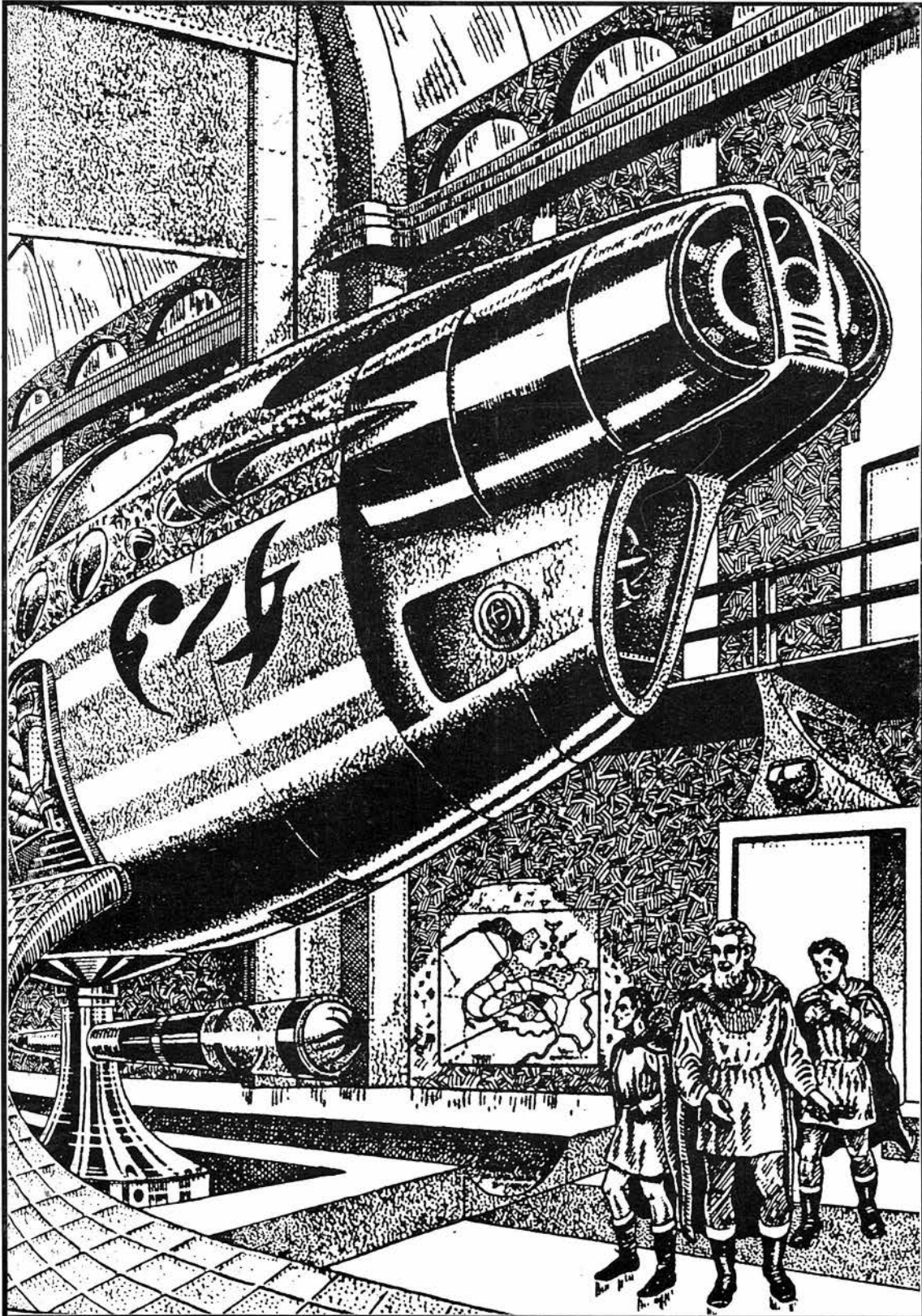


Cryonics

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Cover:

Illustration from The Penultimate Trump. Startling Stories, March, 1948.

Mike Darwin and Ralph Whelan

Transport Technician Certification Course

Despite the fact that we held a Transport Technician Certification Course in December, 1990 and had not planned on holding one again until the fall or winter of 1991 — we're doing one again. One reason for this is the need to train some of our field groups who have "at risk" members — people who may not be able to wait until next winter.

The course will cover the following areas:

- Alcor Administrative Procedures
- Obtaining Hospital Cooperation
- Options for Cardiopulmonary Support: CPR Certification
- Evaluation of the Efficacy of Cardiopulmonary Support

- Use of The Heart-Lung Resuscitator: Conventional and High-Impulse CPR
- Temperature Monitoring
- External Cooling
- Establishing Intravenous Access
- Pharmacology and Administration of Transport Medications
- Collection of Blood Samples
- Air and Ground Transport of Patients

The course will begin on Monday, June 3 and will run through Sunday, June 9 (although we hope to have the basics wrapped by Saturday). Classes will begin at 9:00 AM and run through 5:00 PM with an hour-long break for lunch. There will be copious amounts of coffee available and there are a variety of fast-food restaurants. Transportation to and from will be available.

The course will end with a mock "transport," during which the skills learned in the classroom will hopefully be translated into a real ability to successfully transport and stabilize cryonic suspension patients.

Those who successfully complete the course (and who pass the written and practical exams) will be certified as Alcor Transport Technicians.

The course will be open only to Alcor Suspension Members or those who are in the sign-up process with Alcor. If you are interested in participating in the Alcor Suspension Team, this is the perfect place to begin, since addi-

tional Southern California Suspension Team members will be drawn from the Transport Team pool.

If you interested in attending the Transport Team Training Course please contact Mike Darwin at Alcor, (714) 736-1703. The cutoff date for registration is May 25, 1990.

The New Paperwork

Yes, the new paperwork is complete and in use, and it's a tremendous improvement over the previous iteration. But in response to all the existing members who've been clamoring for the new documents, we must beg for Patience and Understanding. It will take literally hundreds of manhours to update the files: weeks to months if the Membership Administrator could devote his time *exclusively* to this! (Not likely.)

So, if possible, keep the witnesses locked in the closet for a while longer. We'll be contacting everyone over the next several months. The Great Paper Chase *will not* pass you by.

Cryonics Institute Suspensions Confirmed

The Immortalist, (April, 1991) the newsletter of the Cryonics Institute, has confirmed reception of the patient from Norway and the suspension of an older member who deanimated from cancer. No details on the latter were published. The former case was covered in some detail in the April issue of *Cryonics*.

Late to Press

Despite the unbending integrity of the Alcor Staff, every once in a while events conspire with such wickedness that no amount of dedication can balance the scales. In other words, we're behind on the magazine again. This issue is going to production the first day of the month of its publication (April 30). (Happy, David?) Perhaps, though, some of what you read herein will lend you tolerance. . . .

The worst of it is that many of you may be reading this too late to make arrangements for the Transport Protocol Training Course. The best we can do is to say that, at the rate we're going, there'll be another one along soon.



FAIR WARNING!

Beginning with the June 1, 1991 billings for Emergency Response dues will be due in 30 days. All late payments (over 30 days) will be charged a finance charge of 1.5% interest per month (18% per year).

While the vast majority of suspension members pay their dues promptly, we simply cannot afford to carry interest-free receivables for the few that don't.

Membership Status

Alcor has 228 Suspension Members, 557 Associate Members (includes 218 people in the process of becoming Suspension Members), and 17 members in suspension.

Survey

Jim Stevenson, Alcor member, is conducting a study involving people who think that cryonics might work, but have emotional or intellectual (rather than financial or religious) reservations about signing up. The study involves up to two hours of telephone interview, which Jim will pay for. If you're interested in participating, please call Jim at 415-494-1234, or contact us and we'll forward your information to Jim.

Letters to the Editor

Dear *Cryonics*,

Dr. Fahy does raise some serious questions concerning the feasibility of chemistry at LN₂ temperatures. Might I say a few words in defense of this concept?

First, a molecule of paraffin on the surface of a block of wax is continually subject to phonons capable of driving biochemical reactions. And yet, paraffin has a fairly low vapor pressure. This suggests to me that it is in fact possible to hold a molecule by non-covalent bonds, and slam it into another molecule hard enough to get a covalent bond. At least if the molecule is as large as paraffin.

Secondly, I really doubt that this would be done by holding one molecule on one arm, the second molecule on a second arm, and swinging them together. I sure don't do things that way when I drive nails, or use a chisel. I expect that the two molecules would be pressed together as in an enzyme, to minimize the required activation energy, and then hit by a 'hammer'. Or perhaps exposed to the proper energy photon, as Dr. Fahy suggests. Or energetic electrons could be directed against the reaction site using crystal channeling.

I must admit, though, that the doctor is quite correct that we have no *proof* that we can carry out the necessary chemistry at cryogenic temperatures. Given the pace of progress in STM research, I think we can expect to see that proof within a decade, but we don't have it yet.

It is fairly certain, however, that we can perform the analysis phase at those temperatures. We don't have to perform

much chemistry to tear a brain into individual molecules, noting what they are and where *exactly* they came from. And if a membrane protein leaves a few amino units attached to the cytoskeleton, that's not likely to keep us from identifying it, even if we wouldn't encounter that fragment while disassembling the cytoskeleton itself.

As for the problem of dissipating waste heat, isn't that why we want to do this at cryogenic temperatures? So that we can proceed as slowly as necessary to cope with waste heat constraints, while being sure that everything will stay put? Attempting the repair at physiologic temperature would be like trying to repair an automobile engine while it was running.

So, now we have a pile of organic sludge and a computer data base which describes the former brain in excruciating detail. What next? Well, we back up the data at multiple locations and then proceed to repair the data base. Dr. Fahy is right that there's no such thing as a healthy human brain at cryogenic temperature. That need not prevent us from using this data base to infer what sort of healthy brain at physiologic temperatures would correspond to the frozen brain we had. Given near complete understanding of brain physiology and the effects of suspension, we should be able to write software to repair the data base. We don't yet have the proof that such software would run on any feasible computer within the lifetime of the universe, but it does seem likely to me.

So, now we have a data base which describes a healthy brain, at physiologic temperature. We would probably want to

back that up and then build such a brain. For strictly sentimental reasons, we might even use the organic sludge as building material. At this point, we have a lot of options on how to proceed. If we can do chemistry at those temperatures, we can build a frozen brain. Not a healthy, human brain, but a healthy brain as it would be had it been frozen using the cryobiology of 100 years hence. With all sorts of changes to make it more freeze tolerant. Alternatively, we could grow a clone and guide its development to produce the specified brain. We might even forget about building a brain and upload the person instead. (My personal favorite.)

The biggest problem here is that, given the state of our educational system, even if we could provide a valid logical proof that cryonics could work, hardly anyone would be able to appreciate it. Most of the people I've discussed cryonics with tell me flat out that the only proof they'd accept would be our actually reviving someone we'd suspended. A less skeptical minority would be satisfied if we could reverse the suspension of lab animals. In order to prove that cryonics can work, we're going to have to make it work.

As a start towards that, I think we should replicate Suda's work with cat brains, but using our own best techniques. If we don't get good results we want to know that. If we do, that would both be *effective* evidence that cryonics can work and a good experimental model for determining whether memory survives freezing.

We've been told, in effect, that for the next few years we'll have to order our research *a la carte*. So how about a menu:

How much will we have to pay to get that research done? I'd be willing to cough up an additional few hundred dollars a year to see that it's done. For that matter, what research do *you* want to get done and what's the price tag? I'm willing to help pay for legal costs, where necessary, but it was your research program that originally made me settle on Alcor.

Brett Paul Bellmore
Capac, MI

We hope to have more information on precisely what kind of research we have underway in the near future. In the meantime, look over the Alcor Fund-Raising Dinner article elsewhere in this issue. — Ed.

Dear *Cryonics*,

I am a recently signed-up member, after spending about two years following the "Signing Up Made Simple" instructions! I want to first compliment you on your ceaseless efforts on behalf of cryonics progress. I'm sure I speak for many others who appreciate your efforts and hopefully will benefit from them someday.

I have to admit that I do not discuss this subject with too many people. The reactions of some whom I have confided in about my intentions to be suspended have been that they think it is a ripoff, a scheme to gain control over people's money. One person that I am very close to thinks that even if you (the people currently in control of Alcor) are honest people of high ideals, someday the organization may be taken

over by unscrupulous people. I just wonder what your reactions to this estimation is, since I suspect it is a deterrent for many people.

After reading your literature for so many years, I feel I have a good sense of who you are, and even if I am running those risks, in my opinion, it is a risk worth taking.

Keep up the good work. Many of us appreciate it.

Sincerely,
Sharon Long
New York

Dear Editors:

Some miscellaneous thoughts:

The new larger format for *Cryonics* is excellent, as are the graphics and layout.

Should Alcor refer to those *Cryonics* subscribers who are not giving Alcor any indication of wishing to sign up as "associate members?" It seems to inflate the membership list significantly. I feel we should have three classes of members: a) those who have actually signed up and are called members; b) those who are in the process of signing up, have paid the fee to get the sign-up package and are called associate members, and; c) those who are in suspension and are called members-in-suspension. Those simply subscribing (including those receiving gift subscriptions) TO *Cryonics* should be called subscribers.

The progress of Alcor's never-ending quest to find a better word for "dead" gives me great pleasure. I was happy with "deanimated" until the more medically im-

pressive "ischemic coma" came along. The term "metabolically disadvantaged" struck me as even more inspired and causes a chuckle every time I mention it. But let's really get with the program and term those who have recently expired, but are not yet buried or burned, "metabolically challenged." "Disadvantaged" has a negative connotation while "challenged" is in the Alcor spirit and more socially sensitive.

Some time during the last few months Kevin Q. Brown's cryonics forum on USENET had a communication mentioning that Trans Time was storing suspension patients whose costs were being paid month by month (or perhaps quarterly or some such periodic payments) by surviving relatives. What are Trans Time's plans for these patients when (not if) their relatives skip payments due to financial exigencies, or cease payments due to attenuated emotional ties to the patient after five or six decades? (Okay, five or six years.) Does Trans Time have a fund for burial and/or cremation of these patients? Is this practice likely to cause lawsuits with attendant negative publicity? Is Trans Time really doing this?

Sincerely,
Hank Lederer

Regarding the questions you raise in your last paragraph; we suggest you ask Trans Time regarding their current policy. With regard to the past, Alcor currently has two former Trans Time patients whose funding ceased. Trans Time was planning on ending their suspensions. — Ed.

Money Matters

EXECUTIVE LIFE: Down For The Count

Carlos Mondragón

On April 11, the California State Insurance Department took control of Executive Life Insurance Co. The newly elected State Insurance commissioner, John Garamendi, is in the process of cataloguing Executive's assets and liabilities. When the Insurance Department stepped

in, Executive was flush with cash. However, there was concern that the parent company, First Executive, would siphon off this money.

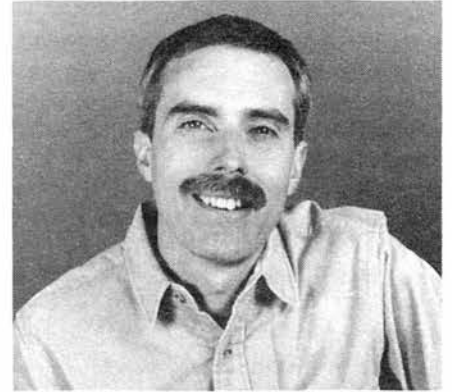
For now, the Insurance Department says that death benefits will continue to be paid. Annuities, guaranteed investment

contracts, and withdrawals of cash values will be paid on a partial basis once the state has finished its analysis. Mr. Garamendi has stated that his goal is to protect the interests of all the policyholders, but he warned that "I am not a miracle worker."

Fortunately, only a few Alcor Suspension Members had policies with Executive Life. Most should be able to simply purchase new policies. Unfortunately, one member with a serious health problem who had a single premium policy may have difficulty finding a replacement. The message here is *caveat emptor*. Care in selecting an insurance company can be just as important as care in selecting a cryonics organization.

More on Remote Standby

Mike Darwin



From time to time we hear things that make our hair stand on end. Take this one for instance:

You mean you won't fly out if I am critically ill? Well, I have all that extra life insurance (over the minimum). Won't that pay for it?"

The answer is "No" and "No." The problem with our flying out when a Suspension Member is critically ill based on reimbursement from life insurance proceeds (or other assets to be conveyed to Alcor post-deanimation) is that *the Member may recover!* Right now, we estimate that the cost of a typical Remote Standby is about \$8,500! And keep in mind that this cost represents artificially low labor charges. We cannot risk coming in a situation like that unless we are CERTAIN that

the member's deanimation is imminent. This is clearly stated in the Alcor **Cryonic Suspension Agreement**.

We are running this article for two reasons: First, to be sure that EVERYONE understands this and is not anticipating that Remote Standby is somehow "included" in the basic Agreement or provided for by overfunding with insurance or trust instruments. Second, we want to start you thinking about what we plan to do about this, which is, offer a Remote Standby Service Agreement. If it is offered, it will be available only within the United States (and possibly Canada).

At the time of this writing this agreement is being drafted and work is well underway. Enclosed in this issue is a survey form which we are BEGGING you to com-

plete. Essentially this survey is intended to help us determine whether or not we should offer such a program. Do you, our Members, want it? And, just as much to the point, can you afford it?

By answering the survey you will help us to not only determine whether to offer the program, but also to better know *how* to offer it.

Please take a little time and complete the survey form and drop it in the mail today. It's postage pre-paid, so all it will cost you is some time. That debt will hopefully be repayed by the creation of a program that will provide a much needed and currently missing layer of protection and transform Alcor into the first true full service cryonics organization in the bargain.

The Penultimate Trump

R. C. W. Ettinger

The Penultimate Trump was the first articulation of the cryonics concept by Robert C. W. Ettinger (see "For The Record" elsewhere in this issue). It is reprinted here from Startling Stories March, 1948 with the generous permission of the author.

Harley D. Haworth had been a doughty warrior in the American manner. Many a powerful Wall Street foe had bowed to his strength and thousands of innocent victims had cursed his name. But that was many a misty year ago.

Now even his son was an aged philanthropist and H.D. himself was relegated almost to legend. But at ninety-two the old battler was locked in his most desperate struggle, vainly trying with his failing strength to beat off the grimmest, most

relentless of all antagonists.

If the man in the street ever heeded or mentioned this struggle, it was to disinter a corny, dog-in-the-manger joke.

"Old Harley D. Haworth," he would say patronizingly, "is such a guy — if he can't take it with him, he just don't go."

But he was going all right, battle by battle, losing his war. Not that his forces were small — two billion greenbacked stalwarts comprised his army. The resources of the planet were his. Only his

generals, the world's fanciest physicians, were incompetent to maneuver these forces to advantage.

They gave him gland extracts, they gave him vitamins, they gave him blood transfusions. They gave him false teeth, eye-glasses, arch-supports. They cut out his varicose veins, his appendix, one of his kidneys. And in the end the learned doctors held a conference and this was the sum of their wisdom — eat crackers and milk.

At this juncture there was a shake-up in the high command. The new Chief of Staff was not a physician but an engineer named Jones.

"What man can imagine, man can do." So runs the optimistic saw. The boy, Garibaldi Jones, had had firm faith in said saw, and imagined himself a great lawyer and famous statesman. With the passage of time, however, there gradually came to Garibaldi, as to many another before and since, the suspicion whoever said that was kidding.

Now Baldy Jones had long since conceded that *his* imagination, at least, far outran his capabilities. He had settled down, when he realized he lacked the persuasive gift, to being a reasonably competent mechanical engineer.

An ordinary slip-stick jockey, that was the work-a-day Jones. But sometimes, on a Sunday, Jones the general-statesman-scientist-prophet-and-all-around-wiseacre would hold forth from his armchair on life, love, art, literature, science, religion, politics and various other manifestations of nature that are dignified by names.

On a certain portentous Sunday in the summer of 1947, about the time the doctors were prescribing crackers-and-milk as a specific for senile debility, Garry had found a particularly depressing article in his Supplement. Goodwife Nancy was relaxed with the Women's Section.

Garry wiped the perspiration from his gleaming head of skin and proceeded to her instruction.

"Listen dear, it says here some scientist thinks the human race is going to be wiped out. It's too dumb to survive, or too smart. I think that's crazy but he's got a lot of points. Listen, he says —

"To date there has been no indication whatever of any barrier to the indefinite extension of the frontiers of science. It is breath-taking to think what this means. It means that so far as we know the scientific method is capable of carrying humanity to any conceivable heights and beyond."

"Garry, stop talking so loud and let me read this, 'Fun With Fish — Hints for the Hurried Housewife.' You're always saying, 'Give me something different.' Science. What do I know about science?"

"You should know something beyond the kitchen. Listen — 'But reflection turns hope to alarm, with this thought — In the vast and ancient universe surely some races must have had time already to attain godlike power and yet they have not

manifested themselves. Many answers are offered to this riddle, but none very satisfactory."

"Garry, will you be quiet?"

Nancy's question was sharp.

"I will not," said Garry. "One answer is that our civilization is very young, and the hypothetical super-civilization somewhere just hasn't found us yet. But that is a contradiction in terms, because it takes most of the "super" out of the super-civilization, considering that a technological culture advances on an exponential curve."

"Garry, are you going to let me read in peace?"

"I am not," said Garry. "Another is



that a super-civilization would have advanced beyond any concern about us or our petty problems. This is an uneasy possibility, but rather thin for this reason —

"From all indications our mastery of the physical world is proceeding much faster than our mental evolution, and while this condition may change I am inclined to think we would be flitting about the galaxy before we would have lost our humanity."

"Garibaldi Jones, if you don't stop with that crazy stuff I'll go out of my mind!"

"You will not," said Garry remorselessly. "We are thus led to the proposition that there is no super-civilization and to the corollary that intelligence, at least technological intelligence, has no survival value. This is a sobering thought, and we

ask —

"Why? Aside from metaphysical hypotheses vain to pursue, there is one outstanding answer. Someone, someday, will find a chain reaction for one of the light elements like oxygen and silicon, or perhaps some other even deadlier agent will be loosed upon the world — for as science progresses more and more power is more and more often concentrated in fewer and fewer hands."

"Garry, do you intend to *ever* stop talking?"

"I do not," said Garry. "There is, sadly, no indication of an abatement of the spirit of irresponsibility that has kept the world, especially in recent years, in turmoil, at war or in fear of war.

"The only real remedy, perhaps, is fear of God, but the materialist knows that when he dies his rotting carcass is beyond punishment, beyond hope, beyond recall. Thus the only restraint on beastliness is the ineffectual one of conscience, and in consequence —"

"Why beyond recall?" interrupted Nancy, surprisingly.

"What?"

"Well, if science can do anything, like he says, why can't they bring the dead people back some day? Now you just read that tripe to yourself, if that 'scientist' knew anything he wouldn't have to write for trashy Sunday Supplements, and let me read in peace, *do you hear me?*"

"How can I help it?" muttered Garry, who had already conceived the germ of a notion.

The notion grew into an idea, and the idea hardened into a resolve. And in the natural course of events he went to H.D. Haworth with his proposition and there was a meeting of minds.

But a third talent was needed for their project, and the logical candidate was Ellsworth Stevens, M.D., Ph.D.

The seduction of Ellsworth Stevens made a temporary stir in certain lofty circles, shocking all but the most cynical.

A brilliant bio-chemist, a few months previously Stevens had reported some attempts at suspending animation in mammals by a method involving preliminary partial dehydration of the living tissue through starvation, followed by freezing.

The technique exploited the newly-discovered tendency of very minute quantities of radioactive phosphorus in certain phospholipids to counteract the degenerative anti-gelation effect of low

temperatures on the colloidal phases of protoplasm.

He had not succeeded in reviving any of the animals, since none of the nerve tissue had lived through the freezing, but results had been nonetheless promising. Now Stevens was employed by the Cancer Institute, consecrated to this most important work.

Until one evening a Tempter called at his modest home. His name, of course, was Jones.

"Dr. Stevens," said Garry, "I want you to quit your job and go back to work on suspended animation."

Stevens blinked rapidly behind his bifocals and smiled deprecatingly.

"Well, Mr. Jones, I could hardly do that. You see, I've been doing some work with radioactive tracers and I'm beginning to get significant results. Can't very well quit now, can I? That other matter isn't very important — I hardly think it could be done, anyway."

"Dr. Stevens," said Garry, "the Cancer Institute doesn't pay you very much. You have a daughter who is getting to the age where she would like to be dressed up. I will give you a ten year contract at ten thousand dollars a year."

"Mr. Jones, do you realize that cancer is responsible for more deaths than any other ailment except heart disease? Maybe I sound sentimental but I actually think of myself as taking an important part in the world's greatest crusade."

"Dr. Stevens, I will give you a ten year contract at one hundred thousand dollars a year."

Blankness in the shy, blinking eyes, then mounting anger. "Look, you, who the heck do you think you're kidding? If you —"

"Dr. Stevens," Garry said hastily — an enraged sheep is an appalling spectacle — "I have a power of attorney from Harley D. Haworth." Ellsworth Stevens gaped like a fish, and was pure no more.

The Pacific lay stagnant, having decided it was too hot a day to do anything except evaporate. But there was the suggestion of a breeze in the garden and ample shade for three men. The dried-up little old man was speaking, and the big bald man and the lean bespectacled man listened with respectful attention.

"I'm a hard-hearted business man, and I'm not easy to fool, as many a smart-aleck's learned, hrumph! It would surprise you the number of quacks that try

to sell me miracle water and yoga systems and such-like. Blasted parasites!

"But I know a good investment when I see one," the thin, complaining voice went on, "and you gentlemen have a sound idea." He paused benevolently to let them look gratified.

This is ridiculous, though Garry, the old boy's a caricature.

"A sound idea — don't depend on these pill-poking fools who call themselves doctors nowadays to keep you hanging around a year or two more, but just go to sleep in a nice refrigerator until people *really* know something about the body." He shook a bony forefinger.

"And they'll do it, too. I don't believe in much, but I believe in science. It will take a lot of money, but that's what I've got. And you can have all you need, Mr. Jones, all you need, as I've told you before. Blank check. You came to the right man when you came to H.D. Haworth." He sank back into his nylon deck chair, exhausted by the long speech.

Garry seized the opportunity to air some of his ideas. He was all enthusiasm.

"We'll put the vault in Michigan, Mr. Haworth, not here in California — too many earthquakes. Might be a long time before they know enough about biochemistry to revive a dead man and restore his youth. Not that you'll be dead," he amended hastily, "just in a state of suspended animation. I'm sure Dr. Stevens can work *that* out.

"Anyway, we'd better put the vault in Michigan — very safe country, geologically. We'll make the vault and the coolers of the very best, of course, granite and stainless steel and quartz that will never wear out. And then," he added, coyly, "I have a little idea for a power plant that will be really *dependable*, if I *am* the one that says it."

"It better be!" snapped H.D., suddenly ferocious.

"Yes — of course. There's the problem of keeping everything secret but I'm sure we can manage it. The workers won't know what they're doing, Dr. Stevens, and I can do all the really technical work. And there'll be only one trustee each generation to keep his eye on things, starting with me."

Stevens was leaning forward, wearing a somewhat bewildered expression.

"But I thought — but surely after we demonstrate that suspended animation is feasible and we've verified our results,

we'll publish?" Seeing the odd-faces the other two were pulling, he repeated plaintively, "I always publish."

H.D. Haworth pronounced a certain four-letter word. Garibaldi Jones cast his eyes to the heavens and tore his hair, coming away empty-handed, of course.

"Well, what's wrong with that?" Stevens snapped, a little color in his face. "Don't the people have a right to know?"

"Young man," quavered H.D., tottering to his feet and shaking the bony forefinger, "what you know about people I could stick in my —"

"Wait a minute, Mr. Haworth," Garry soothed. "Let me explain to Dr. Stevens how it is. Please don't excite yourself. Remember," he coaxed, "we don't want a heart attack *now*, do we?" The old man collapsed into his chair with a feeble curse.

"Look, Ellsworth, old man," Garry said kindly. "The last thing in the world we want to do is keep anything from humanity. *You* know Mr. Haworth is the biggest philanthropist in the world. But in this case — well, it's dangerous.

"What do you think would happen if people found out a few rich men were sleeping in quartz coolers while they had nothing but mouldy graves to look forward to? Why, man, they'd tear our vault down with their bare hands!"

H.D. was nodding, muttering something about blasted riff-raff, but Garry saw Stevens' look of contempt.

"But that's not the main thing," he said hastily. "It wouldn't be good for the country — in fact the world couldn't stand it. Once people were convinced, everybody would demand a frigidaire instead of a coffin. Not many could be made and people would plot and steal and kill to get theirs and religious people would fight against it.

"There'd be fakers and stock promotions all over. The nation's economy would be wrecked. People would take their money with them or leave it as savings at compound interest while they slept for a few centuries. Think of the harm it would do, man — think of the people who are happy now, whose lives would be embittered with vain hopes!"

Haworth's head was bobbing on his scrawny neck. "That's right, young fellow, and that ain't the half of it!" He cackled. "Almost like to get a finger in that pie myself.

"The insurance companies would be

the ones for it of course. Twenty-year endowment and, instead of paying you, they pickle you. But it's too risky, too risky — you see that, don't you, my boy?"

Stevens sighed unhappily. "I suppose so," he said, defeated.

"Good, good!" Garry boomed, rubbing his hands briskly. "I knew Dr. Stevens would see the point. He has a head on his shoulders.

"Now, as I was saying, Mr. Haworth, we'll have space in the vault for a hundred or so. That should be enough, I think, but we'll rush yours through first, of course, and have it ready in jig time, just in case ... And after that ...

And so their plans were laid and something new was born under that sun which shone with such ridiculous indiscriminatio on H.D. Haworth and on the common people.

According to the outline sketched that afternoon, the vault was to be safeguarded and the sleepers' interests looked after by the establishment of a Haworth Trust, with Garibaldi Jones the first Administrator. Only one person in each generation, the Administrator, would know all about the vault.

Of each generation the Administrator and one or two of his closest relatives would join the ranks of the sleepers. The Administrator's responsibilities and discretion would include all measures necessary for the safety of the sleepers and the trust funds would be ample, to allow for unforeseen future contingencies.

A number of experimental animals closely duplicating H.D.'s condition would be included for the future biologists first to try their skill on — because if Stevens should not perfect a practicable method of suspended animation in time, and H.D. should actually die, his resuscitation would be a ticklish matter.

H.D. did not want to wake up blind, for instance, or with an altered personality — although Stevens, for one, thought any change in the old pirate's personality would be a step in the right direction. The blasted Washington administration wouldn't let a citizen buy radioactives without a lot of busybody questions, but Garry had an idea for a reliable source of power for the cooler.

An improvement on the new "heat pump," his design dispensed entirely with moving parts, providing a large safety factor. Successfully reversing the refrigeration cycle, the device utilized the heat

potential between sub-frost level ground and surface to produce power, using buried coils of a common refrigerant gas.

Caches of treasure were to be tucked away in unlikely places, the key to their location securely hidden in H.D.'s mind. No Tut-ankh-amen he, to invite grave-robbers by foolish ostentation.

And so it came to pass, and H.D.'s last months, despite the physical pain his increasing debilitation caused him, were light-hearted ones.

He was sustained by the bubbling knowledge that he tottered down life's highway toward — not that great, silent abyss that the common folk's imagination called Heaven or Hell and peopled with childish gods and demons anxiously waiting to take him to task for his many "sins" — but merely a bend in the road beyond which lay unknown, but surely friendly, lands.

In course of time Harley D. Haworth was carefully laid away in his ice-cold "coffin," and those who read the obituaries did not suspect that he was the first of men to die a qualified death.

He lay on his back, staring at the white ceiling — it had not occurred to him yet to move. His uncoordinated muscles left his face blank but he was frowning mentally. There was something he wanted to remember, something. ...

He struggled laboriously to pin down those elusive shapes, but the words wouldn't come. It's hard to think when the words won't come. His eyes sharpened their focus a little and he perceived that he was in bed. *Hospital*, he thought clearly, *I'm in a hospital, of course.*

He felt more and more secure now and, after a moment's relaxation, tried again to remember.

A man's voice said clearly, "What am I?"

A feminine voice said pleasantly, "You're a man, and your name is Haworth. Feeling all right?"

Thousands of little relays clicked in H.D.'s brain and he sat up quickly. This room was white and windowless, but it was not the vault in Michigan — and that tall, clear-eyed brownette with the grave tones and tender lips was certainly not Dr. Stevens.

The man's voice said, "I guess so," and this time H.D. realized that *he* had spoken. The blood rushed to his head and pounded in his ears, for it had been a strong, *young* voice.

He ripped away the sheet that covered him, careless of his nakedness, and it was true.

These limbs were firmly rounded, the smooth skin pink with the warm blood coursing beneath. His wildest hopes were realized. He snatched the mirror smilingly proffered him and there it was, that face of youth once lost to faded photographs! Then a great wave swept in with a rush, a roar, a dazzling sparkle of spray.

He emerged from his faint to find the head of his bed elevated, the woman in white holding his wrist to count his pulse. *Well, this is it*, H.D. thought jubilantly, *it actually panned out. I did it, I did it!*

Now to plunge into the great adventure — millions of questions to ask, millions of things to do — a new world to conquer. H.D. rubbed his hands briskly together in his habitual getting-down-to-business gesture.

Loosing his hand, the brownette looked up from her watch. Her eyes were dark blue, and ...

Bells rang in the back of H.D.'s head, his skin tingled and he forgot what he wanted to say. Her faint, sweet perfume was in his nostrils; a long-forgotten stimulus performed its ancient function. Being a direct man by nature and training, H.D. decided that the shortest distance between two points was to seize this delicious creature. Without more ado he lunged.

But she had stepped back, shaking her head and smiling reprovingly, and H.D. almost fell out of bed. He recovered and collected himself, and laughed to show that he was a good sport.

"Oh, well, more important things to think of now, anyway — or *are* there more important things? Well, get me some clothes and call the head man around here, and I'll look you up later, Miss ...

"Lorraine, Dr. Lorraine, I'll get you some pajamas — here they are — and you won't see the Supervisor unless you show some pretty unusual symptoms. He's a busy man and I'm a married woman."

H.D. sputtered.

"Now really, Mr. Haworth, I'm not just being mean. You have to stay here under observation for three days as a final check before you're sent to — well, and the supervisor doesn't speak English anyway. I'm the only one here at the hospital that does, which is why I'm here. Now there'll be some nice lunch for you in a few minutes, so relax like a good boy

and —”

H.D. exploded. “Young woman,” he shouted, “*Doctor* young woman, as you value your job, I demand to see the person in charge!” He practically foamed. “Boy indeed! I am Harley D. Haworth and I am ninety-four years old — and then some,” he added thoughtfully.

“Three hundred and twenty years in the vault and two years we’ve been working on you,” Dr. Lorraine said helpfully.

“Eh? Yes. Well, get me —”

“No,” she said very firmly. “You’ve had enough excitement for the first time in so long. When you’ve had a nice lunch and a nice nap I’ll talk to you again, although you won’t really find out very much until you go to —”

A door had opened and shut, and a huge male orderly came in pushing a metal cabinet. The orderly and Dr. Lorraine exchanged a few words that H.D. could identify with no language, although the sounds were easy and musical — a little like Hawaiian, perhaps.

“What’s that?” H.D. asked suspiciously. “Where are we?”

“Why, we’re in Chicago. Oh, the language — Hominine, we call it. It was adopted only about fifty years after you died, at the time of the Union, when the U.S. sort of took over the world and a universal language became necessary.” The orderly had gone out, and she set a dish before H.D. on a sliding bed-tray. “Here, eat your lunch while it’s hot.”

H.D. let out a yelp. “Lunch! A plate of soup! Woman, I’m hungry! Haven’t had a bite for three hundred twenty-two years!”

“That’s just why you must go easy for a bit. Here’s your spoon. Now, doesn’t it smell good?”

It did, and H.D. grumblingly took some. It tasted good, too — beefy — and he went at it. Between slurps he tried to get a little more information. “You say the U.S. conquered the world fifty years after I died?”

“Oh, no! Just absorbed it, you might say. You had something to do with that in a way.”

“Eh? How’s that?”

“Well, your idea of putting yourself on ice to wait for better times gradually got around and, after awhile, it got pretty common in the States. The insurance companies did most of it. But they couldn’t do it in Europe, being, *you* know, bureaucratic and half decayed and all, and so poor from

all the wars. Couldn’t afford it. Guess I’m not much of a historian.”

Snort from H.D.

“Oh, eat your soup! Well, it got hard for the European leaders to keep their people satisfied with their poverty but there were still plenty of ugly things here they could point to. Then Farbenstein came along with his Probe, and the Constitution was amended to adopt the Ascension Code — and a lot of things changed.”

By this time H.D. had finished his soup, and Dr. Lorraine took his plate away and flipped the switch above him that lowered the head of his bed. H.D. objected testily.

“I don’t *want* to lie down! Quit that, will you. What about this confounded Code?”

The doctor shook her head. “Sorry, it’s time for your nap now.”

“*Nap!* Are you out of your mind? Millions of questions! I’m not the least bit sleepy!” This was a lie. There must have been something in his soup, because his eyelids were becoming very, very heavy.

“Well, you can’t argue with a woman,” he complained peevishly. “Who ever heard of a woman doctor — a pretty woman doctor ...?”

Dr. Lorraine did something to a lever, and the room darkened.

H.D. awoke refreshed and full of vigor, the conversation with Dr. Lorraine fresh and clear in his mind. He jumped out of bed, and stumbled, cursing, around in the dark until he finally figured out where the light would be.

He pushed a lever above the head of his bed, the first of several in a panel, and light filled the room, varying in strength with the position of the lever. He did not see the source.

The room was unremarkable in appearance, although he could not identify the smooth, creamy *soft* material of the walls. Of two doors the outer, to his cursing disgust, was locked. The other opened into a Rube Goldberg bathroom. After admiring the array of buttons, switches, cranes and slings, after a little cautious experimentation, H.D. saw that the design was intended to permit cripples the luxury of a real bath and toilet.

Wandering back into the bedroom, he idly fiddled with the other levers in the wall panel with no perceptible results until the last. Then the entire end wall vanished and he was looking at Chicago.

At where Chicago should have been,

at any rate — he could hardly have said what he expected but what he saw was merely a jungle. From what seemed a considerable height he could make out little detail in the mass of growing things.

He could see no other tall buildings, but he was looking toward the lake and his view was limited. As he strained his eyes he could see a little of bright winding paths and graceful little houses buried in greenery and blossom. No movement caught his eye.

These people must conduct their business elsewhere, he thought — underground, perhaps, leaving the surface for leisure and recreation. Garden City indeed! Life must be pleasant here — and it would soon be his! He fairly itched to make his mark on this Brave New World.

He turned from his contemplation when he heard the door open. There was that woman, smiling and inquiring how he’d slept. He’d soon straighten her out.

“Dr. Lorraine,” he said grimly, “why was I locked in?”

The smile faded just a little. “Three days observation, remember?”

H.D. was patient. “Look,” he said carefully, “I don’t think you quite understand. I’m H.D. Haworth. From the little you’ve said I gather there’s been no Bolshevik revolution, common sense be praised, so the Haworth Trust must be worth hundreds of billions. You still use money, don’t you?”

She nodded slowly.

“And I have millions hidden away where no one can ever find them but myself — don’t think I came an empty-handed beggar, even if something happened to the Trust funds. Millions, I tell you — gold and jewels, rare old books and art, everything of value.

“And besides that I’m the oldest sleeper — what’s the matter with you people?” he demanded fretfully: “Don’t you know what news is? Why am I met by one insignificant woman doctor?”

Dr. Lorraine did not seem put out by the upbraiding and this in itself was subtly exasperating. It was her attitude, her air, in which he sensed — sympathy, yes, and a sort of embarrassment. He did not understand it but it was absolutely offensive!

“Well,” H.D. snarled, beside himself, “confound it, woman, say something!”

“Three days observation,” said Dr. Lorraine, almost stupidly. Then she visibly readjusted the mantle of her professional cheerfulness and spoke briskly.

"It won't be so bad. I'll be making tests every day and that will pass the time and you can play the 'visor." She went over to the bedside table and pulled out the drawer holding the instrument.

"I hate radios," H.D. said sullenly. "I'd like to jam every one down Marconi's throat, just breaking the tubes. Confounded trashy programs, changing every five minutes!"

"Is that how they were? How awful for you! See, you just dial, like this, and one station has nothing but dance music, another nothing but Jimmurian dissonances. See? Anything you like.

"And if you first dial 'O' you can then dial for any number or any entire program that's ever been recorded. Here's the index. Too bad we don't have one in English."

H.D. yielded a snicker. "Where's the screen?" he asked, slightly mollified.

"Oh. I did say 'visor,' didn't I? Well, you see, this is a modified visor. No visual, no talking programs, just music. It's too bad, in a way, but we had to have you here for some of the tests. This is a neuro-psychiatric ward, you see. Yes, soft walls and all. It can be stripped down for violents."

H.D. showed signs of becoming that way himself and the doctor smilingly stepped to the door and opened it.

"See you tomorrow."

"Wait!" H.D. roared. "What happens then? What —"

"Three days observation." She nodded, and the door was closing. He reached it in a bound but the lock clicked first.

Late in the afternoon of the third of those maddening days that loathsome woman — the part of her that wasn't phonograph must have been clam — brought him some clothes. And the word that she spoke as she quietly left was music — Good-by.

He vaguely remarked the clothes as he put them on — socks, thin-soled shoes, a loosely draped one-piece garment of a closely woven sky-blue material resembling silk but duller — a light cape of darker blue. Just as he was appraising the quite satisfactory effect in the wall mirror a sound turned him toward the door.

They stood a little awkwardly in the doorway, pulling rather solemn faces. The black-haired man, who would have been big by ordinary standards, was mopping his red face in a nervous gesture and the

seven-foot giant who dwarfed him was stroking his platinum-blond beard.

H.D. stared at the giant gape-mouthed. *He looks exactly like God, if God were in the shape of a man*, he thought.

Teeth flashed in a smile through the silvery brush and God said, haltingly, "Hello, Grampaw."

H.D. stared violently. The black-haired man came forward with a jovial, if forced, laugh and a deprecating wave of the hand.

"You *are* his grandfather, you know, Mr. Haworth. Fourteen times removed, that is. He's the Administrator now. Don't you know me? Guess the bird looks different with all this plumage, eh?"

There was, at that, something familiar about this coarse, good-natured fellow, something ...

"Jones!" It was the delighted cry of a homesick sailor sighting the old church steeple.

"Garibaldi Jones! It's good to see you, man! When did they dig you up?"

"About twenty years ago." Garry grinned.

For a moment H.D. thought he discerned in his grin a trace of that expression he had so come to hate in the last three days, that tinge of something like embarrassment. Nonsense!

He rushed on, "Now I'll find out about this new-fangled world and pretty soon we'll set 'er by the ears. Once I get my ..."

The giant said something to Jones, who nodded uncomfortably. H.D. frowned.

"What's that? Why don't you speak English, Mr. — uh — Mr. Haworth? I guess you're a Haworth?" The giant smiled politely.

"He don't know any English, Mr. Haworth, except those words I taught him. Guess you might as well call him Junior — same name as yours. He says we better get going. Have to be in Washington by six. Your flyer's waiting."

Your flyer! This was more like it. Well, after all, he was H.D. Haworth, and they named demigods after him! In the exuberance of the thought he forgot to ask why they had to go to Washington. He swirled his cape about him and strode out. The demigod stepped aside for him.

The corridor was a surprise. It was not merely long — it was shockingly long. It must have been *miles* long. And it was broad. A truck could have easily passed and it was lined with doors and little signs

in a wavy lettering. No one seemed to be about.

They hurried along, H.D. gawking to all sides, almost trotting as Junior set the pace. At the great double door of an elevator shaft Junior touched the signal button.

Big — everything around here was *big!* The elevator could have accommodated several pianos and the pretty red-head operating the lift had to look down at H.D. She winked and made a laughing remark.

"She says you're cute."

H.D. did not know whether to be pleased or offended and before he could decide the acceleration took his breath away. They went up, up, a ridiculous distance, and at last he stepped out into another corridor.

Corridor! The floor must have been forty yards across and most of it was moving, a series of horizontal escalators with three speeds in each direction, adjacent strips moving at different speeds.

While H.D. stared, Junior and Garry Jones had stepped aboard the nearest strip and were moving away. Now Jones came trotting back, making little headway against the conveyor's motion. He had to chuckle.

In my country, said the queen, you have to run like the devil to stay in the same place.

"Come on, Mr. Haworth," Garry called. H.D. waited for the next opening in the rail to oppose him, took hold and stepped on. When he had come up, Garry explained. "This is Chicago — this building — this is the whole city, the business part, that is. This is one of the transport levels."

"Hmm." The place didn't look right — too bare, too empty. "Where are the stores? Where are the signs? Where are the people?"

"Stores? Oh, this is just a garage. Working day's over. Just about everybody's gone home."

"Garage?"

"Sure, for flyers — remember? Here we are."

The door Junior unlocked let them into a space sufficiently garage-like in its barrenness, but the thirty feet of gold-and-crystal grace it sheltered was a thing of beauty, enough to warm the cockles of any limousine-lover's heart. As H.D. gave himself up to the upholstery's caress he felt his old confidence return.

The wall rolled away as Junior made some unperceived signal. With the slightest of vibration the flyer wafted out into the shadowed evening. As the wingless craft emerged into space H.D.'s hands instinctively tightened their grip on the arms of his chair. Then he relaxed with a smile. He looked around with appreciation, ready to accept each new thrill with easy complacency.

When the mounting flyer finally cleared the shadow of that Everest of a building they must have been six thousand feet up. In the western distance the dipping sun shed its fire on a doll's garden of patched green, with here and there a spot of cheerful early autumn color. *Charming*, he thought patronizingly, *charming!*

"Let's go down closer and have a good look at those suburbs," he exclaimed on sudden impulse.

Garry shook his head. "Too late. We'd never make it to Washington by six." The flyer was gaining speed and altitude.

"What's all this about Washington? What happens there?"

Garry hesitated. "You have to take a trip, Mr. Haworth."

H.D. leaned forward, unable to hear the last words. With their mounting speed the whine of violated air was becoming a scream. Gerry reached back over Junior's shoulder and hit a toggle at the right end of the instrument board. It was like shutting off a radio.

He repeated, "You have to take a trip, Mr. Haworth."

"Trip. By heaven, you're as mysterious as that woman. Why don't you speak up? Well, never mind that." His eyes narrowed. "To whom does this airship belong?"

Garry sighed. "To you, Mr. Haworth." "Tell that oaf to turn around and go back."

"He won't, Mr. Haworth." The flyer was arching through a dark swirling cumulus layer, still gaining speed.

H.D.'s jaw set hard. He gritted his words.

"I don't know just what this is," he said slowly, "but I know this. You won't get away with it. Nobody fools with me. I'll break you and that great goon of a great-great-grandson. Money still counts here — that woman said so."

"Yes."

"Yes. I suppose you know to whom the Haworth Trust reverts now?"

"To you, Mr. Haworth."

"Yes. And that means I'm one of the richest men in the world again."

"No, sir."

H.D.'s cold tone deepened. "What do you mean, no?"

"Well, sir, times have changed, you might say."

"Inflation!" H.D. exploded.

"No, sir, none to speak of. You can still get a loaf of bread for a quarter. It's just that the growth curve is pretty steep, and it gets steeper all the time. Atomic energy, you know, and no wars for a long time, and now no natural death.

"You can get twelve percent on your money in a savings bank. It's really an expanding economy. Why, Chicago alone is worth more in dollars and cents than all the nations of earth in our time."

H.D. reflected this. "Well, how much is the Trust worth?"

Garry exchanged a few words with Junior. "About thirty million, he says."

"What!"

"Well," Garry hastened, "I know it isn't much for twenty million to grow to after all this time, but there have been expenses! What we had to spend for protection in the old days, when the mobs wanted to dynamite the vault!

"The sums that were spent on research to revive you! And then the Administrator, Junior here, has to live up to the Haworth name and that's expensive. He draws over a million a year."

"Why, that thieving, white-whiskered pipsqueak, I'll sue him within an inch of his life! I'll —"

"Now, now, Mr. Haworth, you're still a wealthy man."

H.D. glared. "Wealthy. Yes. And famous. The oldest Sleeper. Can't understand why the newsmen haven't been after me. In my time —"

"You're not news, sir. Look, Mr. Haworth, I have some rather unpleasant things to tell you. I've been shirking it but I might as well tell you now."

H.D. shrugged off a faint twinge of apprehension and leaned back in his seat. He looked out. The flyer was rocketing through clear air, high above a sea of crimson cotton, no longer accelerating.

He relaxed and permitted himself a smile. He had life, health, and millions. The billions would come easily enough. Pah, what "unpleasant things" could mar this paradise?

"You did have some news value as

the oldest and one of the deadest Sleepers — but you've been thoroughly Probed out this last year."

H.D. frowned impatiently. "What's this 'Probe' business? That woman mentioned it, and some 'Code'."

"The Farbenstein Probe," Garry said, looking thoughtfully out at the darkling horizon, "is, in simple terms, a hypno-bio-physical technique for reaching and interpreting buried memories. Your thoughts and experiences are on file and the newsworthy ones have been published."

H.D.'s mind refused to accept this horrible thought. He stared stupidly.

"No! It can't be!" he gasped. "It's — it isn't possible! It isn't *decent!*"

"Oh, not *all* your thoughts," he explained quickly. "Just — well, I'd better just tell you as well as I can about the Code." A very uneasy feeling mounted in H.D.'s breast as Garry continued.

"The Ascension Code made some basic changes in the conditions of life. What it really did was take most of the irresponsibility out of people's behavior. Because the freezatoria gave people hope that had no faith in Heaven — so the Code gave them fear, that didn't fear God. The Code put justice on a remorseless eye-for-an-eye basis."

H.D.'s blood ran slowly cold. He repressed the thought, denied it, rejected it, but in his heart he knew. His intuition had made the connection. Garry noted his heavy breathing, and felt a stir of pity. He continued, gazing out.

"It's simple enough, in practice. Every fifty years each person must submit to a Survey — and all Sleepers when they're revived. By association techniques they're made, under the Probe, to admit everything they've done that was wrong, either by their own conscience or by the written law.

"Then — well, you see — one outgrowth of the Probe is that *suffering* has been classified, qualitatively and quantitatively. Oh, its arbitrary on the edges, but not very, and where there's doubt there's charity, of course.

"After the Survey, if he's passed a certain allowable maximum in wrongdoing, a person must go to — the penal colony and experience himself all the suffering he has caused, qualitatively and quantitatively as closely as possible."

The question was only a whisper. "How long will I have to spend at this — this place — where did you say?"

"The penal colony? It's on the fourth planet. I guess we used to call it Mars." He hesitated. "In your case, I'm afraid — well, they say you hurt a lot of people."

"It's ridiculous!" H.D. cried desperately. "It's barbaric! My word, even in our time reasonable people knew that *revenge* isn't civilized, even against *criminals*. Can't they *rehabilitate* people?"

Garry grimaced, and spoke flatly, slowly.

"There is no known deterrent from harmfully selfish action except fear of punishment. Nor can there be a healthy mind as long as there exists a debt to conscience.' That's a translation from a schoolbook."

H.D. sprawled in his chair like a poled ox. He recognized that he was beaten. His eyes stared vacantly, he mumbled over and over, "They can't, they can't." He did not notice the flyer's swooping deceleration.

Something was shining with a white light. They were hovering. H.D. looked up absently, little interest in his eyes. A great long cave-mouth yawned in the mountain that was Washington, bright in the gathering dusk.

"There's our signal." A green eye was blinking rapidly. Junior settled the flyer in a curbed rectangle and H.D. had a moment to note the rows of craft, the conveyors, the rows of brightly lettered doors in the background. Then the door of the flyer opened and a gray-uniformed man almost as big as Junior clambered in, carrying a little leather bag.

H.D. watched in silence as the Administrator and the stranger exchanged a few words and some sheaves of paper, to which each affixed a signature. Then the man in gray opened his bag and, with the tools he took out, began to do something to the flyer's instrument panel. He whistled as he worked, a jazzy dance tune, and the sound grotesquely accentuated the silence of the watching three.

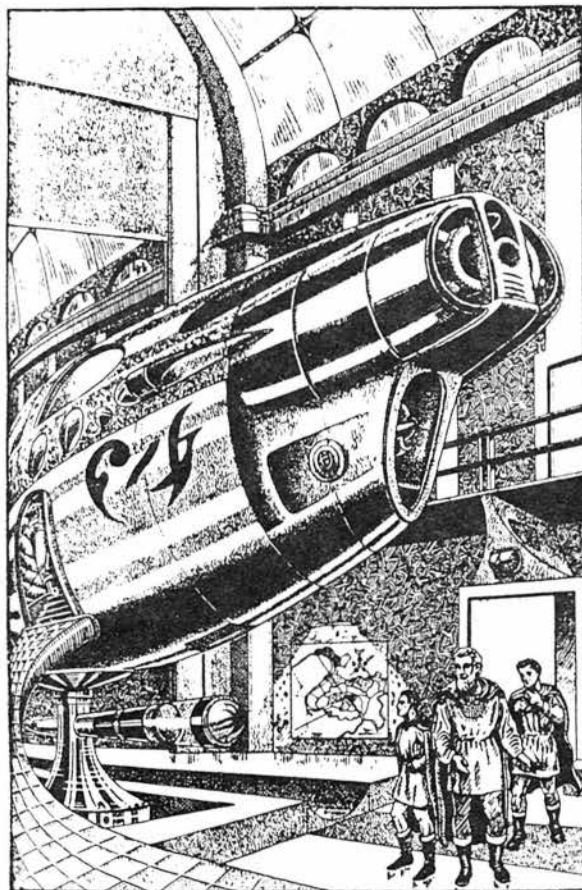
Jones stirred. "Well, here's where we get off, I guess." He stepped down out of the flyer, Junior after him, but when H.D. mechanically followed, the Administrator's bulk blocked the door. He was smiling with polite embarrassment.

"Move, you oaf!" H.D. snapped.

"Sorry, Mr. Haworth," Garry said. "You're going on to ... the penal colony."

Red rage gripped H.D.; they were treating him like an animal, sending him off like a bull to the packing house. He gripped the door-frame with his hands, and in a quick motion set his foot against Junior's chest. The giant sprawled backwards, and there was a satisfying thump as his head struck the pavement.

An iron hand gripped H.D.'s shoulder. The uniformed man's face was completely indifferent, almost bored. He



HAWORTH AND LARGER "ASSISTANTS," ABOUT TO BEGIN THE JOURNEY

merely held H.D. until he relaxed and sank shaking into a seat. Junior was on his feet, rubbing his head, the oafish smile a little rueful now.

The man in gray resumed his work and his whistling. It was intolerable. Those who with their sympathetic silence, and this fellow with his cheerful, loathsome whistling. He had to say something.

"How's a little can like this able to get to another planet?"

"Oh, we're pretty good engineers

these days," Garry said eagerly. "Tell you about it sometime. Well, the J-man's fixing your pilot signal now. It'll fly on automatic. It ought to be pretty interesting, really, your first space trip and all."

H.D. scarcely heard him. The "J-man" had put his tools back in their bag and was descending to the pavement. The door closed with a ringing sound and the J-man was doing something to it from the outside. Despairing, frustrated tears welled in H.D.'s eyes. His knuckles whitened.

A faint vibration stirred in the flyer and H.D. looked around in panic. Going already? He felt horribly afraid. He had an impulse to claw the walls. Garry caught his wild look and returned a glance of sympathy. His lips moved, but no sound came. H.D. stared. Garry's lips moved again, and he gestured. H.D. remembered then and hit the toggle.

"...easy, Mr. Haworth." Garry's voice was as clear now as though he spoke beside him.

The flyer lifted gently and eased around in a 180-degree turn. The last tints of evening glowed in the western sky, the earth was lost in darkness and the first insolent stars were mocking him.

Garry, on the other side now, called again.

"Take it as it comes, Mr. Haworth. It won't last forever, even if it seems like it. Son of a gun — said the wrong thing again, didn't I!"

H.D. screamed, "Appeal! Appeal the case!"

Garry sadly shook his head. "There is no known deterrent from harmfully selfish action except fear of punishment. Nor can there be a healthy mind as long as there exists a debt to conscience.'"

The flyer was easing out into the night, toward that red star of evil.

"You say Mars isn't called Mars any more?" he called hoarsely, pressing desperately against the hard crystal.

"No," Garry called softly and the quiet words were still very clear. "Now they call it Hell."

The Penultimate Trump

Mike Perry

It is sometimes remarked that cryonics didn't begin with the 1964 publication of *The Prospect of Immortality* by Robert Ettinger, as important as this event was in presenting the idea to a mass audience. In fact the basic rationale of cryonics is outlined in an earlier published work by Ettinger, "The Penultimate Trump," a science fiction story that appeared in the March, 1948 issue of *Startling Stories*. In addition to the main premise, there are other interesting thoughts, some of which relate to the future and its possible connection to traditional ideas about the hereafter.

To recount briefly, the story concerns the efforts of an aging billionaire, Harley D. Haworth, to stave off his impending demise. First he hires an army of doctors, but by the time he is 92 all they can tell him is "eat crackers and milk," and (by implication) wait for the inevitable. Not content with that he enlists an engineer and a biologist, who become his confederates in a seemingly unbalanced scheme. As you might guess, it is to freeze H.D. when the time comes, then revive him later when technology can restore his youth as well as reanimate him. It is done, using his ample financial backing to set up the necessary trust and administration. Haworth, frozen at 94, returns to consciousness 322 years later, eminently fit and youthful.

At first his prospects seem rosy indeed. He still has wealth (not as much as he'd hoped, due to various deprivations, but it'll do), and now this incredible, vibrant health. Money has not lost its meaning and he is ready to start gathering more immediately, and to enjoy all the amenities with his newly-restored vigor. But unfortunately there is a problem. He had amassed his original fortune in more-or-less robber-baron fashion, and had wronged many along the way. His

memories, of course, have been read before his reanimation and the whole history of his acts and motives has been analyzed. In the future there is great concern with controlling innate tendencies toward evil which previously led to catastrophes such as world wars and became an increasing threat as technology advanced. Such tendencies, it is also suggested, account for the failure to observe extraterrestrials — most civilizations just self-destruct. So, to avoid this, strong controls have been put in place. Although the idea of simple retribution might seem bar-



Robert Ettinger

baric, it has been recognized that "there is no known deterrent from harmfully selfish action except fear of punishment, nor can there be a healthy mind as long as there exists a debt to conscience." So Harley D. must go to a penal colony, where with advanced techniques he will be made to suffer, however long it takes, all the grief he had earlier caused others. The colony is lo-



cated on Mars, although the planet now has a new name: Hell.

There are several ideas in this story I found especially interesting.

First and foremost, of course, is the cryonics premise itself. (The term "cryonics" didn't exist at the time, but was coined later, in 1965.) As expected, there is not much detail, just enough to get the main idea across, and some of the thinking has since been updated, but this was 1948. There is no mention of liquid nitrogen; Haworth must wait it out, only "ice-cold," in a more conventional freezer. This however is to be powered by a geothermal source, which will make it virtually self-contained.

Then there is the manner in which the idea of freezing is introduced. The originator is Garibaldi Jones, an engineer and also something of an armchair philosopher. One day he is boring his wife with some windy quoting from the paper on the potential of science and she suggests that if, after all, science can do anything, it can eventually raise the dead. A notion is born when Garibaldi (presumably) adds the idea of freezing them first to prevent decomposition. Eventually he finds his way to Haworth who, with little to lose, is willing to furnish funding and serve as the first guinea pig. Someone else is needed for the project: a biologist with experience in low-temperature work, who is duly rounded up and offered a handsome salary. (Despite this he doesn't do much except serve as a sounding board when H.D. must justify the immediate need for secrecy.) The original goals are: 1) To perfect a complete method of suspended animation, including reanimation, *before* it is needed by Haworth, and 2) to design the storage system that will preserve him until science can find a way to restore his youth. It is unstated but clear that only goal 2), the brainchild of

Jones, is met. Later H.D. is "one of the deadest" of the Sleepers, but still has enough potential life that he is brought around after a 2-year effort.

The idea of reanimating a frozen body is an old one. The 18th-century physician John Hunter, for example, tried unsuccessfully to achieve it with fish and speculated on whether it might be possible to extend human life this way ["For The Record," *Cryonics*, Nov. 1990]. Ettinger himself first encountered the idea in a science fiction story, "The Jameson Satellite" (*Amazing Stories*, July 1931), where a long-frozen astronaut is reanimated by aliens from space. The author, one Neil R. Jones, seems to have furnished the name of Haworth's engineer. Ettinger, though, added an essential ingredient: the idea of *deliberately seeking* a happy immortality, through body preservation and waiting for advances in *human* technology.

In the story Haworth appears to have fallen just short of this goal: having

achieved immortality, he finds he must suffer after all, and suffer hard. However, there is an ultimately silver lining: he is assured that his sentence is finite, that he will one day be free. Hell has an escape hatch, though in his case we understand it won't open for a long time. This raises another interesting point, the connection between this story and traditional religious concepts of an afterlife. (The title can also be explained on this basis. The "penultimate trump" or next-to-last trumpet blast would appear to be the act of freezing. It precedes the resurrection, which in Christian tradition was to be heralded with the "last" trumpet. Other meanings relating to "trump" in card games have also been suggested, but it appears that the religious analogy was Ettinger's main intent; cf. his *Man Into Superman*, ch. 8.) Earth, in effect, will be transformed to heaven. This heaven is to be achieved through science, not the supernatural, but the means to get there is really within reach. Still, all will

not be perfect: Free will and thus the possibility of evil will exist, so "hell" will also be necessary. However this is not the true hell but only purgatory, with the prospect of eventual cure and release.

Here we see a clash with mainstream Christianity, with its doctrine of everlasting punishment. The idea of a more temporary penalty, even for the severely reprobate, is upheld in offshoots such as Mormonism and the 3rd-century speculations of Origen. I for one have always been disturbed by the notion of eternal torture: it seems far out of proportion to the crimes a finite being could commit in a finite amount of time. It remains to be seen whether Ettinger's more equitable but still severe system will be necessary. We should think about this, and whether there might be reasonable alternatives for the truly dangerous, such as limited, painless reprogramming, or a long subjective confinement in "virtual reality."

A Perfect Time to Write to Sacramento

Allen J. Lopp



The March, 1991 issue of *Cryonics* reports that the Canadian province of British Columbia has passed legislation prohibiting the offering of cryonics services. It is very likely that this legislation passed without a word being uttered to a British Columbian lawmaker in defense of the merits of cryonics. It is reasonable to wonder whether the Canadian politicians even knew what they were voting for. As unfortunate and ignorant as this situation in British Columbia is, the question that is foremost in my mind, and the minds of many Alcorians, is "Could the same thing happen here in California?"

If the question is taken technically, of course the California Legislature has the power to *at least try* to ban cryonics operations in California if it chooses to do so. However, a strong argument could be developed for a Constitutional challenge to such a ban. Alcor's litigation in recent

years has resulted in several judicial assertions that Californians have a Constitutional right to dispose of their human remains as they choose, including cryonics. Having observed this, let's *take action now* so that we never have to wage such a court challenge.

Far better for us is to ensure that our legislators are more educated about both the scientific merits and the civil rights issues concerning cryonic suspension. Now is a perfect time to write your state senator or state assemblyman and tell him or her that you are a cryonicist and you are concerned that cryonics remain legal and available in California. Alcor has found it necessary to go to court to clarify that existing law does not outlaw cryonics, and briefly pointing out this fact will show that your concerns are reasonable and worth the lawmaker's attention.

And yes, Virginia, I do practice what

I preach. I first wrote to my representatives shortly after the Dora Kent Crisis. State Senator Cecil Green was kind enough to send me a supportive response that included this paragraph:

"Philosophically I support the concept that this is a personal choice. An individual of sound mind should be able to decide what will be done with their body without government intrusion. If legislation were introduced to clarify the legal status of cryonic suspension, I would in principle support this measure. However, I would have to reserve my final decision on this issue pending the exact language of such a measure, and the input from technical experts."

In 1989 I received a very thoughtful letter from Senate Pro-Tem David Roberti, who said in part:

"While my thoughts on human cryonic suspension are not necessarily nega-

tive, the procedure does evoke legal, moral and philosophical questions that need to be addressed.... Although there are no laws that specifically address the practice of cryonics, be assured that I will keep an open mind to any legislation that is proposed to clarify the law and provide some legal guidelines for the protection of prospective clients, and their families, as well as cryonics practitioners."

My impression from these and other responses is that legislators take to heart an argument that is grounded on principles of personal liberties, and it is likely that we can get farther by emphasizing this aspect rather than spotlighting scientific arguments. With civil liberties concerns in the forefront, opponents of cryonics would need to come up with some very good reasons to outlaw cryonics before they could be successful with that effort — very good reasons that cryonics proponents could not adequately refute. I personally doubt that they could do this unless they did it behind our backs when we weren't looking, as happened in British

Columbia.

And we are looking, at least to some extent. Every spring I now write to Senator Green to ask whether any bill dealing with cryonics has been introduced, and none has surfaced to date. (Bills can be introduced only early in the legislative year; the cutoff is usually about March 10. So I ask them to check immediately after the cutoff. This approach at least would find a bill specifically introduced to regulate or outlaw cryonics, but would not necessarily catch such provisions being placed into another bill by the amendment process. A small group of Alcorians are looking into arranging a better legislative watch capability.)

Although the situation is not totally dismal, there is no justification for complacency on anyone's part. Those of you who are California residents, how many of you have written to *your* representative in Sacramento telling them you want to keep cryonics legal? Well, what are you waiting for? The same thing that happened in British Columbia? Why not write to them

right now?

If you don't know who your state representatives are, call the Voter Registration Office in your county seat. They can tell you who your reps are and give you their addresses. By the way, I would recommend that you write to the lawmakers' offices in Sacramento, not their local field offices. Their Sacramento offices usually deal with state-wide policy issues, such as the legality of things like cryonics. Also, be reasonably brief, even though cryonics can be a complex issue. Try to limit your letter to one side of a typewritten page.

If you get a response from your legislator, please share it with me. It might be totally noncommittal, or it might include a statement of the lawmaker's viewpoint, such as Senator Green's above. Any response whatsoever is worth sharing with fellow cryonicists, including the staff at Alcor.

So get out that pen and paper, and write! Do I need to even point out that your chance for life in the future is at stake?

Reanimation

Metamorphosis Again

Ralph Merkle



For those who have just entered the discussion, Thomas Donaldson wrote "Metamorphosis: An Alternative To Uploading," in the May, 1990 issue of *Cryonics*. He discussed many issues in that article, but one hypothesis that he advanced was incorrect. He suggested that a computer able to modify its own circuitry would be endowed with special abilities. He further suggested that the human brain might be so endowed and that this would pose a fundamental problem to uploading.

This can be shown to be incorrect by considering a computer with a built-in switching network which allows it to model the behavior of a hypothetical "brain" endowed with the ability to modify

its own circuitry.

In response to my article pointing this out, Thomas said (among other things) that "Ralph's 'switching computer,' as usual in his comments, remains in an unspecified Fairyland."

There are several existing or proposed massively parallel computers that employ a general purpose switching network as a fundamental component of their architecture. They all illustrate the fact that a computer made from devices (logic gates) that have a fixed interconnection pattern can model the behavior of a hypothetical computer that can dynamically change its own interconnection pattern. Examples include: the Connection Machine, the Hypercube,

the BBN Butterfly, the Monarch, the N-Cube, the IBM TF-1, and a host of others. There is in addition a wealth of literature on switching networks and how they work. The examples I have cited are all "scalable" architectures. The number of processors can be increased without bound, and the associated switching network, made from devices connected in fixed pattern, will scale either linearly or at worst log-linear with the number of processors in the system. The examples chosen can simultaneously send information from all processors to all other processors via a randomly specified (and randomly altered) connection pattern, just as the telephone system (which is also made from parts that

are wired together in a fixed pattern) lets us call any telephone in the world from any other telephone.

Thomas's concern that a switching network must be "hierarchical" and hence suffer a bandwidth bottleneck at the top of the hierarchy is also misplaced. Methods of avoiding bottlenecks are well known.

I have neglected a few problems. The speed of light, coupled with the three-dimensional nature of space, will ultimately limit the performance of any switching network to something not too much better than a rectangular three-dimensional grid of processors, each connected to its six neighbors. Furthermore, gravitational collapse of the processors will eventually pose a significant problem. If we were to truly increase the number of processors without bound, the sheer mass of the structure would eventually turn it into a black hole....

A small number of processors, on the order of the number of synapses in the human brain, will not suffer from either of these problems; they can therefore be neglected.

There also seems to be some concern about the definition of a "computer." The standard definition of a computer in computer science is: "any device or model of computation equivalent in computational capability to a Turing machine." (A Turing machine is a particularly simple form of computer popular among theoreticians which has access to a blank tape of unlimited length which it can use to read and write intermediate results). Note that this definition ignores the time taken to com-

plete the computation. A 6502 microprocessor (the heart of the first Apple computers) and a Cray supercomputer are both "Turing complete," in the sense that any program that can be run on one can be run on the other, although the Cray is clearly faster. The 6502, provided with sufficient memory and given enough time, can do anything the Cray can do.

All proposals for universal computational devices to date have proven to be no more capable than a Turing machine. The formal summary of this observation is known as "Church's thesis." Church's thesis states that any device capable of computation is no more capable than a Turing machine. (Various other equivalent formulations of Church's thesis appear in the literature). Church's thesis includes, *inter alia*, the claim that the human brain cannot be more capable than a Turing machine. Church's thesis cannot be proven, for it is a claim about the physical world, but is widely believed in the computer science community.

Provided that the human brain follows the laws of physics, and that the laws of physics can be modeled by a computer, then the human brain cannot be more computationally capable than a Turing machine. Thus, Church's thesis receives support from the nature of physical law and the claim that everything, our brains included, follows physical law.

The "simple" Turing machine is truly a remarkably capable computational device. The best efforts of the best and brightest researchers have not produced anything better. That the human brain is

not computationally superior to a Turing machine is not a denigration of the human brain, but simply another proof of the fundamental unity of computation, whatever its superficial disguise might be. The Turing machine, the Lambda calculus, logic circuits, recursive functions, the Von Neumann architecture, neural nets, massively parallel architectures and a host of other computational models have all been proven formally to be equivalent. Anything that can be computed using one model can be computed using any of the other models, provided only that sufficient memory and time are allowed.

Thomas suggests that an essential requirement for a "computer" is its ability to run many different programs without modifying its own hardware. According to the definition given above, which reflects the fundamental nature of a "computer," this is false. It is true that most computers today are not able to modify their own structure during the course of a computation. However, it is easy to imagine computer designs that would involve such self-modification. Such an ability would not make the computer more capable than a Turing machine, nor would it otherwise require any fundamental changes in our conclusions about what computers can and cannot do.

The concept that self-modifying programs or self-modifying hardware make any fundamental difference in the nature of computational abilities is a red herring and should be ignored.

Response to the Critique of "Molecular Repair of the Brain"

Ralph Merkle

A Brief Summary

Greg Fahy recently (February, 1991) wrote a critique of "Molecular Repair of the Brain" (originally published in the October, 1989 *Cryonics*, and under continuous revision). To provide orientation for the reader who might not have read that article, or whose memory of it might be hazy, a brief summary is in order. It said that the frozen human brain could be repaired by the following general approach: 1) Digitize the

frozen structure. A sufficiently accurate digitization for any purpose considered here would be provided by giving the coordinates and orientation of every major molecule in the brain; 2) Once a complete description of the frozen structure is available in digital format, the description can be manipulated and revised to eliminate the damage; 3) Once we have a digital description of a healthy human brain, we can then use that description as a blueprint to rebuild the original.

The most obvious concern raised by this strategy is the rather massive amount of raw information and the large amount of computer power being used. The fairly long sections of the paper looking at projected future memory and computational capacities were intended specifically to address that issue. Dr. Fahy's statement that these issues are "peripheral" is wrong, for they are quite central. The claim that computer power of the magnitude required will likely be available in the future is not immediately obvious. If we expect people to believe this claim, it must be supported by a careful analysis of the relevant facts.

The next problem is how to obtain the necessary information. A simple "divide and conquer" strategy, in which the human brain is divided into pieces small enough that they can be directly analyzed by the use of high resolution imaging technology (e.g.,

nanotechnology) was proposed and should be quite adequate.

The paper did not discuss in any detail how "nanotechnology" works, but simply provided some general reasons for believing it is plausible and references for further reading. A detailed discussion of nanotechnology would require writing a rather detailed technical book. Fortunately, Eric Drexler is currently writing exactly such a book. The early drafts look very good. Many of Dr. Fahy's questions really concern the nature and limitations of nanotechnology, so having a detailed technical description of the subject will be very helpful in creating a common framework within which to carry out further discussions.

The final concern is how to build a structure with atomic precision, given the blueprint. Here, the paper concludes that there are strong arguments supporting the general idea that this should be feasible and did not pursue the technical issues further. The argument that it should be possible to build human brains because they have in fact been built is very strong, and it would have required significant additional work to provide a sufficiently detailed analysis of the construction process to provide a better argument.

An issue which I view as completely irrelevant, but which causes some people concern, is the retention of the "original" atoms. The claim that the original electrons, protons, and neutrons are somehow vital to our continued existence strikes me as absurd. Despite my opinions, some quite intelligent people take the opposite view. As a consequence, the paper examined the technical feasibility of retaining the original atoms, and concluded that this retention (while somewhat increasing the technical difficulties that must be dealt with) would in fact be feasible.

It is interesting that Dr. Fahy's criticisms are largely concerned with the section of the paper that was not written, the section on synthesis. In several instances, in the absence of a specific proposal in the paper, Dr. Fahy invented a specific proposal and then criticized it. The whole section discussing "jamming" and "slamming" is of this nature.

This form of criticism suffers because the critic's proposed solution to the perceived problem is in fact a proposal of the critic. It is not surprising that such proposals are often found wanting.... The underlying criticism is that the original proposal has not provided sufficient detail to persuade the critic, so the critic has felt obliged to invent something.

Dr. Fahy appears to agree that the synthesis of large structures (e.g., a human

brain) will be feasible. His criticisms have focused rather specifically on the suggestion that such synthesis be done at low temperature (e.g., perhaps 130 to 140 Kelvins).

Some General Approaches to Repair

Before addressing the specific issues surrounding low temperature synthesis, it would be advisable to discuss the general issues involved in synthesis at any temperature, and the kinds of structures that might prove satisfactory. The following taxonomy is not intended to be exhaustive, but is intended to provide the reader with a feeling for the range of possibilities available.

1) The least demanding approach would be to build an "artificial brain" using the digitized information provided by the analysis of the frozen brain. This approach allows the selection of the simplest technology available which can adequately support consciousness and human thought. While still controversial, it is very likely that this approach will be technically feasible at some point in the future.

The second class of methods seek to build an actual human brain, on the grounds that we have a high degree of confidence that a human brain can support consciousness and human thought. Rather than building a human brain directly, however, we actually build a structure which closely resembles the desired structure but which is, for some reason, stable. That is, the human brain is in a constant state of dynamic change. Directly building a structure which is in a state of constant dynamic change is difficult, so instead we build a static structure which closely resembles the dynamic structure at some specific point in time. The reason for building a static structure is the presumption that it will take some time to build, and that a dynamically changing structure would deteriorate during the synthesis time. The static structure won't move while it's being built, so we can take as long as we wish to complete the construction. The obvious methods of doing this are:

2) Synthesize the structure at low temperature.

3) Synthesize the structure in the dehydrated state.

4) Synthesize the structure in a normal "wet" state, but stabilize all major macromolecules by chemical means (cross linkages, etc.). This might be called "full stabilization."

5) Synthesize the structure in a normal "wet" state, but use minimal stabilization aimed primarily at the membranes (by, e.g., simple mechanical supports), prevent the entry of oxygen or other reactive com-

pounds, and allow "harmless" diffusion to take place. Note that with intact membranes, diffusion outside of well defined compartments will not take place. Some additional stabilization might be required, but the objective in this approach is to stabilize as little as possible. This might be called "minimal stabilization."

Each of methods (2) through (5) has a "start-up" requirement. If synthesis is done at low temperature, then the temperature must be somehow raised. If synthesis is done in the dehydrated state, then water must be added in a controlled way. If chemical stabilization is used, then the stabilizing agents must be removed, presumably in some appropriate sequence. If minimal membrane stabilization coupled with low oxygen content is used, then oxygen levels (and other reactive compound levels) must be restored and the membrane supports removed.

Finally, we could adopt an approach that takes maximum advantage of the existing technology base: guided growth. In this method, we build the dynamic final structure through a series of dynamic intermediate states, much as an actual human brain is synthesized today by natural methods.

6) Synthesize the structure using the same general intermediate states that are used during normal growth. Achieve selectivity by placing key cellular activities under the control of an on-board computer. Thus, the bulk of the cell's metabolic machinery would be identical to that of a normal cell, but where a normal cell would spontaneously initiate cell division, the "controlled" cell would be unable to initiate cell division unless the trigger for division were produced by the on-board computer. Changes in cellular shape and movement would likewise be under on-board computer control, as well as the growth of synapses, etc.

Although superficially resembling the growth of a normal person, this process would in fact be carefully controlled and planned. In simple organisms the growth of every single cell and of every single synapse is determined genetically. "All the cell divisions, deaths, and migrations that generate the embryonic, then the larval, and finally the adult forms of the roundworm *Caenorhabditis Elegans* have now been traced." [2]. "The embryonic lineage is highly invariant, as are the fates of the cells to which it gives rise" [1]. The appendix to reference [1] says: "Parts List: *Caenorhabditis elegans* (Bristol) Newly Hatched Larva. This index was prepared by condensing a list of all cells in the adult animal, then adding comments and references. A

complete listing is available on request..." The adult organism has 959 cells in its body, 302 of which are nerve cells[3].

The same principles apply in many insects. Grasshoppers, for example, have about 50,000 neurons whose development is invariant. Other insects have significantly more neurons.

Building a specific biological structure using this approach would require that we determine the total number and precise growth patterns of all the cells involved. The human brain has roughly 10^{12} nerve cells, plus perhaps ten times as many glial cells and other support cells. While simply encoding this complex a structure into the genome of a single cell and then expecting that cell to grow into the final structure might prove to be overly complex, it would certainly be feasible to control critical cellular activities by the use of on-board nanocomputers. That is, each cell would be controlled by an on-board computer, and that computer would in turn have been programmed with a detailed description of the growth pattern and connections of that particular cell. While the cell would function normally in most respects, critical cellular activities, such as replication, motility, and synapse growth, would be under the direct control of the on-board computer. Thus, as in *C. Elegans* but on a larger scale, the growth of the entire system would be "highly invariant." Once the correct final configuration had been achieved, the on-board nanocomputers would terminate their activities and be flushed from the system as waste.

Tradeoffs

The six approaches mentioned here have different technical and philosophical tradeoffs which will appeal to different people. Which approach is "best" is a question which cannot be answered on purely rational bases. A process more akin to an opinion poll is required. Those familiar with a specific technology will naturally be more comfortable with methods in which that technology is prominently used. Those with more conservative philosophical opinions will quite naturally exclude some approaches, even at the cost of some increased technical complexity.

Dr. Fahy, for example, would probably be most comfortable with "guided growth," for this makes maximal use of existing (proven) technology. On the other hand, for someone worried that "guided growth" might produce a "mere copy," frozen synthesis or fully stabilized chemical synthesis offers the most precise ability to restore the structure with atomic precision.

Building an artificial brain is the simplest approach technically and would therefore be attractive to those most concerned about technical feasibility. This technical simplicity is gained by relaxing the philosophical criteria, which is a tradeoff that some will not wish to make.

As can be readily seen, the debate about which of these general approaches to use includes factors well beyond the technical issues. A desirable goal would be to show that the most philosophically restrictive objectives are technically feasible, for such a proposal could be used as a "least common denominator" by everyone. This, presumably, would require a highly precise synthesis technique, and would thus favor either frozen synthesis or fully stabilized chemical synthesis. An interesting question is the degree of general acceptance of minimally stabilized chemical synthesis. This approach provides a number of significant technical simplifications and, if it were viewed as generally acceptable, might serve as a reasonable "least common denominator."

In minimally stabilized chemical synthesis the original molecules would be restored (thus satisfying the concerns of those who wish restoration of the same atoms), but they would be allowed to move in accordance with diffusive forces as they might normally move in a living person. Individual membranes would be anchored (positionally stabilized) by a framework introduced for the purpose. Thus, repair would restore the original person with the original cellular structure and the original molecules, but the molecules would have been allowed to diffuse within their cellular compartments (or diffuse two-dimensionally within a membrane) much as they would normally do.

Computer Analysis is Fundamental

All these methods first use digitization of the human brain and revision of the digitized information to "repair" damage. Changing bits in a data base is a much more general and uniform method of "repair" than attempting to engage in actual physical repair of a specific form of damage using a specific physical repair technique. Given the severe level of damage that might occur when significant pre-suspension injury has taken place, especially when this is compounded by a suspension performed under adverse or sub-optimal conditions, it seems most attractive to digitize the entire structure first rather than to attempt the direct physical repair of specific forms of damage using specific techniques. Such direct

physical repair techniques could be overwhelmed by the many synergistically interacting forms of injury that are likely to take place in many current suspensions.

Chemistry at Low Temperatures: Radicals and Pressure

Dr. Fahy devotes a long section to claims that low temperature chemistry is unfeasible, violates physical law, and isn't what Feynman and Drexler had in mind!

Feynman never made any statements about temperature, nor did he specify in any detail how synthesis of arbitrary objects might take place. By contrast, Drexler's technical book is very specific about the techniques to be employed, and considers temperature as a significant issue in most settings. Examining the current draft shows that it will include a chapter on "Mechanochemistry" with subsections on radicals, carbenes, and other open-shelled (highly reactive) species; as well as a section on piezochemistry, which will include a section on force versus thermal activation. While normally of limited use in chemistry, highly reactive species can be quite useful when their tendency to react with anything they touch (even at low temperature) is controlled by positional capabilities.

Suppose that we wished to bond two compounds, A and B. Let us presume that both A and B are closed-shell "stable" compounds, that we are operating in a high-vacuum low temperature environment, and that we have positional control available. To create the necessary bond, we might proceed as follows: 1) Abstract a hydrogen from compound A. (For reasons not entirely clear to me, chemists like to "abstract" hydrogens with radicals rather than remove them, delete them, or otherwise dispose of them); 2) Abstract a hydrogen from compound B; 3) Place compound A next to compound B, with the dangling bonds created by the hydrogen abstractions of steps (1) and (2) facing each other; 4) Wait for the laws of physics to do their thing. The activation energy for a radical-radical reaction is very low, so it doesn't look like we have to worry about the temperature being too low to support "chemical reactions."

Of course, we need to do an atomically precise hydrogen abstraction for this procedure to work: how can this be done?

One approach is to use a hydrogen abstraction tool. The basic requirements for such a tool are clear: one end must be very fond of hydrogen and the other end must form a "handle" which can be safely grabbed. 1-propynyl (the radical derivative of propyne) seems to fill the bill (though we

will likely wish to expand the "handle" end of the molecule in some convenient fashion). A carbon radical triple-bonded to another carbon has an affinity for hydrogen which is quite high. The bond dissociation energy for the resulting H-C bond is about 132 kilocalories per mole (data were taken from the *Handbook of Chemistry and Physics* for the H-C bond in acetylene). Such a structure should be quite effective as a hydrogen abstraction tool.

This is just one example. Chemistry textbooks that discuss reaction mechanisms are filled with hydrogen abstractions by radicals. Activation energies for such abstraction operations can be quite small. Although "normal" compounds don't react at low temperatures, chemistry using exotic compounds can take place quite readily.

Of course, we can also apply high pressure. Dr. Fahy said that "...pressures on the order of 15,000 atmospheres are required to convert ice into amorphous solid water at liquid nitrogen temperature..." incorrectly implying that achieving such pressures should be viewed as difficult. The current record for static pressure is almost 1.7 million atmospheres (from the *Guinness Book of World Records*. Much higher pressures have been achieved dynamically). This pressure creates forces at the atomic level that are a substantial fraction of the force required to rupture bonds. We will be able to achieve at least such pressures in the future, and use them in whatever way seems appropriate during the synthesis process. A "molecular vise" is not at all unreasonable. By building a diamond-like "reactive site" that was both extremely hard and whose shape was precisely tailored to promote a specific reaction, we could "squeeze" two compounds together using extremely high force that was very precisely applied. This entirely novel form of synthesis opens yet another broad range of chemical reactions that will occur at low temperature.

And, of course, we can apply modest pressure to highly reactive radicals, thus eliminating the need for even the small thermal activation energy called for in these cases. Chemistry can be done at 0 Kelvin.

Misunderstandings

Many of the criticisms that Dr. Fahy made are based on a massive misunderstanding of the proposal. He devotes an entire section to specific forms of damage and the physical problems that would be involved in attempting to directly repair those forms of damage. However, the major thrust of "Molecular Repair of the Brain" was precisely to avoid the need to worry about the specific physical problems in repairing

each individual form of damage. Having once gotten a digitized description of a human brain (and optionally, for those concerned about it, a "filing cabinet" holding every major macromolecule from that brain), the physical problems involved in repairing a fractured axon simply don't matter. The component molecules of the fractured axon now reside in the filing cabinet, while the coordinate data for the molecules from that fractured axon reside in the data base describing the frozen structure. "Repair" of the frozen axon, at this stage, consists of altering the data base. No physical manipulations are called for, nor would they be useful. Dr. Fahy's concerns are like asking how a computer text editor can remove the paper when you delete a word. There isn't any paper to remove. The question, as stated, simply doesn't make sense. You can ask how the text editor alters the bit-patterns that describe the text. You can ask about the physical process of printing. But you can't ask how the text editor changes the printed words on a piece of paper because that's simply not what's going on.

The alternative to digital modifications of a digital description of the structure is to directly modify the real physical structure, damage and all. Each specific form of damage that might occur would require a separate direct physical repair process. Such a case-by-case analysis is complicated, error prone, and not very confidence-inspiring. If, however, we digitize the original structure and perform the "repairs" on the data base, then we can at once eliminate virtually all problems. The problems that remain are fundamental and are not obscured by a cloud of secondary issues.

There is one case where direct physical repair of the original structure probably makes good sense: when the damage that has been done is minimal, is well defined and well understood, and direct physical repair is not too complicated. One of the major objectives of research in cryobiology is to minimize the damage done by freezing and to better characterize that damage. It seems plausible, therefore, that with continued advances in cryobiology the need for sophisticated repair methods can be avoided entirely. While we can look forward to that happy day, it seems unlikely that direct physical repair methods will produce a satisfactory result when applied to the people suspended using current methods. By contrast, digitization followed by sophisticated computer analysis and repair is likely to produce a good result when applied to a person suspended using the current rather primitive methods (with apologies to those providing us with those

much appreciated primitive methods!). Indeed, sophisticated computer analysis should produce a satisfactory outcome under remarkably bad circumstances.

Further research aimed at better characterizing and minimizing freezing damage, as well as aggressive efforts to minimize the damage actually incurred during suspensions, are both very worthwhile objectives that deserve strong support. At the same time, it is essential to consider repair methods that will be able to cope with the most severe damage that might actually occur in practice. By both minimizing freezing damage and maximizing repair capabilities we will achieve the highest possible probability of success.

Dr. Fahy has argued that building a brain at low temperature and then warming it is "nonsensical" because (inter alia) it would explode. Unfortunately for this argument, extremely rapid warming does not impart momentum *per se*, and volume changes caused by temperature changes can be compensated by a number of mechanisms (e.g., leave space for expansion...). The claim that rapid heating of a biological structure from (say) 130 Kelvins to 340 Kelvins or so will inherently cause it to explode is without merit.

Much as the rapid heating proposal is charming, a proposal of Dr. Fahy's is better: build the frozen structure with an appropriate concentration of cryoprotectant and then heat it slowly. This doesn't have the technical drama of rapid rewarming, but solves the problem quite effectively. This is, of course, simply one illustration of a general principle: if you are building a structure using technology X, then modifications to the structure to make the job easier for that technology are entirely reasonable. If technology X involves building a frozen structure and then warming it, then banning structural changes that would allow the structure to better resist heating would be plain silly. While certain constraints on the allowed modifications must be made (if the structure is my brain, I have some strong opinions on some of the constraints!) it should be very clear that adding cryoprotectants is acceptable.

As an aside, frozen synthesis would allow the cryoprotectant concentration and even the type of cryoprotectant to be varied from tissue to tissue (or even cell to cell) to achieve optimal tissue-specific cryoprotectant concentrations. Combining this with highly controlled (and perhaps quite rapid) heating rates will result in minimal damage during warming. More sophisticated structural modifications to make the tissue resistant to warming damage would also be feasible.

Power

"How will nanomachines be powered? No comments from Merkle."

Comment: properly designed electrostatic motors will function quite nicely, however cold it gets. Electrostatic attraction and repulsion are not altered by temperature. "Is it feasible in principle to power complex molecular manipulations ... at cryogenic temperatures?" Yes. Simple mechanical interactions are not temperature-dependent. If a probe knob runs into a gate knob, it's blocked regardless of how low the temperature gets. Rod logic will work quite nicely at liquid nitrogen temperature.

"Presumably the power would have to be supplied via electrical cables or sliding rods going in through the vascular system." No. Such a presumption might be considered for "on board repair." The off board repair method discussed in the paper eliminates this problem. The structure being examined was taken apart. The issues surrounding power dissipation were largely eliminated. The volume occupied by the repair system could greatly exceed the volume occupied by the brain. The vast bulk of energy dissipation is involved in computation. The computation can take place as far away from any tissue as we desire.

Time Estimates

Dr. Fahy correctly points out that if repair takes place at low temperature, then the time estimates based on biological analogies must be viewed with caution. However, every factor of which I am aware provides a speed advantage to assembler-based methods, rather than the reverse. As a consequence, the biological times are extremely conservative estimates of the time that would actually be required to perform the necessary manipulations. Thermal diffusion and self-assembly are inherently limited in their speed of operation, and it would be remarkable if future molecular engineering technology did not exceed these speeds by several orders of magnitude.

Analysis of the fundamental speed limits produces numbers that are shockingly good (and were not needed to support the basic case). Chemical reactions don't fundamentally require much time. Femtoseconds and picoseconds are the units typically used. If we assume one microsecond per chemical reaction, and something like 10^{25} chemical reactions to synthesize a structure as large as the human brain, and if we assume a parallelism of 10^{16} , then we find the job can be completed

in 1000 seconds, or about 17 minutes. There do not appear to be any fundamental physical reasons to doubt that this will be feasible.

While questions about the fundamental physical limits of computation have attracted a great deal of interest (for rather obvious economic reasons), no one has yet (to my knowledge) published a paper discussing the fundamental physical limits to the speed of synthesis of a complex object. The demonstrated biological speeds are adequate for our purposes, and tend to be less shocking. While Dr. Fahy has argued that the biological speeds cannot be used to estimate the rate of synthesis if non-biological techniques are used, it is in fact reasonable to view the biological speeds as an upper bound on the synthesis time involved provided that the non-biological methods are faster. Positionally-based synthesis techniques should indeed be substantially faster than biological methods, so the assumption is reasonable.

Other items

Dr. Fahy's claim that building structures at the temperature of liquid nitrogen is like building them in a black hole is clearly poetic hyperbole and not intended to be taken seriously.

I'm puzzled by the claim that "removing cracks" is a non-trivial exercise. It is a trivial exercise. Assignment: given a data base that describes frozen tissue with cracks, modify it so that it describes the same structure, but without the cracks. A student in an advanced data structures course might view this as a reasonably challenging assignment, but any professional in the image analysis field could toss off half a dozen algorithms for doing the job in an hour. (I assume the cracks are "clean" low temperature fractures).

The paragraph claiming that rending a molecule asunder at a specific bond is implausible has rather obviously gone too far. Clearly, given a specific molecule, and given that we are pulling on it hard enough to rupture a bond, one of two things will be true. Either: a) two or more bonds are of sufficiently similar strength that random thermal variations will cause one bond or the other to actually rupture, thus leading to difficulty in predicting which bond will break, or; b) one bond is sufficiently weak as compared with other bonds that the weak bond will always (or very nearly always) break.

Rather obviously, if one wanted a molecule to break at a certain point, one would design the molecule with a "weak link" at that point. In this way, the molecule

would always break exactly where it was designed to break. Typically, when a molecule is broken in two in this fashion, the dangling bonds will be highly reactive radicals that can be used in further reactions. Indeed, rupturing a molecule with a deliberately designed "weak link" is a good way to reliably and predictably create specific radicals. In current chemistry, radicals are often produced by selecting "weak bonds" and breaking them by some process. Oxygen-oxygen single bonds (peroxides) are fairly popular in this regard. The use of mechanical methods to rupture weak bonds simply continues an old and familiar chemical tradition used to generate radicals in support of chemistry.

Conclusion

Dr. Fahy concludes that "From the point of view of a cryobiologist, however, Merkle's analysis falls far short of being convincing." Evidently, however, the analysis was convincing as far as it went. The "unconvincing" part was the part not written: e.g., the synthesis method. Even here, Dr. Fahy seems to agree that the synthesis of a human brain is feasible. His only objection is that such synthesis could not be done at low temperature. I have no objections to synthesis at some other temperature, but the objections he raises to low temperature synthesis are incorrect. Low temperature synthesis continues to be a synthetic method with certain advantages (e.g., high precision, stability of intermediate structures) when compared with other approaches.

This exchange on the subject will not be the last, nor should it be. As repair scenarios become more detailed, there will be more points of disagreement, not fewer. Consensus does not emerge at once, full blown. Instead, it emerges bit by bit, a single piece at a time, as the various issues are argued and discussed in greater and greater detail.

References

1. J.E. Sulston, E. Schierenberg, J.G. White, and J.N. Thomson, "The embryonic cell lineage of the nematode *Caenorhabditis elegans*," *Developmental Biology*, Vol. 100, pages 64-119 (1983).
2. Jean L. Marx, "*Caenorhabditis elegans*: Getting to Know You," *Science*, Vol. 225, pages 40-42 (July 6 1984).
3. Roger Lewin, "Why is Development So Illogical?" *Science*, Vol. 224, pages 1327-1329 (June 22 1984).

Call for Evidence in the Case Against Robert F. Nelson

Mike Darwin

Many of our readers will know of the Chatsworth Disaster. For those who do not, a brief explanation of it is in order. In the mid-1960s an organization called the Cryonics Society of California (CSC) came into being. CSC was the second cryonics society formed, and the first to place a patient in cryonic suspension (Dr. James Bedford, on 12 Jan., 1967). By circa 1979 CSC had approximately nine patients in its care. Also by this date it had allowed all or most of those patients to thaw out and decompose. This action resulted in high-profile litigation and the award of approximately one million dollars in damages as a result of civil action brought by relatives of some of the patients in suspension.

The Chatsworth disaster was very damaging to cryonics, causing a serious breach in public confidence and a sharp downturn in the growth of the program. Even today, the workability and the integrity of cryonics is often questioned by the media and the public as a result of Chatsworth.

The Alcor Life Extension Foundation was founded by Fred and Linda Chamberlain long before Chatsworth because of unsatisfactory dealing with CSC's president Robert F. Nelson. Others in the cryonics community at that time, including myself and Saul Kent and Curtis Henderson of the Cryonics Society of New York, publicly raised questions about CSC's operations and integrity (Kent, S. "Trouble in southern California?" *Cryonics Reports*, 4:5, 1969).

The subsequent events at Chatsworth tragically confirmed our judgment of Mr. Nelson and of CSC. A jury in a civil court trial carried out in Los Angeles County in 1981 found Nelson **guilty of fraud and intentional infliction of emotional distress**. Damages in the amount of \$928,594 were returned against Nelson and his co-defendant Joseph Klockgether. This judgment was upheld on appeal in 1983.

The damage inflicted on cryonics as a result of Chatsworth is impossible to quantify, but it is fair to say that it was enormous. Chatsworth, and the litigation resulting from it, caused tragic financial losses for Fred and Linda Chamberlain and others who were completely innocent of any wrongdoing, and who had in fact spoken

out against Nelson. These losses resulted from the involvement of innocent people in litigation as a result of false statements made by Nelson implicating them in his activities. The emotional harm done these people and others in the cryonics community continues to be felt to this day.

With the conclusion of his civil trial and his subsequent conviction, those of us who lived through the agony of Chatsworth felt at last able to put the incident if not the suffering behind us. While never able to forget the lies, deceptions, and atrocities Nelson perpetrated on us, on the families of suspension patients, and most horribly on the patients themselves, we hoped to "get on with life" and continue in a productive way our struggle to secure safe passage to an opened-ended tomorrow for ourselves and our families and friends.



Bob Nelson

Photo: David Pizer

The responsibility for "getting on with life" clearly lies with us. And we intend to do so. Sadly, an important part of that effort must now include the documentation of the evidence regarding Nelson's role in Chatsworth. This has been made necessary due to the publication in the *Venturist Monthly News* of an interview with Nelson conducted by David Pizer and Dr. Michael Perry.

While we believe strongly in freedom of speech and freedom of inquiry, we also understand that tension necessarily exists between freedom and responsibility. Our

civilization provides trials and other such mechanisms of "closure" so that at some point both plaintiff and defendant — guilty or innocent — can be relieved of the need to constantly defend themselves, and to destructively relive the past. Unfortunately, in this case — perhaps because of the unique nature of the cryonics community — these mechanisms have failed to work.

The interview was published in three parts in *Venturist Monthly News* with the stated purpose being to "stir up controversy" and "allow Nelson to tell his side of the story" (David Pizer, personal communication). The publication of the first installment of Nelson's interview provoked a firestorm of outrage from those (still living) who considered themselves Nelson's victims. Mr. Pizer and Dr. Perry were urged not to continue with the publication of Nelson's interviews and were spoken to at length and provided with hours of documentary testimony concerning Nelson's deceitfulness and lies from a broad cross-section of respected people within the cryonics community including Fred and Linda Chamberlain, Saul Kent, Curtis Henderson, Marcelon Johnson, Robert Krueger and myself.

Publication of the Nelson interview continued. As a consequence, I and many others within Alcor and the cryonics community have had the incredibly painful and infuriating experience of being told by relative newcomers to cryonics about the "tragedy of Bob Nelson and how much he suffered," or "how much of a saint Nelson must have been..." It is thus clear that there has been a terrible distortion of the historical record.

The documentation in support of Nelson's civil conviction is available for public perusal at the Los Angeles County Courthouse. It comprises over **three feet** of files. It tells a sordid tale of fraud and lies. Would that it were possible to hand this to anyone who inquires about Nelson, CSC, and Chatsworth. But it is not.

Those of us from the Chatsworth era still active in cryonics now confront the unpleasant task of verbally trying to set the record straight on an increasingly frequent basis. Once again Nelson has succeeded in causing emotional harm, economic dislocation, and unproductive use of time as a result of his fraud and lies.

For Fred and Linda Chamberlain the publication of the Nelson interview has caused terrible pain and grief as they have been forced to relive one of the most painful and costly episodes in their lives. It has also been an ugly experience for the rest of us here at Alcor who suffered through

Chatsworth once.

Nine people lost their chance at continued life at Chatsworth as a direct result of Bob Nelson's actions and two others lost their chance as an indirect result.

There is no statute of limitations on homicide.

Some argue that this point is moot, since current law does not recognize Nelson's actions as homicide. But in reality this is not the case. The law defines homicide as the killing of one human being by another. To kill is to deprive of life. The problem is not with the law, but rather with the flawed standards contemporary medicine uses to pronounce death, the legal definition of which is the irreversible loss of life.

It could also be argued that since medicine today uses flawed, function-based criteria we are all "off the hook" regarding our actions toward suspension patients. The problem with this argument is that we, as cryonicists, know better. The question then becomes to what standard should Nelson be held? Should he be held accountable to the incorrect standards of contemporary medicine, or to the standards he publicly stated he believed in, publicly advocated, and which he clearly acted upon in accepting and suspending the nine patients at Chatsworth?

It is apparent to me that there needs to be, within the cryonics community, a com-

pilation of all remaining available evidence which bears on the Chatsworth case and Nelson's (and others') role in it. Just on the basis of efficiency and credibility alone, there clearly needs to be a document that can be handed out which marshals the evidence and presents the case in as well-documented a fashion as possible from a cryonics perspective. Shouting accusations and denunciations is nearly meaningless without the documentation to back up these charges. Certainly, it is not a constructive use of time or intellectual or emotional energy for Fred and Linda, Saul, Curtis, myself, and others to have to repeat and suffer through the accompanying emotional turmoil of presenting our "case against Nelson." It is apparent that the years of civil litigation resulting in Nelson's conviction was not sufficient to establish the record—at least not within the cryonics community.

There is also the matter of the patients who were destroyed at Nelson's hands; where is their justice? After long and painful consideration, I have decided to formally gather together, document, and order the case against Nelson; acting in effect as prosecutor and advocate for the patients who lost their chance while in Nelson's care.

While we cannot enforce a judgment or even render one (and have no intention of doing so) we can document so that history

can judge. It is quite possible that Nelson will live many additional years and that he may yet avail himself of cryonic suspension. We believe it important that his actions towards others who were in suspension and his responsibility be documented and made available.

In any event, for our own peace of mind we wish to set the record straight. This incident and the activities of historical revisionists in the matter of the Jewish holocaust have made us painfully aware of the fragility of the voice of the historical record. That fellow cryonicists and colleagues could have taken the action they did to provide Nelson with a voice in such an irresponsible way is wounding and unbelievable enough. That Nelson's voice should gain further credibility in the cryonics community, or beyond, is intolerable.

Thus, we are asking that any persons having evidence, information, or who are willing to give testimony against Robert F. Nelson, also known as Frank Bucelli, in the matter of the termination of the cryonic suspension of: Marie Phelps-Sweet, Louis Tom Nisco, C. Russell Stanley, Helen Kline, Steven J. Mandell, Mildred E. Harris, Gaylord Harris, Genevieve de la Poterie, Pedro Ladesma, and possibly others under Nelson's care, please contact Mike Darwin at 800-367-2228.

Alcor News

More Trouble at Alcor

On 18 March subpoenas were issued by the California Medical Board (CMB) ordering Jerry Leaf and Mike Darwin to appear and testify before the CMB in its case against the physician who signed Dora Kent's death certificate. The charge? Aiding and abetting the practice of medicine without a license. The penalty to the physician if he is found culpable? Anything from probation to revocation of his license to practice medicine. The penalty to Alcor? Serious inability to retain a medical director (and thus to operate) and possibly the determination that the practice of cryonic suspension *per se* constitutes the practice of medicine. Interestingly, no one at Alcor was ever charged or convicted of the practice of medicine without a license.

The objective of showing that cryonics equals medicine seems clear, based on a memo provided by Senior Special Investigator Dan Goldsmith to Alcor's attorney Christopher Ashworth.

The subpoenas were personally served by Mr. Goldsmith; a man who seems to have a special axe to grind against cryonics and whose only way of doing so is to go after a physician of outstanding character who has had no professional association with Alcor since the Dora Kent episode in 1987, and who has continued his academic position, research, and practice of medicine without incident or complaint since that time. Indeed, if this physician represented such a threat to the community that the CMB felt removal of his license or censure was required, why has it waited nearly four years (with the physician continuing his practice) to act? Could it be that all other mechanisms to shut down Alcor have failed, leaving them no recourse but to proceed on a 4-year old *civil* case? (The statute of limitations on filing criminal charges of felony practice of medicine without a license against the Alcor Suspension team expired on January 12, 1991).

On Thursday, 11 April our attorney (Mr. Ashworth) notified Mr. Goldsmith that

Mr. Leaf and Mr. Darwin would be claiming their 5th Amendment rights and thus would not be providing any testimony relating to the Kent case unless complete immunity was granted. Darwin and Leaf declined to testify since there is technically an open case regarding the "death" of Dora Kent: her Death Certificate still lists the mode of death as "homicide."

On the morning of the following day, Mr. Goldsmith showed up at Alcor's front door accompanied by Robert Grow, an inspector from the California State Pharmacy Board, and asked to "see whatever drugs and records pertaining to drugs that we maintain in the facility." Contrary to Alcor policy regarding warrantless officials, they were allowed inside and seated in the reception area by Alcor staff member Ralph Whelan. Calls were placed by Alcor staff member Mike Perry to Alcor President Carlos Mondragón (who was out of the facility at that time). Instructions were relayed from Carlos Mondragón to Ralph Whelan and later to Alcor staff member Arthur Mc-

Riverside police cite Alcor official for brandishing gun

By Dave Boyles
The Press-Enterprise

RIVERSIDE

Things heated up yesterday at Alcor Life Extension Foundation, the Riverside company that freezes dead bodies and heads in the hope of one day bringing people back to life.

By the time cooler heads prevailed, Alcor administrator Arthur McCombs was cited by Riverside police for allegedly brandishing a loaded gun at an armed state medical board investigator, authorities said.

McCombs, 36, of Fullerton, was not taken into custody but has been ordered to appear in court, police Lt. Gary Nissen said.

Alcor president Carlos Mondragon said McCombs had been placed on temporary leave while the company investigates the incident.

In recent years, Alcor has made international headlines. Riverside County prosecutors conducted a murder investigation after the December 1987 death of Dora Kent, an 83-year-old woman who died at Alcor's facility and had her head removed

and frozen in liquid nitrogen.

Investigators believed Kent might have been killed by a lethal dose of barbiturates, but Alcor personnel denied wrongdoing. Raids of Alcor netted Kent's hands but not her head.

Alcor and the county coroner's office, which classified Kent's death a homicide, wrestled in court over custody of the head, whose location remains a secret. County prosecutors later dropped their homicide investigation.

Mondragon said yesterday's incident occurred because of what he called ongoing harassment by state medical authorities. However, Ronald W. Cooke, supervising special investigator for the Medical Board of California, said Alcor was not being harassed and was not under investigation.

Cooke said authorities are investigating a physician who might have had records at Alcor's offices. He declined to discuss that investigation or to identify the doctor.

Mondragon, however, said that Alcor's director of research, Michael Federowicz, also known as Michael Darwin, and Jerry

Leaf, a medical researcher and contractor for Alcor, had been subpoenaed to be interviewed April 30 by state authorities. He declined to elaborate.

Yesterday's incident occurred after medical board investigator Dan Goldsmith and state pharmacy board inspector Robert Grow went to Alcor's office on Doherty Street in western Riverside sometime before noon, Cooke said. The two did not have a warrant, Cooke said.

Goldsmith and Grow initially were allowed in to the office but shortly afterward were asked to leave.

Goldsmith refused to leave and, according to Mondragon, made a comment about being armed with a gun. Cooke disputed that account but declined to elaborate, saying he did not want to debate the issue in the media.

Mondragon, who was not present during the alleged brandishing incident but learned about it from employees and police, said that because of Goldsmith's refusal to leave, McCombs "pointed one of our guns at these guys (Goldsmith and Grow) and told them to leave. They did."

Police were called and seized the gun, which Nissen described as a .38-caliber semiautomatic handgun. Mondragon said he did not know whether the gun belonged to McCombs or was part of a gun collection kept at the office.

Brandishing a gun at a peace officer would be a serious reaction,

Mondragon said, but he did not think McCombs was necessarily out of line. He said Alcor personnel were victims of unfair scrutiny by some law enforcement authorities, particularly Goldsmith.

"I would call it a vendetta on his part," Mondragon said of the investigator. Goldsmith, contacted at the scene shortly after the incident, declined to comment.

Mondragon said media attention of recent years has not hurt business. Membership has doubled in the last year, he said, and there currently are about 230 "suspension members" — people who have made legal and financial arrangements to be frozen after death.

Since the Dora Kent matter, eight additional people have had either their whole bodies or heads frozen, Mondragon said, bringing to 10 the number of heads and seven the number of bodies in cryonic suspension. It costs \$120,000 to have a whole body frozen and \$41,000 to have a head frozen, he said.

Combs by both Mike Darwin and Carlos that Mr. Goldsmith should be asked to leave the facility unless he had a search warrant.

Mr. Goldsmith then produced photocopies from the California Business and Professional Code which he claimed authorized a search of our facility on administrative grounds; that since this was not a criminal matter no warrant was needed.

Ralph entered into dialogue with Mr. Goldsmith, informing him that he could not search the facility without a warrant and repeatedly instructed him to leave the premises.

During the course of this discussion between Ralph and Goldsmith, Arthur McCombs confronted Mr. Goldsmith with a pistol and ordered him out of the facility immediately.

This resulted in Goldsmith and Grow exiting the facility and taking up defensive positions with Goldsmith training a weapon on the facility. Subsequently Alcor President Carlos Mondragon arrived and both Goldsmith and Mondragon placed calls to the Riverside Police Department. A short while later Mike Darwin arrived, and communicated the demands of the rapidly deploying police outside the building: i.e., that Mr. McCombs leave the building hands-in-air and the gun be placed on the ground and stepped away from. This was done.

Subsequently Arthur McCombs was cited by the Riverside Police Department (i.e., given a ticket) for brandishing a weapon: a misdemeanor. The RPD also ordered Mr. Goldsmith to leave the area.

We have reproduced in full in the article documenting this incident from the *Riverside Press Enterprise*.

At this time Arthur McCombs is on administrative leave pending a determination by the Alcor Board of Directors as to how this incident should be handled. It is probable that no action will be taken on this matter until after his court appearance on 2 May, 1991.

Commentary

We wish to point out several things about this incident.

First, as should be obvious, the CMB (perhaps acting as a stalking horse for the Department of Health Services) is attempting to harass and damage Alcor and presumably make the practice of cryonics difficult or impossible in California.

Second, the CMB attempted to execute a warrantless (and thus illegal) search of Alcor's facilities using the Pharmacy Board as a front. (Please note that in the 19-year history of Alcor and the 16-year history of Cryovita Laboratories we have never had a Pharmacy Board inspection. Furthermore,

no veterinarian or physician that we know personally or professionally (this is quite a number) has ever had such an inspection; we get one the day after we refuse to testify against Mrs. Kent's physician.)

Third, the above notwithstanding, Alcor does not countenance the use of deadly force except in situations where there is a clear threat to life. The weapon used was a personal one and use of this weapon was not authorized by Alcor management.

Beyond that, we can say little until this matter has been resolved by the court and the Alcor Board of Directors.

Analysis

Everyone at Alcor is feeling the pressure from the ongoing harassment from the State. All of us want it to end. Sadly, there seems to be no end in sight.

We wish to reassure readers and Members that the immediate ramifications of this incident to Alcor appear to be slight; we were fearful of immediate and aggressive retaliation.

Nevertheless, the action by the CMB in this incident should serve to inform our members that the battle to secure our rights to cryonic suspension is far, far from over.

With good judgment, careful planning, adequate resources and cool heads we will hopefully prevail.

British Facility Closing

Continuing with the bad news.... We have received word that the Alcor U.K. building is to be sold. We understand from Alan Sinclair that title has already passed to the bank and the building is up for sale. This represents a real tragedy, one that we feel here in the United States as well. Mr. Sinclair has invested over \$450,000 in the U.K. operation, and due to our inability to raise \$90,000 the current facility was lost.

This story and the previous one are related more than that they represent less than happy news; the terrible drain on our resources caused by the ongoing litigation with the State of California is *directly* responsible for the loss of this facility.

Use of Patient Care Fund money to provide the needed \$90K was carefully considered, with the entire value of the building to serve as collateral. Ultimately, this was rejected due to tight cash flow on this end and the generalized feeling that violation of our long-standing policy against use of patient care fund money in this way was not wise. The renewed activity against Alcor by the California CMB tipped the balance and caused us to decide to take as conservative a financial position as possible.

Several of the local members need to be praised for the outstanding efforts to save the facility, including a pledge of nearly \$20,000.

Conversations with Alan Sinclair indicate that when the current facility closes (presumably after its sale, which in Britain's currently depressed economy could take some time) they hope to acquire a smaller, less costly facility which will be: a) debt free, and b) either jointly owned or owned by an entity registered as a charity in Britain.

In the meantime Alan and others are

evaluating a number of sites as possible locations for an interim capability until the dust settles and a second go at it can be had.

New York Group Retains Kit

A decision has been made to bring the New York group up to full Coordinator status. Equipment deployed to that area will be remain there pending their obtaining Transport Technician Certification and exerting renewed effort at on-going local training. It is anticipated that at least two members of New York group, both EMTs, will attend the June training session.

Auction to be Held at Turkey Roast

At this year's Alcor Turkey Roast there will a unique event — an auction to raise money for Alcor's programs. Among the kinds of things expected to be up for auction are cryonics historical documents and memorabilia from the early days of cryonics, works of art, books, videotapes, services, and vacation trips. The event will be held, as usual, on Sunday, 8 December, 1991 at the home of Saul Kent and Jo Ann Martin in Riverside, California.

We are looking for items and services to auction in order to make this event a real success. Thus, if you have services others might be interested in, and you would be willing to contribute to this effort, please let us know. For instance, if you are a CPA or tax-preparer you might consider donating an hour or two of time towards preparation of someone's income taxes. If you are physician, perhaps you'd be willing to give a free health assessment appointment or consultation, and so on. And even if you aren't a "professional" maybe you'd be willing to bake a cake and bring it to be

auctioned off, or offer an evening's free baby-sitting (particularly needed in the Silicon Valley area where there are a growing number of young cryonicist families).

Also, if you have some nice item that you would like to offer consider bringing it to the auction (but please, contact us first).

If you'd like to donate a product or service to be auctioned off at the Turkey Roast this year, please call Saul Kent at (714) 780-3252; (Fax) (714) 780-5758.

Alcor Fundraising Dinner For Cryonics Research

by Saul Kent

Critics of cryonic suspension charge that today's suspension patients will never be restored to life because the freezing damage that occurs during suspension is irreparable. Our response to this charge is to provide evidence that today's methods of cryonic suspension preserve enough of the brain structure of cryonics patients to enable future medicine to restore them to life. This argument has become more credible in recent years because of the enormous strides being made to develop technologies that operate on a very small scale (nanotechnology). We often point out that the continuation of this trend seems to be leading to the kind of medical cell and tissue repair technology that may make it possible to restore today's suspension patients to life in 100 years or more.

The problem with this argument is that the central tenets of our position are a matter of opinion. It is a matter of opinion, for example, that today's cryonic suspension methods preserve enough brain structure to allow for recover of the patient's identity. Most cryobiologists disagree and we've yet to provide incontrovertible evidence that they are wrong.

It is also a matter of opinion that future medical technology will, someday, be able to repair the brain damage that occurs in today's suspension patients. Few of our critics are aware of the recent explosive advances in nanotechnology, which leads them to dismiss the idea of molecular repair of human cells and tissues as "science fiction." But even full knowledge of the recent advances in nanotechnology doesn't necessarily lead to the conclusion that technologies capable of restoring today's cryonics patients to life will ever be achieved. We think they will be, others disagree, and once again what we have is a matter of opinion.

Improving The Chances of Success

The strongest argument for cryonics in not simply to assert that today's cryonics



Alcor U.K. facility

Photo: Luigi Warren

patients have a chance of reanimation in the future, but to point out that today's suspension patients have a better chance of reanimation than cryonics patients frozen in the 1960s because of improvements in cryonic suspension since that time, and to make it clear that the chances of future patients will be constantly improving because of ongoing cryonics research.

Many of our members were first attracted to Alcor because of our approach to cryonics as an ever-evolving science and our dedication to the improvement of cryonics techniques through scientific research. Those who joined when Alcor (in conjunction with Cryovita Laboratories) was engaged in path-breaking hypothermia experiments with dogs were thrilled that we were working so hard to improve our members' chances of survival. The most common criticism of Alcor today is our failure to continue to conduct this type of research.

New Research Programs

The good news is that Alcor and Cryovita scientists are back in the laboratory and that we now have several exciting research approaches to keep us busy for the next few years. Alcor is developing a comprehensive, long-term plan to achieve perfect preservation for the brain.

Among the research programs we are planning are a series of studies of a new cryoprotective compound that preliminary work indicates should be greatly superior to glycerol for brain cryopreservation. We have been using glycerol to treat cryonic suspension patients for the past twenty years. A second project involves the attempt to demonstrate that laboratory animals can retain their ability to perform learned tasks after freezing.

These projects will be underway shortly, but there's not nearly enough money around to carry them through to completion, or to conduct the follow-up studies needed to achieve these objectives. The purpose of the Alcor Fund-Raising Dinner is to kick off a campaign to raise the kind of money we need to improve our cryonic suspension techniques. **The Dinner will be held on**

Saturday, 28 Sept. at 7:00 PM at the Marriott Hotel, 5855 W. Century Blvd. near Los Angeles International Airport.

Speakers at the Fund-Raising Dinner

The major feature at the Alcor Fund-Raising Dinner will be authoritative presentations about the past, present and future directions of cryonics research, including:

- **ADVANCES IN CRYONIC SUSPENSION** by Mike Darwin, Director of Research of the Alcor Life Extension Foundation in Riverside, California — A historical overview of how cryonic suspension patients have been treated since the beginning of the cryonics movement in the mid-1960s. Darwin will explain how cryonic suspension has been transformed from a crude procedure performed by amateurs to an impressive medical procedure performed by professionals. Also discussed will be some of the improvements we're likely to see in suspension in the near future based upon current research.

- **DOES MEMORY SURVIVE FREEZING** by Jerry Leaf, President of Cryovita Laboratories in Riverside, California — The critical question in assessing whether patients suspended with today's techniques can be restored to life in the future is whether today's techniques preserve enough memory to maintain identity. There will be discussion of how little we know about how to answer this question today, how we can develop scientific evidence to answer the question in the future, what steps are currently being taken to conduct experiments in animals to answer the question, and how the results of these experiments can be used to improve cryonic suspension techniques.

- **VITRIFICATION: A NEW TECHNOLOGY** by Gregory M. Fahy, Ph.D., Research Scientist at the Transplantation Laboratory of the American Red Cross in Rockville, Maryland — Vitrification enables scientists to preserve biological tissues at ultra-low temperatures without the formation of damaging ice crystals. It shows great

promise as a means of cryopreserving with little or no damage, cells, tissues, and organs for use in transplantation and other medical procedures. This will be an in-depth exploration of this exciting new technology by the world's foremost expert on the subject, who will also speculate about the possibility of application of vitrification to cryonics.

- **WHY YOU SHOULD SUPPORT ALCOR'S RESEARCH PROGRAM** by Saul Kent, President of the Life Extension Foundation in Ft. Lauderdale, Florida and Head of the Alcor Volunteer Program — Why contributing money to Alcor's research program today may save your life tomorrow. How much research your money will buy. How it will help Alcor to grow larger, stronger, and more influential.

The key to Alcor's growth — and to our own chances for survival — is strong support for Alcor's cryonics research program. I urge you to come to Alcor's Fund-Raising Dinner on the 28th of September. If you do so, I promise that you will be dazzled by the remarkable advances achieved thus far and exhilarated by the opportunities ahead. I'm looking forward to seeing you there.

Reservations for the Alcor Fund-Raising Dinner

It is important that we receive your reservations for the Alcor Fund-Raising Dinner as soon as possible. Don't wait to make your reservation for the Fund-Raising Dinner at the last minute. If you do, you may have to go without dinner. We need to know how many people will be attending *beforehand* so that we can order the appropriate number of dinners. So please send your reservations in today.

Reservations for the Alcor Fund-Raising Dinner are **\$100 per plate**, by check or money order to: **Alcor, 12327 Doherty Street, Riverside, California, 92503**. Or you can make reservations by credit card by calling **1-800-367-2228**.



Mike Darwin



Greg Fahy



Saul Kent



Ralph Merkle



Jerry Leaf

Advertisements And Personals

The Alcor Life Extension Foundation and Cryonics reserve the right to accept, reject, or edit ads at our own discretion and assume no responsibility for their content or the consequences of answering these advertisements. The rate is \$10.00 per line per month (lines are approximately 90 columns wide). Tip-in rates per sheet are \$90 (already printed and folded); or \$180 (printed one side) or \$270 (printed both sides), from camera-ready copy. Tip-in ads must be clearly identified as such.

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

EXTROPY: Vaccine for Future Shock. #6 available, \$3 per copy. Futurist philosophy, avoiding the heat death of the universe, neurocomputation, reviews of futurist and transhuman books, and much more. EXTROPY; c/o Max More; P.O. Box 77243, Los Angeles, CA 90007-0243.

Gay cryonicist, 30, nonsmoker, libertarian, freethinker, is interested in contacting similar men. Boxholder; P.O. Box 191231; San Francisco, CA 94119.

Wanted: Person to live in and work at mountain resort. Fair pay, free room and board. Call Dave Pizer at 619-249-4848.

Meeting Schedules

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

The SUN, JUNE 2 meeting will be held at:
ALCOR/Cryovita Laboratories
12327 Doherty St.
Riverside, CA 92503

Directions: Take the Riverside Freeway (State Hwy 91) east toward Riverside. Go through Corona, and get off at the McKinley St. exit. Go right (south) on McKinley. Turn left (east) on Sampson (1st stop light). Go about 1 mile along Sampson to Granite. Go left on Granite to its end, and turn right on Doherty. Go about 200 yards on Doherty and turn left into the industrial park just short of "Great Eastern Furniture." Alcor is the third building from the back, on the right.

The SUN, JULY 7 meeting will be at the home of:
Dave and Trudy Pizer
Mountain View Motel
State Highway 2
Wrightwood, CA
Tel: (619) 249-3553

Directions: Take US 15 (Barstow Freeway) up into Cajon Pass. Get off at State 138 and go west (left, toward Palmdale) to County Road 2. Turn left onto County Road 2 and go through Wrightwood. The Mountain View Motel is on the far side of town, on the right.

There is an Alcor chapter in the San Francisco Bay area. Its members are aggressively pursuing an improved rescue and suspension capability in that area. Meetings are generally held on the second Sunday of the month, at 4 PM. Meeting locations can be obtained by calling the chapter's secretary, Carol Shaw, at (408) 730-5224.

The SUN, JUNE 9 meeting will be held at the home of:
Leonard Zubkoff
3078 Sulphur Spring Court
San Jose, CA

The SUN, JULY 14 meeting will be held at the home of:
Ralph Merkle and Carol Shaw

1134 Pimento Ave.
Sunnyvale, CA

Directions: Take US 85 through Sunnyvale and exit going east on Fremont to Mary. Go left on Mary to Ticonderoga. Go right on Ticonderoga to Pimento. Turn left on Pimento to 1134 Pimento Ave.

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

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

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

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

Meeting dates: June 16, July 21, August 18.

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

Meeting dates: June 1, July 6, August 3, September 7.

There is a cryonics discussion group in the Boston area meeting every second Sunday at 3:00 PM. Information may be obtained by contacting Eric Klien at (508) 663-5480 (work) or (508) 250-0820 (home). Meetings will be June 9, July 14, and August 11 at 3 PM at the home of Eric Klien; 1 Sinai Circle B10; Chelmsford, MA 01824. Take 128 to 3 north, then take the Route 110 exit right toward Chelmsford. Go 1.5 miles and turn left on Wilson Street, in front of the CVS. Make a right into the apartment complex.

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

Other Events Of Interest

The 1991 International Space Development Conference will be held in San Antonio, Texas from 22-27 May. Brenda Peters is looking for people who are planning to attend the conference or who live in the San Antonio area to help provide an Alcor presence. Contact Brenda through Alcor or directly at (212) 353-2942.

CHANGE! There will be an Alcor fund-raising dinner on Saturday, September 28 at 7 PM at the LAX Marriott Hotel, 5855 W. Century Blvd., Los Angeles. The goal is to raise money to continue Alcor's research to improve cryonic suspension services. Reports will be given on recent advances in cryonic suspension, ongoing research in cryonics, and plans for future research. Reservations are \$100/plate, check or money order to Alcor at 12327 Doherty St., Riverside, CA 92503; or by credit card to 1-800-367-2228. This dinner was previously scheduled for June 15. See this issue of *Cryonics* for details.

ALCOR LIFE EXTENSION FOUNDATION
12327 Doherty Street
Riverside, CA 92503

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

