before or after her death," he said.

Kent's head and seven others found at the foundation were submerged and stored.

Bogan said the heads are kept frozen at minus 200 degrees in the hope that, with future technology and medical advances, doctors will be able to either reattach them to the bodies or transplant the brains in trans-

The danger inherent in the above state of things ought to be apparent to any cryonicist. Although legal lines may be initially drawn somewhat arbitrarily, they do have the virtue of being easily identified and complied with—indeed that is their purpose. But where a line is not clearly drawn in a process which itself is murky, the law becomes worse than useless. The word "irreversible" implies a functional definition of "death" and a functional test. You can't tell if function is "irreversible" in many instances unless you try to reverse it! If the test (attempted resuscitation) is not done, it is impossible to imagine how one is to tell the legal status of anyone for a very long time after their hearts have stopped. This being the case, the matter of when to prosecute for suspected violations of law in this area would seem to be completely arbitrary.

A well known method of social control is to pass laws with such a structure as to guarantee universal violation, then enforce them selectively against undesirables. Although physicians involved in standard medical practice may never be prosecuted for violation of the law's new definition of death (though in violation of it every day), it is entirely possible that physicians (and nonphysicians) involved in cryonics may be.

To make things worse, all of the above legal problems are complicated by a religious overlay. Many religions conceive of death as a sharp event which takes place when the soul leaves the body. The religious confusion generated in the last 25 years by the changing technological definition of death is to be gauged by the proliferation of stories about

people whose souls left their bodies during clinical death and then were jerked back by resuscitation (one envisions a sort of Platonic/metaphysical elastic paddle-ball for the souls of folks who are resuscitated several times). Thus, many people are convinced that death *does* occur as an *event* sometime after the heart stops, and therefore that murder of a person already in cardiac arrest may indeed be theoretically *possible*. And once the possibility is admitted of a crime for which there are no hard and fast defining criteria, then the way becomes open for prosecution (or persecution) of people who just seem vaguely "up to no good."

Thus, it might be entirely possible for a jury of believers to convict on the "impression" that someone was "alive" or "dead" when they underwent a given cryonics procedure, in somewhat the same fashion that a Inquisitorial tribunal might have judged persons guilty of heresy in the middle ages.

#### IV. Transitional Ceremonies

All societies have ways of dealing with gradual social changes in which status would otherwise not be clear. Some of these social functions are grouped under the heading of "rites of passage," and they are often elaborate. An example is the puberty ceremony in many cultures (for example, the *bar mitzvah* in Jewish culture) in which adolescents are formally accepted into society as adults.

In areas where the status of a social transition or the new status of an individual would not otherwise be immediately clear to the average member of society, ceremonies may be especially ornate. Examples here are marriage ceremonies and award ceremonies of various kinds. Under many circumstances, the ceremony itself often becomes part of the new status of the individual, and one consequently sometimes sees ceremonies performed in this context even when they make little physical sense. For example, one sees empty coffins buried sometimes when missing persons are declared formally dead.

Transition ceremonies and rites of passage are only extensions of our definitional language. They are used to draw lines in continuous processes so as to minimize confusion and anxiety in a society. As in law, they seem to be necessary. Also as in law, however, they become dangerous when the people who perform them come to believe that their words make an objective change in reality. An official pronouncement of marriage by a priest is such a transition ceremony. An official pronouncement of death by a doctor is such a transition ceremony. The danger comes when a society forgets that the one is no more an indication of an objective physical change than the other.

#### Conclusion

We began this essay with a scene from the 1939 MGM production of *The Wizard of Oz*. In the scene, Dorothy's house has come down in The Land of Oz on top of the Wicked Witch of the East, crushing her. The Munchkins are still anxious, however, and they need absolute assurance that the wicked witch is dead by all possible definitions. In the movie this assurance is at last provided by the Munchkin coroner, who draws himself up importantly (he is four feet tall), produces a huge death certificate, and makes the formal pronouncement. The all-important social line must be drawn even in Munchkin Land.

Sad to say, as we look about us here in Southern California in the year 1989, we find that things are not that much different here than in the wildest fantasies of L. Frank



Baum. The Dark Ages, we must remember, were only 25 generations ago. We live in a pretty crazy society, still bound up with intellectual baggage from a magical and mystical past - and its way of looking at things is sometimes completely irrational. Our job now is to find ways of dealing with it. A sense of humor is helpful, particularly if one is confronted with a coroner who seems straight from the Land of Oz, or assorted Munchkins who have begun to worry about whether a person whose heart has stopped is only *merely* dead, or is really most *sincerely* dead.

Cryonics has passed a threshold of some sort in this past year, and we really aren't in Kansas anymore. Courage is now required, and brains, and heart. Let us hope that we find that these things were always within us, whether we knew it or not.

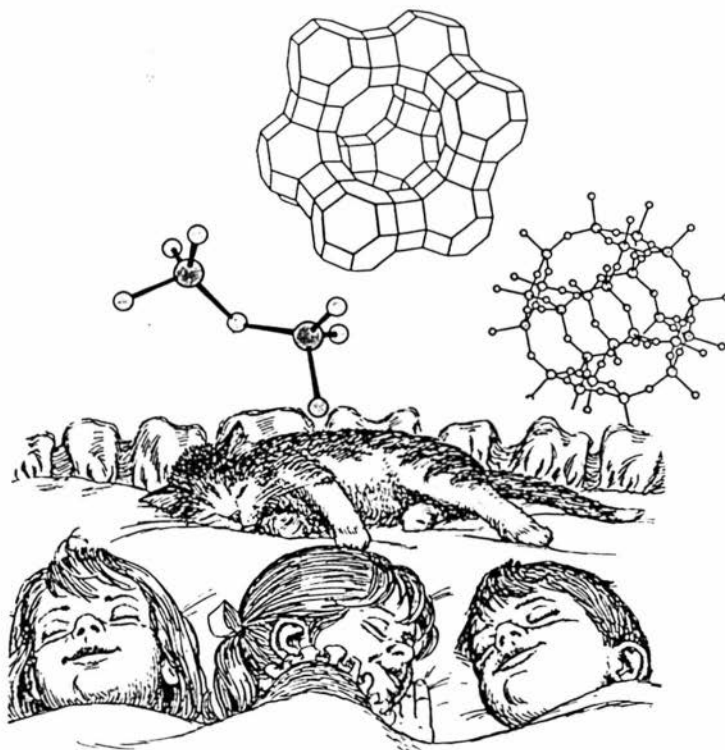


## A Visit from Saint Assembler

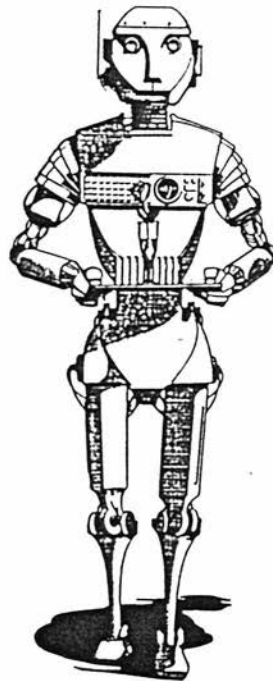
by J. Storrs Hall

(With Apologies to Clement Moore)

'Twas the night before Breakthrough; when all through the house,  
Not a creature was stirring, not even a mouse.  
The smocks were hung up in the lab for the night,  
In hopes that a rest would bring some new insight.  
The children were nestled all snug in their beds,  
While visions of molecules danced through their heads.  
Ma in her kerchief, and I in my cap,  
Had just settled our brains for a long winter's nap--  
When logical inference struck me so hard  
I let down my everyday common-sense guard.  
The mind, on the crest of this new point of view  
Took wild flights of fancy and made them seem true.  
My wondering eyes, as I stood there agape,  
Saw a miniature robot complete with a tape;  
Of such a micronic molecular mass,  
I knew in a moment it must be Saint ... well, it must be a molecular assembler.



More rapidly than I could figure it out,  
 He built more of himself from stuff lying about.  
 He built Dasher and Dancer; they, Prancer and Vixen;  
 And then Comet and Cupid and Donder and Blitzen.  
 Now faster than I could match each with his name,  
 they doubled and doubled--and they all were the same.  
 As dry leaves that before the wild hurricane fly,  
 (or more, rather, like smoke) they took off to the sky.  
 And I could imagine I heard on the roof  
 the prancing and pawing of each tiny hoof.  
 Down the chimney they came, eating all of the soot,  
 As carelessly diamonds were dropped on my foot.  
 Another small cloud of atomic erectors  
 Were turning the roof into solar collectors.  
 I looked at one closely: a jolly old speck,  
 He had plenty of arms, and a bivalent neck.  
 His tape told him what he was programmed to do;  
 He was fast and efficient--self-referent too.  
 He looked like a gang of maniacal boys  
 Had been put in a room full of wee tinkertoys,  
 And making a mechanical jest of their teacher,  
 Allowed it to mutate into an odd creature.  
 Benzene rings on his fingers, propellers for toes,  
 Bucky ball for a belly, and lithium nose.  
 His arms moved like twinkling magical wands,  
 and his ears were connected by hydrogen bonds.  
 A wink of his eye, and a twist of his head,  
 Soon gave me to know I had nothing to dread;  
 Though New Jersey, the previous hour or two,  
 Had melted to form a sweet, sticky, gray goo.  
 He said not a word, but went straight to his work,  
 Built three more just like him, and turned with a jerk.  
 It was hard to see whether he gestured or beckoned,  
 For he did it a million or more times a second.  
 Not a bit of the household escaped from his hustle,  
 Even the doors received eyes, ears, and muscle.  
 I'd just gotten used to a toaster with brains;  
 I now must contend with intelligent drains.  
 Then most of them left through the skin of my hands,  
 to do a refurbishing job on my glands--  
 But I heard them exclaim, ere they dove out of sight,  
 "Happy Future to all, and to all a good night!"



\* \* \* \* \*

## SCIENCE UPDATES

by Thomas Donaldson

### Human Test Of Genetically Altered Cells

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

complicate our lives.

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

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

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

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

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

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

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

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

### Protein Synthesized

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

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

Briefly, Regan and Degrado worked out a sequence of amino acids which should produce a tightly packed helical shape. Their choice of helical shape was determined more by the

ease of verifying it than by any fault of their design methods. It turns out that the spectrum of the protein, once made, will leave the most characteristic traces when it is helical. Since this was after all a first effort, they didn't want to get involved in debates about whether or not they had actually made what they said they made.

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

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

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

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

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

### Clues To Understanding Brain Memory

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

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

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

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

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

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

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

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### PERSONALS

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

Needing a home: Dixie, who took part in a total body washout several years ago, and her sister Slinky, are in need of a home. They are spayed female shepherd-collie mixes, about 6 years old, and make very gentle and loving pets. They have been hard to place because they seem to depend a great deal on each other, and we are reluctant to separate them; thus we hope that someone will be willing to accept them both. They have been lab pets for several years but with all the construction in our area it is becoming increasingly difficult to find places for their daily walks. If you or someone you know would like two nice pets, let us know. We can arrange their transportation to your area (within the U.S.).

Would you like 1% of your long distance phone bill or Visa card to go to research? Call/write: Charlie Hartman; 514 NW; Stuart, IA 50250; (515) 523-1116. (I'm also working on ways to make group insurance become a cash-flow enhancer.

Gay male cryonicist, 28, is interested in meeting or writing to other gay cryonicists. Occupant; 4 Bayside Village Pl., #307; San Francisco, CA 94107.

The LIFE EXTENSION FOUNDATION publishes a monthly newsletter on new anti-aging therapies. Members get this newsletter and big discounts on vitamin purchases. For free information, call 1-800-841-LIFE, or write Life Extension Foundation; 2835 Hollywood Blvd.; Hollywood, FL 33020.

\* \* \* \* \*

### Meeting Schedules

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



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The JULY meeting will be held at the home of:

(SUN, 9 JUL, 1989) Diane Alexander  
(SECOND SUNDAY) 5100 Longfellow St.\*  
Los Angeles, CA

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

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The AUGUST meeting will be held at the home of:

(SUN, 6 AUG, 1989) Bill Seidel  
10627 Youngworth  
Culver City, CA

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The SEPTEMBER meeting will be held at the home of:

(SUN, 3 SEP, 1989) Marcelon Johnson  
8081 Yorktown  
Huntington Beach, CA

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\* \* \*

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

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The AUGUST meeting will be held at the home of:

(SUN, 13 AUG, 1989) Keith Henson and Arel Lucas  
1794 Cardel Way  
San Jose, CA

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The SEPTEMBER meeting will be held at the home of:

(SUN, 10 SEP, 1989) Leonard Zubkoff  
3078 Sulphur Spring Court  
San Jose, CA

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\* \* \*

The New York Cryonics Discussion Group of Alcor meets on the the third Saturday of each month at 6:30 PM, at 72nd Street Studios. The address is 131 West 72nd Street (New York), between Columbus and Broadway. Ask for the Alcor group. Subway stop: 72nd Street, on the 1, 2, or 3 trains.

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The meeting dates are as follows:

JULY 15                      AUGUST 19                      SEPTEMBER 16                      OCTOBER 21

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

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

ALCOR LIFE EXTENSION FOUNDATION  
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