

CRYONICS

The Alcor CryoTransport Program

3rd Qtr. 2000 A PUBLICATION OF THE ALCOR LIFE EXTENSION FOUNDATION Volume 21:3

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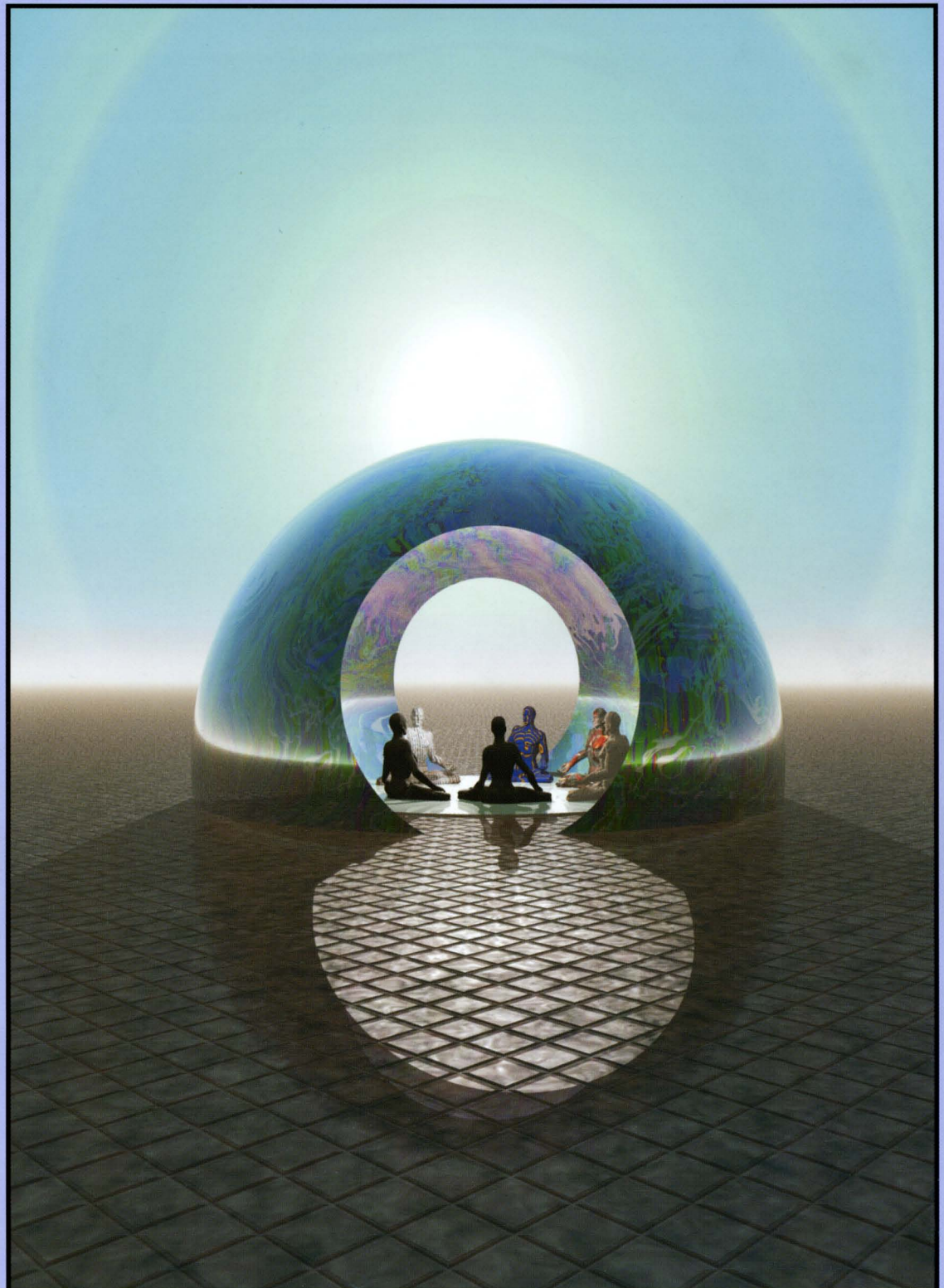
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FM2030 in Cryostasis

(excerpted from the Associated Press article "Waiting for the Thaw")



NEW YORK—A nationally known futurist and philosopher who was convinced he would live to be 100 died of pancreatic cancer Friday, July 7, in New York at the age of 69. But he plans to come back to life in Scottsdale Airpark. He had his brain cryonically frozen Saturday night at Alcor Life Extension Foundation, which is located at the airpark.

A teacher, author, and corporate consultant who lived in Miami, Fla., FM2030 was launched—his word for born—in Belgium to an Iranian diplomat. He lived in 17 countries by the time he was 11, fostering self-proclaimed identity as a citizen of the universe. He considered nationality an anachronism and often said, "There are no illegal immigrants, only irrelevant borders."

Tributes to FM2030, written by his friends and colleagues, will be published in the next issue of Cryonics.

You Asked for Greater Membership Growth ... Here Is Your Opportunity to Help "Make It So!"



The Robert Miller family, Alcor members who live in Canada, recently made a generous donation of \$100,000 for the extraordinarily important purpose of developing a marketing program that will increase Alcor's membership.

Now, we are asking you to join the Millers' gesture of support and their confidence in our future by adding your own contribution to this important membership-building campaign. Your dollars will enable us to communicate our story in a positive and compelling manner, develop marketing materials that will reflect Alcor's professionalism, and create a presence at important meetings where we can exchange information with scientists from around the world.

We have set our goal at the \$200,000 level for the year 2000. With your help, we will quickly reach this important milestone. If you agree that we need to build the Alcor membership, for greater strength and safety, now is the time to give a contribution that will truly make a difference.

Donations of more than \$1,000 will receive honorable mention in the pages of this publication. We ask you to help support what the Miller family has started by adding your own contribution.

If you need tax deductions for the year 2000, this is the time to take such a deduction and make a major contribution toward your own long-term survival at the same time!

eryonics is a quarterly publication of the Alcor Life Extension Foundation

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Submissions may be sent via e-mail (fred@alcor.org or linda@alcor.org or llock@winterthur.org) in ASCII, Word, or PageMaker format. Mailed submissions should include a PC diskette with the file in any previously mentioned format (although printed text alone will be considered). All submitted media become property of the Alcor Life Extension Foundation unless accompanied by a self-addressed stamped envelope. The Alcor Life Extension Foundation assumes no responsibility for unsolicited manuscripts, photographs, or art. Send all correspondence and submissions to:

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7895 E. Acoma Dr., Suite 110
Scottsdale, AZ 85260

about the cover

CGI art by Tim Hubble

About That Special BioTransport Announcement dated 26 July 2000!...

(which was sent to all Alcor Members and subscribers of Cryonics)

by Fred Chamberlain

An announcement you recently received said, "BioTransport is Developing an Extraordinary New Program for Viable Cell Cryogenic Storage." The flyer also indicated that the service would be made available exclusively to fully signed-up Alcor Members at a substantial discount, prior to advertising to the public. It said that more information regarding pricing and procedures would be available to Alcor Members by early September. So, it's early September!

What's this all about?

Just in case you missed it, here are the essentials. The cells stored (human or animal) will be fully viable, able to grow in culture (make copies of themselves) both before and after cryogenic storage. This means that they should be suitable for therapeutic cloning in humans (growing organs), reproductive cloning of pets, diagnostic purposes such as genetic analysis, gene therapy applications, and reanimation tissue engineering.

What about reproductive cloning? Will the cells stored be

suitable for this? Yes, they should be fully suitable. Use for this purpose will be promoted to the public, for pets. Legal prohibitions, ethical questions, and technical concerns may delay cloning in humans, but pets appear to be a perfect proving ground. Many of the technical concerns with human cloning may in fact be resolved by widespread pet cloning. As pet cloning becomes commonplace, the idea of human reproductive cloning should become more widely accepted also. This will be an evolutionary process.

The announcement said soon (after availability to Alcor Members) BioTransport would "open its doors" to the public. Service fees and quality levels are expected to

be highly competitive. What's available right now? Companies providing this service are as yet still tiny and appear to rely on collection techniques that may not preserve true viability.

Prices available now through other firms are \$300 to \$500 or more, for limited periods of time. Negotiations with Alcor may provide for reciprocal "backups," with the samples at Alcor having no time limits whatever, and no additional charges either.

Alcor will get excellent visibility. In addition to being acknowledged as a "time without limits" backup, Alcor can offer its members highly discounted prices, since BioTransport can contract to serve Alcor Members at "cost." The

service could even be a "fringe benefit" of BioTransport's cryotransport service role for Alcor. BioTransport can also engage in public service related programs funded by donations to Alcor, with Alcor as the primary storage site and BioTransport providing the backup storage. Along with this would go wide-



Left to right: Fred Chamberlain; Linda Chamberlain; Terry Grossman, M.D.; Dale Howell; Karla Steen; and Ron Wise.

spread public recognition of BioTransport's role in the cryotransport rescue of Alcor Members. All of these factors should accelerate Alcor's membership growth.

As the announcement said, if you had been contemplating the storage of your cells for any of these purposes, you might wish to wait a short while longer, to see what BioTransport is about to offer. The higher reliability and quality BioTransport will provide, at very substantial discounts for Alcor Members, may more than make up for the short delay in your being able to take advantage of the service. With that in mind, your next question may be "So how far along are we toward this goal?"

BioTransport's team includes Terry Grossman, M.D., as Supervising Physician. Dale Howell, a cell biologist, is now working full time at Alcor (for BioTransport), setting up a cell culture and preservation laboratory and conducting market surveys and analyses. An Alcor Member with a Ph.D. in cell biology presently serves as our Science Advisor-Consultant and may later be named as "Chief Scientist" for the company; his name is withheld pending that announcement. Ron Wise, VP for Corporate Communications and Marketing for a major

medical services firm, guides the development of our PR and marketing plans. Karla Steen, Alcor's Legal Assistant, is in charge of contract formulation and legal risk assessment as well as our future offerings of shares to investors. Linda Chamberlain, Alcor's Executive Director and (also) a Director of BioTransport, will guide the development of our administrative systems for close control of cell samples and will implement most of the early marketing activity. My job is to make sure that nobody gets in their way.

Equipment is being ordered and installed. Cell culture experimentation to trade off collection approaches began even before the lab at Alcor was set up, at other locations. Marketing strategies are coming into sharp focus. The question on your minds, of course, is "How soon are we going to begin offering services to Alcor Members?"

The answer to that question may be in your hands already. This article, of necessity, had to be written for publication earlier, weeks earlier. Check the separate BioTransport mailer for details. Still more information will follow as the program develops.

This is a brief synopsis of what BioTransport will be doing to gain

strength and improve the public visibility of Alcor. Thanks to all of you who invested in BioTransport and donated to Alcor. Many of you, as Life Members, paid dues on an accelerated basis, which directly enabled Alcor to support the launch of BioTransport. All of you Alcor Members deserve the best services that BioTransport can provide, at the lowest prices possible, and you're going to get them. 1



In the last issue, Vol. 21:2, on page 27, is printed the statement that all Alcor members must have changed their life insurance policies to name Alcor as owner and beneficiary by January 1, 2001.

Actually, Alcor requires that you make this change and send an updated "schedule" of your policy to Alcor by

January 1, 2002.

We apologize for any confusion this may have caused.

letters to the Editors

Letters to the editors are most welcome on all topics, including counterpoint on previously published materials and suggestions as to future content. We especially invite questions about cryotransport (cryonics) that are original and far-reaching.

If you are seeking information

about Alcor, please consult our web site, at www.alcor.org. If you have questions about developmental programs within Alcor, you may stir us into talking about them even sooner than we might have otherwise.

If your letter is lengthy and involved, we may use it as a sepa-

rate article and may ask you to expand it. We need your ideas, your personal visions. This is the place to start.

Please send letters and/or articles to:

fred@alcor.org,
linda@alcor.org, or
llock@winterthur.org.

The Baby Boomers' Guide to Living Forever

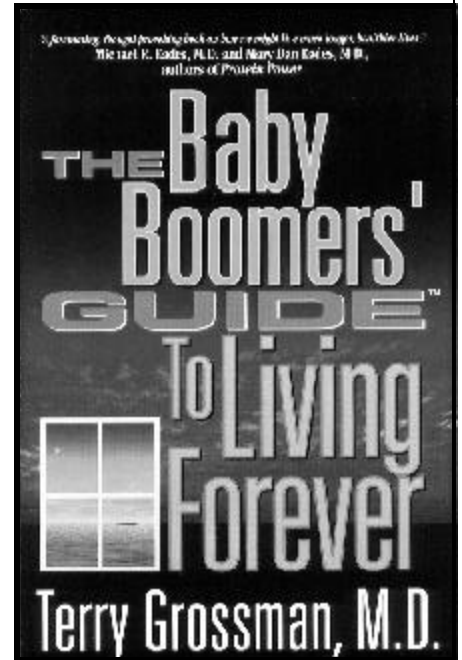
The Promise and the Future Impact of Trying to Live Forever

by Terry Grossman, M.D.

This book presents the thesis that radical extensions of human life span are only a few decades away. The problem is many baby boomers may not live long enough to avail themselves of these breakthrough technologies—but they will be close! This book offers a way to live a healthier life now, so that anyone can maximize his or her chances of being alive when this new wave of life extension and rejuvenation really begins to take hold.

“A must read for anyone who wants to live to see (and enjoy!) the remarkable century ahead. Grossman has brilliantly synthesized an immense array of insight and scientific knowledge.... This beautifully written book provides a very walkable bridge to vastly enhanced longevity and fulfillment.” **Ray Kurzweil**, author of *The Age of Spiritual Machines*

“I’ve long known Terry Grossman as a gifted lecturer and teacher of doctors...this marvelous new book makes his wealth of innovative medical knowledge clearly accessible to the public...a must for ‘boomers’ aspiring to maximal health and longevity.” **Ronald L. Hoffman, M.D.**, author of *Intelligent Medicine: A Guide to Optimizing Health and Preventing Illness for the Baby Boomer Generation*



About the Author:

Terry Grossman, M.D., is the founder and medical director of Frontier Medical Institute. Prior to moving to the Denver metro area, he spent 15 years as a community family doctor in the Colorado mountains, during which he delivered almost 1,000 babies. Dr. Grossman is a licensed homeopathic medical doctor and devotes most of his professional time to running a busy nutritional medicine practice. Dr. Grossman has written numerous articles for health-related magazines and lectures frequently on topics related to alternative medicine.

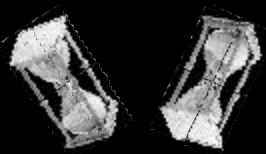
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You Only Go Around Twice

by Jerry B. Lemler, M.D.

“Are you the two newest Alcor members?” my wife and I were recently asked at Asilomar, as we unabashedly flaunted our barely 10-day-old shiny stainless steel bracelets for all to admire.

“I would think so,” I instinctively replied, “though I rather hope not.”

“So, how did you get interested in cryonics?” ensued the inevitable follow-up query.

“Let me give you the *Reader’s Digest* version,” I countered, not wishing to drive my new acquaintance into R.E.M. spindles on the spot. “I was browsing in the science section of Barnes and Noble a few months ago, and I picked up a copy of Eric Drexler’s *Engines of Creation*. Two days later, I had finished the book, and I felt distinctly privileged to have an entire new universe open up before my eyes.

“I tried to call Alcor using the phone number Drexler listed in *Engines*, but since the book was published back in ’86, they had moved. I finally was able to track them down over the Internet, and here I am!” brandishing my right wrist while shaking the flap-pable bracelet in tambourine fashion.

* * *

I am positively delighted to offer my thoughts, feelings, and general musings on a quarterly basis in a standard column form, here in *Cryonics*. I would be remiss if I didn’t thank our new editor, Lisa Lock, along with two new (yet not-so-very old) friends,

Linda and Fred Chamberlain, for suggesting I do so. Thusly, “You Only Go Around Twice” has its inception with this issue.

Now then, since you are obviously free at your own discretion to turn the page, casting me aside without any discernable adverse recriminations, permit me to embellish just a bit, as to how I was so dendritically receptive to Drexler’s stunning propositions.

I was sitting on a damp, soiled blanket between my wife and 15-year-old son, and wedged amongst what later would be estimated as 299,997 others when the light went on. And, it wasn’t good. Just the night before, I’d gotten a restless 4 hours sleep in a makeshift, self-assembled pup tent, after being forcibly tossed against a mesh wire fence, and herded like a sheep onto an overcrowded creaky school bus, for a none-too-comfortable 90-minute ride, all for the “privilege” of being stuffed into a massive, crowded field.

I sensed a growing desire to urinate, but after all I’d gone through to secure a prime location for our blanket, I dared not risk losing my position at the mere expense of a potentially disobedient bladder. It would have to wait. I was noticeably perspiring in the copiously muggy early afternoon air of mid August, while my mouth was ablaze with the aroma of several halitotic ingredients.

Joe Cocker, aged almost beyond recognition from 25 years before, was

about to complete another animated performance, while the much-anticipated Shannon Hoon and Blind Melon waited in the wings.

“See you at Woodstock III in 2019!” Joe pronounced with a farewell wave, as he exited the colossal Saugerties stage.

It was at that precise moment, assimilating the premonitory words of “Cocker the Rocker” that I was blindsided into acknowledging my own inevitable mortality; or so I imagined back in August of ’94. Turning 30, and coming to grips with the end of boundless youth some 14 years previously, had only been the opening jab. In response, I’d rearranged my early middle years and, accordingly, managed to weather the storm’s leading squall. Now, though, after nearly a decade and a half of quiescence, came the penetrating impact of a solid right hook to the chin, triggered by an unlikely pugilistic prophet, dressed not in a coat of many colors but in the form of an aging rock star.

I flunked algebra twice in high school, but being married to a former math teacher for nearly a quarter century enabled me to compensatingly calculate with alacrity that I’d be 69 years old should Joe’s vision be accurate. I surmised he and I both would require more than just “a little help from our friends” to make it so.

Shannon Hoon performed with typical reckless abandon, and then tragically died of an accidental drug

overdose a scant year later. After the soaking rain and the good-natured frolicking of the mud people, Crosby, Stills, and Nash graced the Woodstock stage for the second time in 25 years and, as customary, highlighted the festival. Try as I did, though, I couldn't make myself recall ever having been "here before." Then, David Crosby nearly died shortly after Woodstock, his life thankfully prolonged by receipt of a transplanted liver.

"Weren't we all teetering on the brink?" I asked myself, not wishing to upset my son, Russell, who at age 15, I judged, would be upset by participating in such a morbid father and son dialogue. In fact, perhaps the pervasive impact of the Woodstock moment was inescapably augmented on account of my parentally imposed limited acquaintance with the grave. In my youth I had largely been sequestered from the sting of death; arguably to excess. When I was a lad of 12, I returned home from a sleep-away summer camp when I noticed a different bird was occupying my pet parakeet's perch. I literally had spent hours upon hours with Cookie, vainly trying to teach him to talk, as we both mindlessly (and silently) listened to the annoying lady's instructions emanating from the portable record player, coercing the bird without success to say, "Hello." In any event, when I inquired of my parents what had happened to Cookie, I was reluctantly informed he had died while I was away.

"I spent a whole morning at the pet store," my mother complained, "watching all those birds flying around, trying to find one that looked just like Cookie. I didn't think you'd notice the difference. Oh," she added, "I made a pot roast for your first supper back at home." So much for the encouragement of grieving, and I never attempted to cajole Cookie II into discourse.

The very next summer my favorite grandfather died, secondary to multiple metastases, prolifically seeded from a cancerous prostate. I went off to camp having been told he was merely

"not feeling well." When I returned, fully three weeks after his burial in a Long Island cemetery, I was nonchalantly given the essential veneer of information. My parents never asked how I felt about the loss, though thankfully they hadn't tried to deceive me a second time by procuring a replacement "Grandpa Harry."

Even if we don't purposefully whitewash the issue, like my misguided parents, we humans have a way, as perhaps most vividly demonstrated in our commonality of language, of sanitizing ourselves from the gripping reality of the termination of our earthly existence. Let's take a casual glance at the many euphemistic synonyms for "dead" we consistently construct. It's a virtual struggle to say to another person that someone they know well is actually "dead." Instead, what we usually hear is how they are: "no longer with us," "resting in peace," "in heaven," "gone to their eternal reward," "with Jesus," "gone," "passed away," "met his/her demise," "the late," "in a better place," or "come home." We physicians offer little more comfort in this quagmire, as we're prone to saying the patient is "deceased," or "expired."

In my time, I too have distanced myself from the word "dead," to the point where I truly wonder if dancing around such a periphery has been of useful validity—for any of us. It certainly had been counterproductive for me, and promised to remain so, when fortuitously the daring world of cryonics came along and put a dead certain end to it!

* * *

This writer's pen is going to see plenty of action in the coming months. Perhaps the most significant long-range project is already under way as this column is being written. *Reaching for Tomorrow* has served Alcor faithfully as its introductory manual to cryonics. Nonetheless, it is understandably somewhat outdated, especially in consideration of the interest and progress in nanotechnology and related disciplines over the last seven years. The new in-

troductory text is tentatively titled "Immortality for Beginners," and builds upon *Reaching for Tomorrow* with state-of-the-art updates and the inclusion of a newly scripted "De-Animation Ceremony." Further details will be forthcoming in this column, and the projected completion date is December of this year.

On the subject of books, I'd like to recommend *The Baby Boomers' Guide to Living Forever* by Dr. Terry Grossman. As a fellow physician, I read Dr. Grossman's new publication with an eye focused on detail. He makes a most compelling case for cryonics and offers an in-depth rationale with concomitant strategies for staying alive as long as possible, in a decidedly easy-to-read format.

At the Asilomar conference, I glanced through a copy of Mike Perry's monumental work *Forever for All*, which is due for imminent release. I have also read excerpts from this text, as published in the latest two issues of *The Venturist*. It's on the high-brow side, and you assuredly need to be smarter than the average bear to meaningfully comprehend it. If you qualify, though, I anticipate it being a "must read," and I am most eager to get my hands on a first edition. I wouldn't wait for the movie on this one.

* * *

Succinctly put, Asilomar was especially invigorating and, on balance, worth the 15 hours of travel time and missed connections we endured (that's one way, courtesy of TWA), in addition to the loss of luggage on the return. We met so many fascinating people, made some new and refreshing friends, and it was a genuine privilege to converse with the likes of Eric Drexler, Ralph Merkle, Linda and Fred Chamberlain, Robert Newport, Lisa Lock, Dave Pizer, and Steve Bridge.

I dare say by now you've probably heard enough from me. I know I have. So, I'll be seeing you, sooner and later! 1



The Place of Proselytization in the Cryonics Movement

by Michael R. Seidl

My office overlooks Rodney Square in Wilmington, Delaware. Several times a year, religious fundamentalists congregate on the square, setting up a podium and loudspeakers. They take turns testifying to their faith, and in between the testifying they play Christian rock music to pull in the younger crowd. What is probably not very loud at ground level apparently bounces off the buildings in just the wrong way so as to make them sound like they are broadcasting from my windowsill. I hate this. I am not simply annoyed by the fact that they interrupt my work—I resent people who are in-your-face about their beliefs, who think that they have the truth-market cornered, who touch religious symbols they wear around their necks when they want to express their sincerity. The people I associate with mostly seem to feel the same way; we all agree that people ought to be allowed to believe pretty much what they want as long as they are not acting out their beliefs in a way that is destructive to others or forcing those beliefs on others. But we do not want to hear about it. For whatever reason, testifying, preaching one's beliefs, seems to me to be illiberal, un-American.

So imagine my discomfort at being an Alcor member. I think that I have information regarding a profound truth—bodily “death” does not have to mean final death. Nevertheless, because of my liberal beliefs, I find it exceedingly difficult to muster the proselytizing spirit sufficiently to proselytize on behalf of cryotransport. I am torn between my liberal ideology of non-proselytization and the terrifying facts that (a) all around me people are dying their final death while I sit silent fearing to offend and (b) the movement that might help to save me remains nascent and sputtering for lack of broad interest.

Make no mistake—pushing cryotransport is pushing “beliefs,” and it does offend, in exactly the same way the people preaching in the square offend. I know of no polite way to reconcile my beliefs about cryotransport with the beliefs of others, just as there is no polite way to reconcile a belief in medical treatment with the belief of a Jehovah's Witness that such treatment should be refused. Either we try to compel others to take up the principles associated with cryotransport or we sit silent and watch them die, just as we either try to compel a Jehovah's Witness to

seek treatment or watch him or her die. There is no middle ground (there is, of course, a more extreme ground—the compelling force of the State, but that is subject for another discussion).

Having sneered so long at proselytization, I am slowly, by almost imperceptible increments, coming to the conclusion that I can no longer sit silent. As distasteful as I find it, I will, at last, have to begin “preaching” cryotransport. I think all members of the cryonics movement will have to as well, regardless of the moral/ethical system each of you inhabits, for one of two reasons:

First, you may wish to proselytize because you find it morally uncomfortable to sit silent when you know of an alternative “treatment” to recommend, just as you might recommend chemo/radiation to a friend treating his cancer with herbal teas. Personally, I do not believe I have an obligation to tell anyone anything; although I may choose to share cryotransport information with some people, it is not incumbent upon me to enlighten the world. But that's just me.

Second, you may wish to proselytize because of self-interest—

there are tremendous economies of scale that we can all profit from if cryotransport becomes more widespread. I do not mean merely in cryostasis and long-term storage; I mean in hundreds of ways we cannot begin yet to imagine. For instance, right now, when I get on an airplane, I risk my successful cryopreservation—if the plane crashes and burns or crashes over water, there is unlikely to be anything of my head to freeze. But planes are not designed with cryostasis in mind today; at some point, their designers concluded, “well, everyone on board will die when the plane slams into the ground at 500 miles an hour regardless of what we do, so let’s direct our attention elsewhere.” A generation of aeronautical engineers aware of the possibility of cryotransport might think differently, designing a fuselage to survive impact and extinguish fires, knowing that everyone inside is dead from the force of the impact but wishing to preserve the fuselage intact to protect the bodies within for cryopreservation. One day, all airplanes may have super-strong fuselages, passenger restraint systems to keep us from flying around on impact, and under-the-seat crash helmets for cranial preservation. But we will not see these benefits—or others that we cannot imagine—with only a few hundred active cryonicists.

So I conclude that, for my own benefit and perhaps for the benefits of others, I have to preach cryotransport. Going about this will be hard, and the purpose of this foray is to seek ideas for successful proselytization. Here are several initial observations:

As I see it, three significant beliefs deploy in cryotransport: (1) cryostasis works—it freezes people; (2) given sufficient time, our technology will develop to the point where restoration of previously frozen people will be technologically and economically possible; and (3) if I am properly cryotransported, I have a good chance of coming back from the “dead” personally, and I want to come back.

Selling point (1) requires only that people change their mortuary practices; some people want to be buried, some want to be burned, some want to be shot into space, and some want to be frozen. We should approach the funeral home industry and the public health industry with cryonics as an alternative to interment or immolation. We need to get the cost of cryotransport to the point where it is, at least, less than interment even if more than immolation, and it needs to be put forth with the same everyday approach. Just as the funeral home industry now helps to market burial plots and insurance to cover funeral costs, we need to push an active plan of cryotransport as an alternative to traditional disposal.

Selling point (2) requires a systematic education of people in the basics of a scientific world-view (i.e., technology works, it solves problems, it develops along a predictable continuum, and saying it “will” be able to restore people is a semantically and scientifically more reliable statement than horse x “will” win the Triple Crown or Jesus “will” return). We need a program of public lectures to private and governmental groups at all levels, from the Rotary Club to the Senate. We need to prepare set lectures with audiovisual support

that we can make available to our members, to offer lists of standard organizations that might be interested with contact people, and to provide minimal training to lecturers. We need people to write editorials to their newspapers and to magazines they read. We need to make the views associated with cryotransport as ubiquitous in everyday life as the proponents of the various religions have made their beliefs.

Selling point (3) is the hardest because it requires (a) people to take a gamble (I’ll be properly frozen, will not die in a crash over water or from a degenerative brain disease that liquefies my cortex) and (b) people to take a leap of faith in themselves and the world. However, I suggest that the successful traversing of points (1) and (2) will add a significant number of people to the cryonics movement. Point (3) is and will continue to be somewhat intractable, and some people, for whatever reason, will still balk at that last step. I propose that, for the moment, we put aside (3) and focus on (1) and (2)—surely there is a vast mass of middle-of-the-road people out there waiting for conversion, waiting for the freezers of men and women to take the place of the fishers of men.

The Gideons put a New Testament in every hotel in America. Let us put a cryotransport brochure in every mailbox, an editorial in every paper, a lecturer before every group willing to hear us. Let us take our Alcor medallions out from under our shirts, or, better yet, find a new symbol, one that transcends particular cryotransport groups and that stands for the idea itself, and wear it proudly, and be ready, when someone asks, “what’s that,” to testify about life eternal.

Why Fund Your Suspension with Life Insurance?

by Rudi Hoffman
Certified Financial Planner



"I expect to have the money to fund my suspension in cash eventually. Mr. Hoffman, why should I take out a life insurance policy to fund my suspension?"

This question in some form comes up often in discussions with people with an interest in cryopreservation. The good news is that there are answers that are mathematically valid (i.e., not merely opinions) and that make sense to most people.

The purpose of this article is to answer this question in a clear, concise, understandable manner. Additionally, we will see that there is an empirical way of determining the optimum funding that will appeal to most rationally minded cryonicists.

Let's personalize this with a discussion of a hypothetical individual "Jack," who is a 45-year-old software developer.

Okay, Jack, so you want to be cryogenically frozen with the possibility of future reanimation. You have thought about it for some time, but you are of a skeptical and questioning nature, and you have a constituency in the form of a wife and family who are not at all sure if you have not gone off the deep end and do not share your enthusiasm for the possibilities of technology.

You want to create \$120,000 for a full-body suspension with Alcor. You are excited because your mutual funds have been growing well, your career is taking off, and you expect to be seriously wealthy in the future. You want to do the best thing to assure your funding. You have negotiated with

your wife, and you and she have decided that you can spend \$1,000 per year toward cryonics funding.

Here is the key question. Is it better for Jack to spend his \$80 per month in a mutual fund, or a life insurance policy, to fund his suspension?

Here are the facts. Jack, a healthy nonsmoker, can create an *instant* \$120,000 to fund his suspension in a permanent Universal Life policy. Once he pays 80 bucks and qualifies, there is an *immediate* and *sure* payment to his cryonics organization to assure his suspension. The money does not go to the cryonics organization at the expense of the survivors. This \$120,000 does not have to come out of the estate Jack is leaving for his wife, Mary, and the children. Nor do they have the opportunity of second-guessing Jack's choice and delaying or litigating Jack's wishes.

On the other hand, let's say Jack puts his \$80 per month into a mutual fund. Even if he averages a great return, it will take decades to generate the required \$120,000.* What happens if Jack is struck by a truck on the way to work tomorrow? There is no full funding, and Jack will not be suspended.

What if Jack lives long enough to have adequate funding in his account? When Jack "dies," there is \$120,000 that Jack has earmarked for his suspension. But this \$120,000 is a much clearer target for any of Jack's potential heirs to contest.

Jack's kids all turned out great. Except for the youngest, Leroy, who felt the world owed him a living. Jack had

left each of his children \$200,000 in his will. But Leroy wanted at least part of the \$120,000 Jack had earmarked for suspension! Do you think Leroy could find an attorney who would take this case? Could the money be tied up in a legal battle? Do will and estate contests occur over far less controversial issues than funding cryostasis? Absolutely! And these funding controversies *shave* and *will continue* to occur.

There are other issues. If Jack is not insurable due to health reasons, he will not be able to obtain life insurance to fund his suspension, and he would be forced to fund his suspension from his estate.

Most people become uninsurable at some point in their lives. It therefore makes sense to find out how affordable it can be to fund your suspension with the incredible financial leverage that only life insurance provides. In the case of cryonicists, the policy can truly become *life* insurance—not *death* insurance.

Cryonicists tend to be life extensionists who take great care of themselves and thereby can usually qualify for the best possible insurance rates. (I spend a good deal of time explaining this information to insurance companies!)

In conclusion, for most people it makes sense to use life insurance to fund the exciting possibilities of cryonic suspension. 1

* \$80 per month = \$960 per year
\$960 annual payment
12 % after tax compound yield
25 years to grow to \$128,001
(22 years at 15% after tax yield)

*A non-profit,
tax-exempt 501(c)(3)
California Corporation*

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The Preservation
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Alcor Update



BioTransport Purchases CryoStar Freezer

In late July 2000, Alcor's Patient Care Bay received a new piece of equipment purchased by BioTransport, Inc. The freezer shown could accommodate up to 12 (more likely only 6) neuropatients in a vitrified state at between -130°C and -140°C . At this temperature, the patient's brain would be expected to be in a "glasslike" state rather than containing a very large number of tiny ice crystals, which present-day thinking suggests could only be restored to normal function by nanotechnology.

BioTransport has also purchased all of the constituents for improved base perfusates and very advanced cryoprotectants, paying an additional \$10,000 license fee for use of these formulations. Both varieties of "freeze blocker" from Twenty First Century Medicine, Inc. (21CM) have also been purchased, as needed with this approach to combat crystallization. Immersion fluids for very rapid cooldown have been procured, as advised by 21CM, and Alcor's cooldown apparatus is being modified (at BioTransport's expense) for this procedure.

In a recent Alcor suspension, surgery was pioneered for making use of this "vitrification" approach with neuros. One Alcor Member has consented to have this procedure applied in the event of need, instead of the more standard approaches. Interestingly, the member is signed up for a "whole body" procedure, but this



approach can only be applied at the "neuro" level presently. In order to make use of this procedure, the member has conditionally consented to the switch of options, in the interests of better brain protection.

Alcor is still studying how to price this advanced neuro option, termed "neuro-plus" by some of those who are developing the procedure. The option may require a level of funding comparable to "whole body." Also, the CryoStar freezer is only the first step along the road of studying how to eventually provide neuro-plus storage at costs that are equivalent to those for today's neuro option. If that can be achieved, then it is possible that the vitrification option may be opened for existing members with neuro arrangements, without a need for increased funding.

ALCOR'S MEMBERSHIP GROWTH

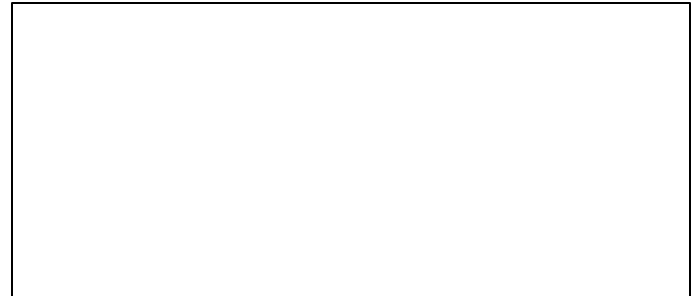


by **Mathew Sullivan**
Facility Operations Manager

I've noticed in recent conversations and through various media that most people are a little confused about membership growth and growth rates. 1) Having a high growth rate is relatively easy when you don't have many members to begin with. 2) The definition of "membership" can vary widely, making cursory comparisons difficult. Some organizations include in this definition such categories as those already in cryostasis, associate members, subscribers to ancillary services, etc. Alcor is much more restrictive in defining members, including only those who have full cryotransport arrangements.



To illustrate point 1), the best way to look at Alcor's long-term growth is to imagine an empty swimming pool that is being filled with a hose. Initially, the percentage of filling (growth) is very high. Liquid levels double in a matter of seconds, but then doubling quickly stretches out from seconds to hours.



Looking at the details, 1985 was a banner year in Alcor's membership with a growth rate of 61.4%, a net increase of 27 new members, which was largely due to the absorption of the Cryonics Society of South Florida. But if we were to add 27 new members to Alcor's current membership of 504 (as of July), that would be equal to a growth of 5.3%. Alcor's growth rate in 1999 was 8.2%.

1991 was also an important year with a net increase of 90 members, which was an increase of 45% (larger actual number than in 1985, but a smaller percentage of the total). Many have argued, however, that high growth in the late 80s and through the early 90s was a combination of the publicity from the Dora Kent crisis and that Alcor raised its suspension minimums. The increase in suspension minimums helped to create a burst of new members who wanted to be grandfathered into the previous pricing structure.



Between the early and mid 90s there was a dramatic drop in our growth rate, culminating in 1994 with a net loss of 14 members. Many believe this was primarily due to the split that led to the formation of CryoCare, in the same year that Alcor moved to Arizona.

Others have countered this argument and stated the decline in growth was due to the increase of suspension minimums and that our current pricing structure is too high. If this were the case, that price is more important than quality, our largest competitor would have a membership base in the thousands. You would not expect to see Alcor's membership base larger than all the other organizations combined. If Alcor and/or the entire industry were making money hand over fist, you would expect to see new venture capitalists entering the market in an effort to capture a share of the profit. This certainly is not the case.

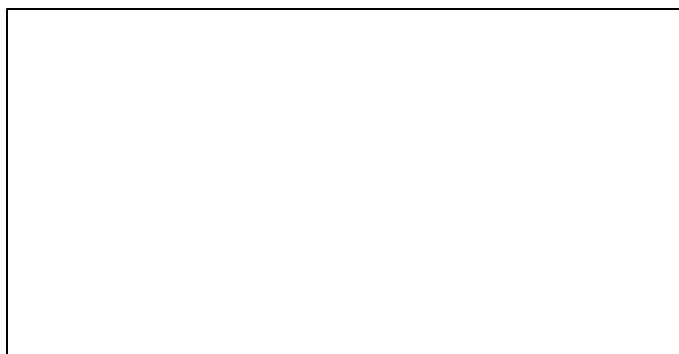
By March 1995, according to Joe Hovey's notes (Alcor's bookkeeper), Alcor had a total of 89 ex-members since about 1990. 52 members had switched to CryoCare, 17 were cancelled for non-payment of dues, and 20 were lost for miscellaneous or unknown reasons.

Alcor's average growth rate per year since the split has been 6.3%, or a net growth of 25.6 new members per year. Not nearly as high as we would like, but we are steadily growing.

With the recent influx of ex-CryoCare members, you might expect to see a spike in membership growth. In fact, net growth in the first half of 2000 has dropped slightly due to the fact that Alcor's staff have performed an exhaustive overhaul of the membership files and have found a number of members whose financial arrangements were inadequate. Many of these situations are being resolved, but a number of others have resulted in cancellation of membership.

Although secure funding is important for Alcor's long-term viability (see article by Linda Chamberlain in the 2nd quarter *Cryonics*) it is always a serious matter to see a membership cancelled, and it does have a long-term effect on the growth rate.

The graph below is useful to the extent of predicting possible growth trends, but it certainly does not guarantee them. When an individual starts the sign-up process, it does not necessarily mean he or she will become a member.



The value of the above graph increases by cross-referencing when the applicant started the sign-up process (see next column). If most applicants had been in the sign-up process for many years, one might consider conducting a review to find out if there was a problem.



As you can see, most of those who are in the sign-up process have been there no more than a few years. The remainder have been in the sign-up process for 8 or more years—a result of an old policy that allowed individuals to begin the sign-up process with a one-time payment. This was later changed for obvious reasons.

More recently, our membership has surged upward to 504 members, an increase of 21 members in two months, or a net increase (minus losses due to non-payment of dues, funding inadequacies, etc.) of 16 for this year so far. In spite of more productive follow-up and an improved marketing approach since 1998, this was a surprise in light of all the cleanup of funding inadequacies that resulted in lost memberships. We had expected overall membership growth to be largely stagnant for the year as a tradeoff, to strengthen Alcor's long-term stability.

So, if you hear someone preaching that the sky is falling, that our movement is dying, ignore them because the evidence clearly states otherwise. 1

Alcor Membership Status

Alcor has 504 Suspension Members (including 109 Life Members), and 39 patients in suspension. These numbers are broken down by country below.

Country	Membership Status		
	Members	Applicants	Subscribers
Argentina	0	0	1
Australia	12	3	6
Austria	1	0	2
Brazil	1	0	0
Canada	12	3	11
France	0	0	1
Germany	3	1	2
Ireland	0	0	1
Italy	0	2	2
Japan	2	0	2
Netherlands	2	3	1
Russia	0	0	4
South Africa	0	0	1
Sri Lanka	0	0	1
Switzerland	0	0	2
Taiwan	0	0	1
U.K.	26	6	8
U.S.A.	445	72	226
TOTALS	504	90	273

No. of Countries: 18

Asilomar Conference

by Fred Chamberlain
President/CEO, Alcor



“I think on a technical front, we really need to gain acceptance for two ideas: one, that there is very little damage, or that we can preserve physical structure with very little damage, and second, that we can restore damaged structure, that we can in fact restore extensive structure.”



Strongly emphasizing the implications of nanotechnology for cryotransport with words like this, Ralph Merkle introduced Eric Drexler as the Keynote Speaker at Alcor’s Fourth Conference on Life Extension Technologies at Asilomar, California, on June 17th, 2000.

About two hundred persons, many of them scientists and physicians and about half of them Alcor Members, had gathered at scenic conference grounds by the Pacific Ocean, just north of the Pebble

Beach golf course in Northern California. The next two days were filled with presentations and informal discussions on extending life spans, with no thought of simply giving in to near-term mortality.

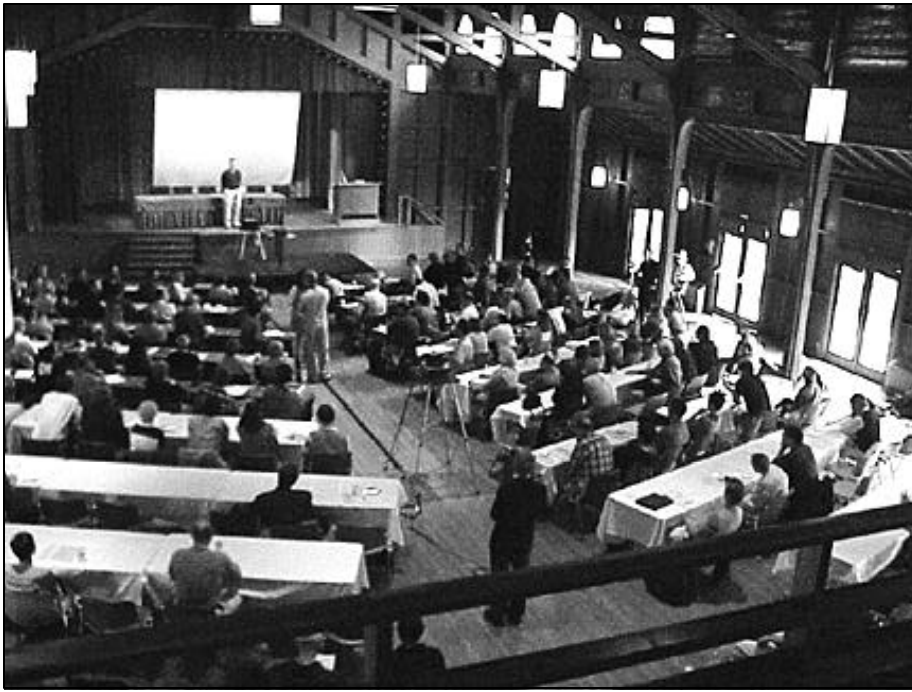
Modern and restored rustic lodges were sprinkled along a hillside of tall pines, interspersed with conference halls of all sizes. An extensive dining hall filled with large circular tables permitted the attendees to share meals with one another on a convenient basis, no ordering or waiting. Theoretically,

Asilomar can handle conferences of up to 1,000 persons, but the Alcor Conference attendees accounted for about half of the tables at each meal. We were clearly the largest event in progress, at the same conference center that hosted the historic debates on control of genetic engineering in the early 1970s.

In each of the lodges, gathering areas with couches and other seating, along with pianos, provided a way for special interest groups to explore ideas informally.



Left to right: James Swaze, Rob Frietas, and Ralph Merkle



Late Saturday afternoon, in a reserved area by paths to the beach, an outdoor meal (BarBQ) brought everyone together at picnic tables, for what has to be the largest such event so far attended almost exclusively by those who envision themselves as prospective star travelers, centuries hence. (Remember, this was no science fiction convention. It was a purposeful gathering by a very high-tech community in which the members are creating and using practical means for life extension.)

One event, among all the others, highlighted the conference. Just before the Saturday evening presentation and panel discussion, one of the attendees briefly lost consciousness and fell, striking his head. Inside the conference hall, as the news of this came to me, the first question (naturally) was “Does that person have an Alcor bracelet on his wrist?”

The answer was “Yes!” In the next few minutes, over a dozen certified Alcor rescue team members were gathered and coordi-

nated. In the Sunnyvale area, a few hours away, other Alcor rescue team members were alerted and preparations were made to deploy a set of transport equipment, if needed. The partner of the “downed” member was a certified team member herself, having been part of the group that performed a standby and cryotransport operation less than a year before. Even the downed member was trained and certified as a rescue team member. As the member and his partner were being loaded into the ambulance, an Alcor physician and I were already on our way to the hospital to set the stage for a standby if needed. It turned out that there was no need for that, and the member was fine, but it was reassuring to know that so many hands were there, ready to help if the situation had become critical.

The synopses of talks that follow are brief and cannot begin to capture the full content of the presentations, but they may give you at least a glimmer of the scope and quality of the speakers and their subjects. In time, vid-eotapes of selected talks will be made available, and these summaries may help you decide which you will want to obtain.



**K. Eric Drexler, Ph.D.,
Foresight Institute**



**“The Conservative Treatment of
Transient Inviability; or, Your
Computer Crashed—Shall I
Throw It Out?”**

Keynote Speaker Eric Drexler challenged anyone to offer proof that “freezing erases the brain.”

Many in the audience suggested mechanisms of freezing that might erase the brain, but none could offer evidence that in fact this does happen. The point that Eric set out to establish, and relentlessly argued, was that we cannot dispute the possibility that our “minds” are conserved by preserving our brains, though he admitted the uncertainty of recovery.

In leading up to his challenge, Eric contrasted the preservation of brains for future recovery by cryobiologists vs. molecular scientists. He observed that early attempts at manned flight were guided by ornithologists, prior to the emergence of aeronautical engineers, and that success in manned flight was only achieved when birds were abandoned as the best models. In like manner, Eric asserted, the recovery of persons preserved by present technologies will require technologies far beyond those entertained in our present thinking in terms of medications and the preservation of biological viability.

Arguments from the audience

asserted that the brain might be rendered irreparable by ischemia, freezing, and many other hypothesized mechanisms. Eric acknowledged that such damage was irreversible by present technologies, but he repeatedly returned to the question of whether or not, in any way that could be convincingly demonstrated, information essential to the reconstruction of the brain and restoration of memory and identity was “erased” by freezing.



The advice Eric gave, at the end of his talk and after considerable interaction with the audience, was that in order to reach the future, if one could not stay alive to do so with the help of current medical technology, one should at least stay “intact” (through cryostasis)!

**James Hughes, Ph.D.,
Trinity College, Hartford,
Conn. (also Webmaster for the
Medical Ethics Center, Dept. of
Medicine, Univ. of Chicago)**



**“Our Evolving Definitions of
Death: Looking Ahead”**

“Treating someone who is dead as if they were alive is almost as odd as treating someone alive as if they were dead! Given the gravity of these two potential errors, it’s a wonder that there isn’t more public debate about the lines we draw between life and death!”

James Hughes, Ph.D., a sociologist and bioethicist, thus introduced the difficulty of the blurred distinctions emerging in the context of cryostasis, and then moved into a number of principles that lie beneath our current civil behavior and related the life-death distinction to the increasingly controversial perceptions of levels of consciousness in animals, a central issue in animal rights activities. Dr. Hughes then turned the focus of his discussion to topics related to cryostasis, connecting this with various evolving definitions of the word “death.”

“Whole brain death” was an earlier standard, for example. It had many flaws, gray areas in which an unending controversy now exists. Dr. Hughes noted a protocol now in use leading to a “non heart-beating cadaver,” for permanently unconscious coma victims. This supposedly converts an ambiguous state of death (acknowledged irreversible coma) into a less ambiguous state of death (cessation of heartbeat) by the removal of the respirator and waiting two minutes beyond cardiac arrest. Then organs are harvested. Consent of the family is required. In effect, he said, “Who is kidding whom?” He pointed out that many of the leading pioneers in this field are fed up with interminable debating of nebulous issues like this.

Dr. Hughes stated that it should be of interest to cryonicists that organ transplant teams are per-

mitted to insert cannula and administer anticoagulants while the patient is still alive, prior to conversion of coma victims to “non heart-



beating cadavers,” even though these procedures have nothing to do with prolonging life. Proposals are now being made to eliminate the necessity of going through the ritual of removing the respirator before taking the organs. (It is important to remember that these protocols are considered ethical only with long-term coma patients, where even brain-stem functions may have been supplanted by ICU technologies for keeping patients’ bodies alive.)

In terms of fundamentals, Dr. Hughes said he thought many of these arguments would spread upward into distinctions of biofundamentalism vs. transhumanism. Then he suggested that cryostasis bring about an even further broadening of definitions. Will the degree of damage upon cryotransport lead to a number of levels of “death? What about the prospects for reanimation? Will a person be treated as “dead or alive” in terms of changing probabilities of eventual recovery? How does this intersect with assisted suicide?

The complexities can only grow. Dr. Hughes pointed out that at some level of loss of memory and identity, a line will have to be drawn between a repaired cryonaut and a virtual clone. How to do this?

Will there be subjective criteria? Continuity of consciousness will be sure to figure, he said, but how?

Finally Dr. Hughes examined where all of this was going. In a slide titled “Threats to Liberal Individualism,” he itemized the dilemmas to include (1) Consciousness Desaggregation; (2) Memory & Personality Malleability; (3) Identity Cloning; (4) Identity Sharing; (5) Distributed Identity; and (6) Group Identity. He also pointed out that at major bioethics conferences, many issues of emerging technologies are simply not addressed. He invited the attendees to get involved in these discussions at an early stage, so as to influence decisionmaking that could easily affect them.

Gregory Stock, Ph.D., UCLA School of Medicine



“Who’s Afraid of Freezer Burn?”

“Freeze the head, but donate the organs! If the head is not frozen, no organs!”

This was, in essence, one of the suggestions Greg Stock had for getting the cooperation and acceptance of the medical community. “If you let medicine do whatever it wants with the parts that are really not going to be any use to cryo-

nicists, or can be easily replaced, then suddenly you have the entire medical profession allied with you, and very strong interests because of the shortage of organs for organ donations.”

“Cryonics could be simply viewed as a donation to medical science, where you specify that you really don’t want to be part of the control group, but part of the experimental group” (following from Ralph Merkle’s description of what cryonics in essence is). “It would be extremely low cost, in fact I would think that hospitals might foot the bill for a large part of it.”

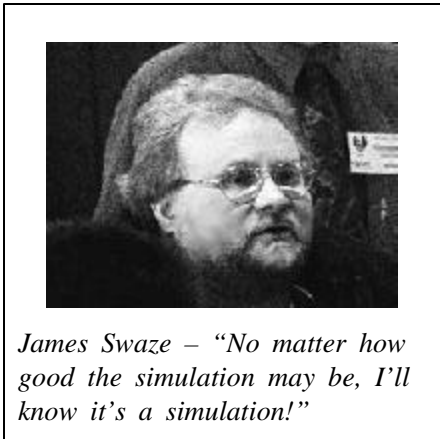
Dr. Stock’s basic approach is to bypass the step of organic reconstruction entirely and rely on “strong nanotechnology” to recover sufficient information to fully emulate the behavior of the brain before final loss of conscious, thus (from the standpoint of identity being a dynamic process) restoring the person concerned to consciousness and the experience of “life.”

Would it even be practical to achieve biological reconstruction, by comparison with the relative ease of uploading? This was a key question for Gregory Stock.

“Before you reach that point, the line between biology and technology has to be very blurred, if not having disappeared almost entirely; and in fact I think that pure biology is going to seem extraordinarily primitive and that there are all sorts of limitations to purely biological structures. And it’s not clear to me, from the vantage point of that changed environment, that one would even really want to be a biological creature. I think much of this would be the case for the possibility of uploading, and the technologies required for that, but it would definitely be the case for the requirement of biological recon

struction; and you know, there's a question of what the status of purely biological creatures, humans, would be relative to a far more advanced machine realm, if you postulate those kinds of developments."

The audience, while expressing various levels of skepticism and concerns that improved cryoprotection might answer the problem, seemed open to the idea that we have to be prepared for a future in which our current views of "human" will be progressively outdated. Accepting the possibility of uploading while the person concerned was still alive, questions arose as to "who is the real person?" Dr. Stock, in some interactions with the audience, found himself having to take the conservative position, probably a different situation than with most audiences to whom he speaks.



James Swaze – "No matter how good the simulation may be, I'll know it's a simulation!"

Conversely, some in the audience could not relate emulations of mental states to the identities of humans and questioned the validity of "simulations" as substitutes for biologically sentient entities. One of the speakers on cryobiology pointed out that approaches immediately on the horizon might permit recovery without the need for strong nanotechnology, and Dr. Stock's

response was, "If you can do that, of course, that changes the whole ball game!"

Robert T. Newport, M.D., BioTransport, Inc.



"The Fear of Death and Its Impact on the Rational Process"

"The age of immortality looms," began Dr. Newport. Then, he addressed the question of why most do not sign up for cryonics, or drop out. "The fear of death provides polluted data which interferes with our ability to be fully alive, and prevents our making rational decision about our own lives!" In compact form, this introduced a wide range of topics exploring motivations, rationality, and values affecting decisionmaking about life extension.

"Most of us, most of the time, believe that we know what we mean when we say I, myself, me. That is to say, most of us believe that we know who we are." By reference to the difficulties of this, including a summary of many personality models, Dr. Newport pointed out that confidence that we "know ourselves" is highly illusory. "Content of awareness" we can know. But the full extent of "what we are" will be far more difficult to define, if at all. Emotions, he

pointed out, are common to animals as well as (possibly) forms of plant life. They become part of our "self definition," and our "self definition" is a fiction of our own creation, interfering with our moment-to-moment perceptions that (with those distractions and limitations) are the only source of our self definition.

In extended discussion, Dr. Newport pursued the question of self perception and all of the things that might stand between reality and how we in fact perceive ourselves. There is no good way to summarize the content of this presentation, but there is one area in which quotes may be helpful—dealing with Dr. Newport's hypothesis that birth trauma is instrumental in our reluctance to pursue life extension. (The excerpt below is from Dr. Newport's talk. The text is available in its entirety at <http://www.alcor.org/Fear.htm>.)

"The vast majority of all of us, 95% by some estimates, are almost completely irrational when it comes to ourselves, and live within the confines of the synthetic ego, limited by our own self definitions, our own self story, attentive to mostly the sound of our own thoughts, and thereby disconnected from the incredible machine that is the body and from the fabulous computer that is our own brain. Unhappy, full of existential angst, low grade misery, anxiety, depression, missing out on the full joyous experience of being alive, unaware of the origin of our misery, but, most likely willing to talk about it and explain it all day long. Why?"

"Stanislav Grof, a Czechoslovakian psychoanalyst, working abroad in the 1960s, induced altered states of consciousness in a large number of psychiatric patients and found that the patients had

access to memories and symbolic experiences that had heretofore been entirely unconscious, many dating to the first few weeks of neonatal life and including long forgotten (or repressed) physical traumas. Very many, included intra-uterine experiences of a close encounter with death.



“These experiences Dr. Grof constellated and called Basic Perinatal Matrices and classified them into four stages. BPM I through IV, which corresponded to the four main categories of experiences of every human being’s early life. E.g. BPM I: Intra-uterine peace, support, and nurturance. BPM II: The beginning of the birth process when the earlier peace is rudely disturbed by uncomfortable contractions about the head along with a change in the chemical composition of maternally supplied blood due to the rapid hormonal shifts which bring about the labor, and emotional changes in the mother (who is understandably aroused). BPM III: The progressive agony of being squeezed into the birthing canal. Squeezed to the point of death, Squeezed, slowly crushed, to the very point of death. (Sounds like some medieval torture.) And BPM IV: The shot of adrenaline and the release from the vagina into a very novel and harsh light of day.

“In all cases, the experiences were remembered as traumatic and the arousal was experienced as terrifying. Known to all, now, simply as the Birth Trauma, in most cases this constitutes the first conscious content involving pain-and-adrenaline-prompted arousal, which in our later years we come to know as fear and rage. This is the first experience of the FEAR OF DEATH!”

This fear is extremely uncomfortable, Dr. Newport explains. When parents see this in the many forms it takes, they shut down our expressions of it through shame or humiliation, which just makes matters worse. What are the consequences? Quoting Dr. Newport:

“The chronic illnesses, hypertension, gastritis, ileitis, colitis, auto-immune disorders of all kinds, anxiety disorders, depression, (depression is diagnosable in 10 to 25% of the adult population at any one time), hormonal disorders, and cancer. Have I covered everybody in the country yet? Not quite, well let’s add ten million alcoholics and substance abusers.”

Methodically, and with a sense of compassion for those caught in these many traps, Dr. Newport continued to explore the underpinnings of resistance to the idea of “living on indefinitely.” He concluded with the following two paragraphs:

“People are moved to cryonics one of two ways: by the LOVE of life, or by the FEAR of death. I suspect, and I will shortly be conducting a study to either affirm or disabuse myself of this notion, that those who drop out once signed up were motivated by the fear of death (conscious or unconscious) and have finally gotten tired of living an unhappy, fear-driven life. Having had no hope in BPM

III, they cannot maintain hope in their own future.

“Many of you might say ‘I came to cryonics because it’s the only rational course of action, it has nothing to do with fear or love.’ To which I would respond, ‘Your thinking rational mind outlined the course, but it was your emotion that moved you. Joy has the potential to make it worth staying the course. Fear—conscious, subconscious or unconscious—does not. It will only kill you in the end.’”

**Glenna Burmer, M.D.,
Ph.D., LifeSpan
BioSciences, Inc.**



**“Identifying Aging Genes by
Using DNA Microarrays”**

Founder and Chief Scientific Officer of LifeSpan BioSciences, Dr. Burmer started by talking about “discovery”—in particular, the first inklings that microorganisms existed in the early days of the microscope. Now, the search is for genes that have to do with aging, and how to control them, to keep us young.

Of the 100,000 genes in the human genome, only about 10,000 have been classified as functional and the rest are as yet a mystery. Dr. Burmer pointed out that although she has “twenty top-notch bioinformaticians analyzing” genes,

they are barely scratching the surface.

Decoding the genome is what BioSciences is all about, Dr. Burmer said. This is true whether it's for big pharmaceutical companies as clients for near-term drug development, or for themselves, where aging is the arena of study. However, even though the genes are becoming accessible, they must be mapped into the body. To quote Dr. Burmer:

"The simple fact of the matter is that the human body has over 1,500 cell types; we have over 200 organs; the brain itself is probably 50 organs, minimally; and in addition to that, each cell of those cell types is expressing 20,000 to 50,000 different genes. So, decoding 100,000 genes into the blueprint of the human body is really the complexity of the task we have to work with.

"What do you do with numbers like 100,000? Well, the easiest thing to do is put them on some kind of chip. And so what we do is clone these genes, put them on a chip, and then we take pieces of diseased tissue, pieces of normal tissue, grind it up, make a probe out of it, and then look to see what genes are turned on or off in a disease. We thought this was the Holy Grail about three years ago, when we started down the path of DNA chip technology, and what I'm going to explain is that it's not the Holy Grail, it's "step one." And step two is decoding it.

"What we are doing is what we think is the next step, after DNA chip technology, which is really what we call molecular pathology. And that is actually identifying genes we think are up- or down-regulated in a disease process, we then take that and then go directly into human tissues, and I'll show

you how this is done. And then we map it. We map exactly what cell type has that gene turned on. We map whether or not that gene is turned on in disease, and whether it is not present in normal. You can identify cancer genes this way, rheumatoid arthritis genes this way, Alzheimer's genes this way. And I will talk about how this is done."

This should give you an idea of where Dr. Burmer's talk started! The rest of it was a detailed analysis of how her tools could be applied to the problem of aging. Gene expression vs. aging in various cell types raises fascinating and tantalizing possibilities, yet this also opens up new questions and enigmas. Trends show up and beg to be explored. Strong up-regulation of specific genes in aging suggests that therapies could be designed to reverse aging, but hundreds of genes show this kind of behavior.

Near the end of her talk, Dr. Burmer showed four genes whose expression seems highly correlated with aging, in over 140 different tissue types. The genes are not related to mutual biochemical pathways, based on current knowledge, yet they all seem to have something important to do with aging. "Why these genes are related, we don't have a clue!" Dr. Burmer said.

In other cases, she pointed out that there are strong correlations between multiple genes that are biochemically related and implicated in the aging of specific tissues. But still, this is only one piece of an enormous puzzle. Is there any hope of addressing these problems in a time scale compatible with near-term solutions in aging? Dr. Burmer put it this way:

"What we are in the process of doing is building high throughput tissue chip robotics, and using these

robots our target is really 500 to 1000 genes a day, which means that in the period of about a year, we will have localized all the genes in the human body, to all the tissue types in the human body." That gave the audience a clue as how it might be possible to tackle the problem. While the complexity of the problem boggles the imagination, the speed with which Dr. Burmer is plowing into this investigation is equally awesome.

An audience survey rated Glenna Burner's talk at the very top of the list. All of the quotes in this review probably account for no more than one minute of actual speaking time, and of course it's not practical to include any of the many colored visuals she used in her talk. (Get the video, when Alcor makes it available, if you want the full picture.)

Michael West, Ph.D., Advanced Cell Technologies



"Human Therapeutic Cloning"

Drawing parallels from ancient Egyptian history, Michael West first foreshadowed the recognition of germ lines as immortal colonies. Then, he observed that the somatic cells by comparison have almost no such potential. Clearly, the differences had to be matters of gene expression, he pointed out, and this

pointed to some very fundamental differences that should be subject to discovery.

Telomere shortening was a distinctive difference between the two classes, and it soon became clear that this was a universal characteristic of somatic cells. When telomerase, which causes telomere length to be maintained, was added to lines of somatic cells, their capacities to maintain the colony were similar to those of true germ lines. Was this the answer?

As a founder of Geron Corporation, Dr. West pursued this line of investigation with the goal of anti-aging applications. The results were encouraging, and he now is continuing this work through a new corporation, Advanced Cell Technology (ACT) in the Boston area. The present focus is on medical therapeutics vs. direct intervention in aging, but the issue of cellular aging remains a critical factor. No one would want an “old” organ as a transplant, and early observations of Dolly (the first cloned sheep) indicated that there might be a problem—shorter telomeres. Would there be a way around that?

ACT, Dr. West said, had indeed found a way around the problem. Cows cloned by his present method do not exhibit shortened telomeres. Their telomeres are actually longer than a normal newborn’s. Exactly how the cloning process is handled so as to achieve this was not discussed. The comparative telomere length data, however, was shown. It is not necessary to create entirely new organisms or individuals. By the correct guidance, the new tissues can be guided into forming the replacement tissues or organs needed for therapy. Quoting Dr. West:

“These cells are, in a sense, magical cells, in the sense that they

can do things we’ve never been able to coax cells into doing before. The exciting thing is, of course, think of the combination of being able to make even a complex tissue that you might need, that’s your own, won’t be rejected, won’t need to take immunosuppressants the rest of your life, and that are young. That have been taken back in time and had their whole life span back again. There are a lot of steps necessary to make all this happen.

“We’ve been working hard on the de-differentiation step, the therapeutic cloning step, the nuclear transfer step. There’s many other steps involved. Selecting out the cells, genetically modifying them in some cases, growing the stem cells, and then selecting out the lineages of cells you need and making the particular cells and tissues that you want. We’re hard at work in all these areas.



“It’s important to remember, though, you know, there’s many applications to these new technologies. One, for instance, you could also make besides somatic cells, you could make a reproductive cell. On the bottom (referring to the slide) you could potentially make an oocyte. For a woman of any age. Essentially, you can get around menopause.

“Now, when we start talking about the germ line, genetically

engineering the germ line, a lot of people get nervous, including me. Where are we headed with all these technologies? Now, first, I’d like to point out that I believe this is an ethical use of these technologies. We’d have to talk longer than we have today on the ethics. The reason I think it’s ethical is evidence from nature.

“Nature teaches us that at the stage of the blastocyst, this little ball of cells that I showed you a couple of times, that individuation, a person, a human being, has not formed. How do we know that? If you take that little ball of cells and divide it into two, you get identical twins, and that’s how identical twins form. As you know, about one in three hundred live births are identical twins. Happens all the time.

“It’s also possible that two separate fertilized eggs can bump together in the fallopian tube and merge together, and then you get unnatural chimera. Two human beings in one body. If that happens at this stage, they’re a normal human being. You wouldn’t even notice it, could be one eye’s green, one’s blue, but you could look in their cells and see that there are two persons, two different people in that one person.”

This above quote is a “flash-sample” of what Dr. West’s talk was like. He explored many ethical and technological enigmas, in a fascinating way, in terms of both human therapeutic cloning and other emerging genetic possibilities that will be far more controversial. “Where to draw the line?” will be the question in many of these areas, but one I think Dr. West made clear. The use of human therapeutic cloning will not only be an extremely potent tool for improving our well being, but it will be far less controversial, far less likely to be

slowed down, than many other areas which will soon be open to application in human reproduction.

Brian Wowk, Ph.D., 21st Century Medicine Inc.



“Molecular Control of Ice Formation”

“We may be able to stop freezing cryonics patients right now!”

Dr. Wowk woke up the audience with that statement, but he did not mean that members of cryo-transport organizations should cancel their arrangements. Rather, he quickly stated that better methods than freezing were not just on the horizon but, figuratively speaking, “approaching the pier.”

Recently it has become practical, through research at Dr. Wowk’s laboratory, to use advanced materials to virtually eliminate ice during cooldown to cryogenic temperatures. He showed comparisons of biological materials protected in this way versus earlier methods and illustrated the arrangements of molecules that made the better methods possible.

Ordinary cryoprotection combats freezing by lowering the freezing point, but Dr. Wowk pointed out that sophisticated proteins can be included in small quantities, akin to natural “freeze-blocking” compounds that protect arctic fish and insects. This further

restrains ice formation. With sufficiently rapid cooling, he showed that a glasslike or “vitreous” state could be produced, with custom molecules developed in his laboratory.

Dr. Wowk described the approach developed in his laboratory by which ice formation can be bypassed entirely. He also pointed out that an even more difficult problem exists in rewarming, where the glasslike state has the tendency to be replaced by a crystalline or “ice-like” state as it is heated, “devitrifying” with destructive effects on the cells. Using dynamic molecular computer models, he showed in animated analysis how his well-designed, protective freeze-blockers could help with rewarming.

The talk was highly illustrated but very complex. On the other hand, it dealt with the crux of what was on the minds of many of the attendees: What are the possibilities that a procedure can be done so well, that most scientists and physicians of today can see the potential of this approach and endorse it? Dr. Wowk’s presentation was evidence that hard science was addressing the challenge of true suspended animation.

Gregory Fahy, Ph.D., 21st Century Medicine, Inc.



“Cryobiological Research at 21st Century Medicine”

Dr. Fahy, backed by more than thirty years of active interest and study of cryobiology, began with the statement:

“The central focus of research at 21st Century Medicine is to cryopreserve large, complicated systems, the larger and the more complicated, the better. But we’re going to be starting with something relatively practical—namely, whole organs. This would also include artificial organs, engineered tissues, if Mike West is successful, perhaps cloned organs that are prepared in advance of need and have to be stored. In any case, it’s a finite problem and potentially could chase after a very huge medical market. But we’re the only group in the world, as far as I know, that’s actively pursuing this, and this requires that we try to do some things that other people don’t have to face and deal with.”

Brain preservation was the focus of Dr. Fahy’s talk. In contrast to the broader market suggested by the quotation above, it was evident that the driving motives behind the research and the long-range goals were dedicated to the challenge of protecting something not normally thought of as a transplantable organ.

Hippocampal brain slices were the initial model discussed, where the task was to find optimal cryoprotective agents. Dr. Fahy commented that chilling injury was investigated, and one important finding was that perfusion at 10° C eliminates chilling injury, and is yet significantly better than results at 15° C.

Mannitol concentration was optimized, and kidney preservation perfusates were evaluated in the work Dr. Fahy reported. Excellent results were obtained at 50%

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Why Memory?

by Thomas Donaldson, Ph.D.

I have spoken at Cryonics conferences and in writing about the importance of memory to us: how it really works and what memories cryonic suspension may preserve... or not preserve. Partly because I was not able to attend the latest Conference at Asilomar, I will here discuss memory and its importance once more. Moreover, simply supposing some kind of computer uploading totally fails to solve our problem, as I shall explain later.

The easiest way to see memory's importance comes from realizing that virtually all neuroscientists would now agree that memory is shown in the connections between neurons. Neural net computers basically operate in similar ways: their learning consists of marking some connections between neurons as particularly important and others less important. (Our brains either grow new connections or they do not: an important and critical difference). Clearly, for neural net *computers*, destruction of enough of these connections will wipe out any learning they've done, i.e., destroy their memory. This issue becomes even more important because we know that in brains, the great majority of people have identical *major* connections between brain regions: it is the new connections for their individual

memories that differ... and that just might end up destroyed either by events prior to suspension or suspension itself. Some other factors may help us keep our memories: unlike electrical circuits, neurons often have many connections with one another rather than just one. For a memory to survive, it may not need all connections. Yet if our memories consist only of *special* connections between our neurons (not those present in everyone) then those memories might well become seriously disrupted. Suspension may change the number of connections between two neurons and their locations on the axons and dendrites enough to disrupt any memories those neurons may hold collectively.

In terms of revival I see no difficulty in preserving *consciousness*, even though we don't yet understand the brain circuits involved. Yet if suspension wipes out *all* your memories, will you remain the same person? Suspensions may even disrupt memories rather than destroy them, so that your memories turn out not just to be totally false (and remember that you will think them true) but even fantastic and absurd. Nor does uploading into computers help at all: we still need to recover our memories, which requires much more under-

standing of those wet messy biochemical devices we call brains.

So what do we do here? And what reasons for hope might exist?

The easiest path for *future* suspension consists of working out some form of suspension that clearly preserves memories. Because brains of all mammals work much the same, if we can suspend rats (say) and have them remember training that they had before, then we'll have means to preserve memories on suspension. (Freezing *parts* of brains isn't enough: We may well have to go as far as freezing whole brains to verify preservation of memory.) Such an achievement, at least in Dr. Greg Fahy's opinion, is not so far away (Greg is a major cryobiologist, not just a cryonicist). It won't totally solve our suspension problems, but it is certainly an important step.

However, we clearly do not have that ability at present. Just how long it will take to acquire such methods remains unknown, if only because the cost and time required to develop them unfortunately are high, and the issue has not gotten as much attention from cryonicists as it should. Moreover, cryonic suspension can often occur as an emergency operation, in which the equipment (whatever it will turn out to be) isn't there or is

only half there. So there will *always* be cases of people suspended by older and less ideal methods. Sure, such cases will grow less and less frequent, but they will still continue. Furthermore, what about all those suspended *before* we have such suspension methods?

Given the beliefs of virtually all neuroscientists, recovering memories for suspended patients will require individual attention. Individual connections between neurons may be able to be recovered by using a much deeper understanding of brain anatomy and chemistry than we now have. It's not that such understanding will give automatic recovery, but that the connections between two *particular* neurons might be recovered by knowing their special geometric and chemical relations to one another. Since we need not just the connections between two neurons but those between millions, that recovery will probably require a highly parallel computer, larger than any that now exists in terms of number of processors (but possibly only the size of a PC due to nanotechnological construction). The point to remember here is that we're never dealing with just two arbitrary neurons: each has a position in the brain, with some parts remaining and others not, and many chemical signs may survive to show that a connection existed between the two. Their geometry and chemistry will differ from any other pair ... so this problem is hardly a simple one.

And could current neuroscientists actually not have as good a handle on how memory works as most think they do? Perhaps. One neurotransmitter important to memory can also play a major role in destroying neurons: glutamate. In our brain cortex, pyramidal

neurons use glutamate, while other neurons (interneurons) do not. Could it be that those *others*, not our pyramidal neurons, play the major role in memory storage? Some neuroscientists think so, and those neurons may survive our primitive forms of suspension much better than pyramidal neurons.

Another recent series of discoveries shows not just how neurons grow new connections but even more striking, provides more instances of neurons *losing* their connections (WT Wong et al, CURRENT OPINION IN NEUROBIOLOGY 10(2000) 118ff; M Segal et al, TRENDS IN NEUROSCIENCE 29(2)(2000) 53ff). Such loses, which apparently happen quite easily, may ultimately raise questions about just how our brains store memories. Neuroscientists talking now about how memory works may ultimately turn out to be wrong, and the required experiments on living animals remain quite difficult[1]. And if other chemical factors play a necessary role in preserving special connections for a true long-term memory, that will tell us that simple preservation of connections (using embalming chemicals, as some have suggested) may ultimately fail.

Some additional words for those who envision being read off into a computer also need saying. First of all, we have no way at present of reading off memories from brains (as distinct from producing a machine that acts like you, with your memories). Second, any device which really is to be *you* requires several things computers generally lack: an ability to sense and interact with the world (including the drives you have: hunger, sex, etc.), consciousness, and most of all (for those who bring up Turing's work especially) *real-time*

computer processing. This latter means that it isn't enough for you to work out that the car speeding down the highway will hit you... after a year of processing. You must do so soon enough to react, and not only that, you must *actually react*. Whether that may someday be done by something we would call a computer remains unknown; it's easy to state how brains differ from computers: growing new neurons, forming and destroying connections. So far as I know, such devices may not even fit the requirements Turing suggested for a computer. As for any present ideas, to find out how to read someone into a computer as a functioning creature requires much more knowledge of how brains actually work.

Unless we can avoid these questions about memory by finding some suspension method that *guarantees* survival of a patient's memories, we'll inevitably have to learn more about how brains preserve memories. And even if we can (usually) use such methods, they cannot benefit former patients, and there will always be some patients suspended by primitive methods. How human brains work will remain an issue for us indefinitely. 1

[1] The earliest papers showing growth of new neurons in *adult* mice, by Altman and Das (J COMPARATIVE NEUROBIOLOGY 124(1965) 319ff). Many doubted this work, though later work has verified it. The earliest work showing changes in neuron connections over 1 month comes from Purves and Hadley (NATURE 315(1985) 404ff).

An Exciting Summer

It has been a big summer, with the announcement of the long-sought goal of mapping of the human genome and other interesting advances. Here are some highlights.

Mapping the human genome.

A major scientific milestone, the nearly complete mapping of the human genome (the chemical base-pair sequence for human DNA, which in turn determines the size, internal structure, growth processes, and much of the functioning of the human organism) was announced in the media June 27. Hailed by British Prime Minister Tony Blair as “the first great technological triumph of the 21st century,” it is expected to provide a starting point for much progress in medicine over the coming decades.

An interesting feature of the new milestone is that it was not the accomplishment of one vanguard group but, instead, two competing research teams who struggled, sometimes bitterly, for the scientific credit, then finally agreed to share it. A closer look at this suggests a most interesting tale that I expect to be chronicled in book form eventually. For now a very brief summary will have to do, based on my own impressions from reports I’ve read. Basically, first you had the multinational Human Genome Project (HGP), a publicly funded effort started in 1990. It was supposed to finish mapping the human genome sometime early in the twenty-first

century; 2005 became the settled date. The effort was plodding along far behind schedule when, about 1998, the newly formed and privately funded Celera Genomics got into the act. Celera, it turned out (the name, by the way, comes from a Latin word meaning “swift”), used a nifty new technique that HGP had overlooked, which produced more rapid results. The folks at HGP were scornful at first, then they realized just what a serious threat this posed to their own prestige and credibility, and swung into action. At the day of reckoning, June 27, HGP was claiming they had mapped 85 percent of the genome, while Celera claimed 99 percent. On the face of it, I’m inclined to think both estimates are reasonably accurate, so at this point Celera is probably leading the field, though their rival can still claim some respect. Both groups, of course, deserve credit for whatever work they did, which in either case was substantial.

The competition clearly was good for the overall result, which might have taken much longer if either side had been going it alone. As a publicly funded group, HGP is committed to making its results freely available to the public. Celera is not similarly bound, though it has promised to make most of its human genomic data available to scientists without charge.

Something is worth saying here about the method used by Celera in decoding the human genome. Called the “shotgun” approach, it exploits the power of computers to do gigantic amounts

of rather simple matching operations. The human genome, consisting of a total of about 6 billion base pairs, is divided into 46 subunits, or chromosomes, consisting of independent pieces of DNA and supporting proteins. (An individual chromosome is usually also further complicated by doubling of its DNA strand; the two strands remain physically attached.) Each chromosome thus averages around 130 million base pairs. A chunk this size is far too large to map in one operation using today’s techniques, so it must be broken down further, which is an uncertain operation because at present we lack tools to carry out controlled cutting at this scale. In the shotgun approach the whole genome, chromosomes and all, is first cloned many times over. The copies are then broken up into random fragments of a few hundred base pairs each, which is within the feasible mapping range. The fragments are mapped and compared by computer, and matching pieces fitted together to reconstruct the complete sequence. By analogy, we could imagine assembling one perfect copy of a book from many torn fragments, each of which contributes some part of the missing text, and which can be fitted into the whole by matching with other, partly overlapping text fragments. The alternate approach, used by HGP, called for insertion of numerous chemical tags or markers throughout the genome first, to establish a frame of reference for mapping. Celera’s success showed that this extra step was unnecessary.

The Human Genome Project is being conducted under the guidance of the National Human Genome Research Institute in Bethesda, Maryland. Celera Genomics is based in nearby Rockville. Both groups were expected to publish their findings together in the journal *Science* in early September.

Where to go from here: better computers.

Mapping the genome was a major scientific feat, but by itself it does little to improve the quality or duration of human life. Much more work will be needed to augment and translate the new genomic knowledge into useful applications. More generally, there are many hard problems to be confronted in mastering the secrets of biology. This is particularly true at the molecular level, where such processes as aging and illnesses must be understood if we are to obtain the degree of control we are seeking. Here we are confronted with an almost unthinkable complexity. The human body, for instance, contains about 10^{28} atoms, which means that it could be subdivided into a trillion trillion or 10^{24} pieces, each of which would consist of enough atoms—10,000—to make a fair-sized molecule. There are no easy answers, but help in various forms is on the way, one being improvements in computers, which should have many important uses in addressing this vast complexity.

Toward this end, the National Science Foundation announced August 3 that it had awarded a \$45 million grant to the Pittsburgh Supercomputing Center to buy what will be the world's most powerful, nonmilitary supercomputer. The machine is to be built by Compaq and will rate at 6

teraflops (6×10^{12} floating point operations per second). It is expected to be installed sometime in the second half of next year. It will be used by various scientific disciplines, including materials science, climate modeling, and—importantly—biological sciences. The use of supercomputers raises hopes that such advances as slowing and reversing aging will not take as long as some have predicted.

New step toward nanomachines.

Among the many anticipated applications of nanotechnology are supercomputers that would far outclass those of today—and perhaps be far smaller than pinhead size to boot and serve as the brains of tiny, mechanical robots (“nanobots”) that could perform a wide range of useful functions. Such possibilities are still a dream of the future, but progress toward nanodevices is continuing. A significant share of this progress involves the carbon nanotube, a tiny, elongated cage made of chemically bonded and interlocking carbon atoms. Nanotubes appear to have many possible uses, among them being structural components for tiny machines. In a simple way an important step toward such machines may have been taken recently. Researchers at the University of California, Berkeley, working with telescoping nanotubes of differing bore or thickness, report creating tiny bearings and springs. Initially the nanotubes are formed concentrically, one inside the other, into a multilayered tube that is closed at either end. “Peeling” or clipping the outer layers of one end yields a flask holding an inner, still intact, multilayered tube. This inner tube can then be rotated freely

within the flask or can be pushed back and forth to achieve the effect of a spring. The method holds promise not only for miniaturization of machine components but also for virtually frictionless moving parts that never wear out. A scanning tunneling microscope is used as a positioning tool to manipulate the nanotubes.

Precise, efficient insertion of genetic material into DNA.



Dr. Alan Lambowitz

Source: <<http://www.cm.utexas.edu/research/profiles/Lambowitz.html>>

A very interesting development relating to DNA insertions was reported in the July 21 issue of *Science* by a team at the University of Texas, Austin, headed by Alan Lambowitz. It involves the use of “introns”—pieces of genetic debris that litter DNA and may interrupt the coding of many genes. Some introns, though, have another interesting property, which is the ability incorporate themselves into double-stranded DNA. (Initially an intron consists of a length of single-stranded RNA together with reverse transcriptase. The incorporation of the intron into DNA transforms the intron itself into a double-stranded form, but also preserves its original “message,” or pattern of nucleotide bases.) Moreover, the self-insertion of introns can now be precisely directed to specific sites in a length of DNA or a whole genome. This clearly is nanotechnology in action, and of a sort that could soon lead to

medical applications. The introns use a sequence, or “address,” consisting of about 14 nucleotide bases to recognize the desired insertion site, which is located by a matching operation as the intron explores a length of DNA. Changing the address sequence—modifying the intron—results in insertion at a new matching site, assuming one can be found. The method holds promise in treating AIDS, among many other possibilities. The AIDS virus itself can be disabled, as has been shown in experiments with mammalian cells in culture. Genes that encode a protein the virus uses to infect cells can also be altered to lose their lethal property. More generally, the possibility is opened of genetically modifying specific sites while leaving others unchanged. Previously, precise gene targeting could only be done in one mammal, the mouse, and very inefficiently, contrary to the present method.

Quantum superposition: macroscopic states observed in parallel.

In a loop of superconducting wire, electric current flows indefinitely unless stopped from the outside. The current may flow in either direction. Based on classical physics, though, we’d be inclined to say that the current cannot flow in *both* directions at once. But here is where classical physics parts company with the newer and more comprehensive quantum theory. That in turn requires the superposition of different states of a system, and this property is essential in explaining many effects at the atomic and subatomic levels. For example, two atoms that are chemically bonded “share” one or more electrons, which are simultaneously bound to the different atoms, an

impossibility under classical physics. The superposition of states is a well-established phenomenon over small distances but had not been previously observed at the macroscopic level because then it requires an isolation of the system from surrounding effects that is very difficult to achieve. This raised the possibility that it would not occur at all at these larger scales, so that quantum theory itself would be found inadequate, like its classical rival, and some new theory must be sought. Now, however, simultaneous, macroscopic quantum states have been observed—currents flowing in opposite directions in a superconducting loop—which meet the stringent requirements of quantum coherence, in which two or more ongoing, independent processes happen in parallel. In addition to reinforcing quantum theory, the result is significant for the continuing effort to perfect a quantum computer, which requires that different computational processes execute simultaneously in a single device. The work was carried out at the State University of New York, Stony Brook, under Jonathan R. Friedman and colleagues.

Reversing presbyopia.

One effect of aging that seems universal and has usually made its appearance by age 50 is presbyopia, the inability to focus the eyes on nearby objects, such as a printed page. (Generally the ability to focus on more distant objects is retained.) Actually, presbyopia does not just strike in the 40s but may be said to start in adolescence, though its effects are usually not serious enough to impair one’s reading until decades later. Its exact cause is still in dispute. It is known that the lens of the eye becomes larger

and thicker with age, but this alone would not preclude retention of focusing ability. Conventional wisdom says the lens simply hardens, losing the flexibility that permits it to be focused by the tension of the ciliary muscle that surrounds it. But this is questioned by others, some of whom argue that the real culprit is that the progressively enlarging lens can no longer be stretched enough by the surrounding muscle to be adequately focused, though it still remains flexible. An advocate of this view is Dr. Ronald Schachar, a Texas ophthalmologist and physicist. In the early 1990s he devised a controversial procedure known as scleral expansion surgery for reversing presbyopia. The eyeball is expanded slightly to stretch and tighten the ciliary muscle so it can again focus the lens. To accomplish this, four small pieces of curved plastic are implanted in the sclera (white of the eye) surrounding the iris. To date several hundred have undergone the procedure, with generally favorable results, and clinical trials have been scheduled in the United States, where the procedure is not yet approved. One happy recipient is 60-year-old Dr. Stephan D. Plager, himself an ophthalmologist, who had the surgery done in Mexico last March. Two days later, glasses discarded, he was doing cataract surgery in his office. Eight days after that he read a newspaper aloud to a reporter and said he was seeing better than he had since age 35, despite some minor blurring that seemed to be clearing day by day.

There’s a little more to this story—another, entirely different solution to presbyopia is now being sought, which is to simply replace the lens of the eye with something better. Replacement lenses are

routinely used to treat cataracts, in which the natural lens becomes cloudy and opaque to light. But the replacement lenses currently in use, generally of hard plastic, are of fixed focus and thus can only cause, not cure, presbyopia. Happily, this may be about to change. C & C Vision of Irvine, California, has developed a flexible lens of silicone that restores vision at all distances, says president J. Andy Corley. About 200 experimental surgeries have been performed already, with reportedly good results, and clinical trials have started. FDA approval is estimated to take 2 to 3 years.

Implantable transceiver offers instant, remote patient monitoring.

A tiny, implantable transceiver offers the twin prospects of monitoring a patient's vital signs and determining the patient's location. Dubbed the Digital Angel by its owner, Applied Digital Solutions, Inc. of Palm Beach, Florida, the device is smaller than a grain of rice and equipped with a miniature antenna to track such data as heart rate and pulse. It can then broadcast the data to a ground station with an Internet connection, and can also receive data from the Global Positioning System, which would be used to determine the patient's location. (The Global Positioning System, or GPS, consists of 24 orbiting satellites that broadcast precise timing information to different points around the globe. The signals will be delayed by varying amounts depending on where they are received, so that the location of the receiver can be determined to within a few feet.) The value of this for cryonicists hardly needs comment; it would be especially useful for people living alone who might

experience life-threatening emergencies that prevent them from summoning help. Other possible uses range from tracking endangered wildlife to locating stolen property. A demonstration of the device is planned for October in

New York City. The chief scientist responsible for its development is Dr. Peter Zhou of Digital Angel.net, Inc., a subsidiary of Applied Digital. 1

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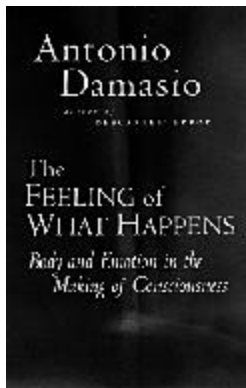
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The Feeling of What Happens: Body and Emotion in the Making of Consciousness

By Antonio Damasio

Harcourt, Brace, 1999

Book Review by Thomas Donaldson



Damasio has written an interesting speculative book about how our consciousness works. Even to explain his major thesis I must describe his definitions

of major terms: *core consciousness* is a primitive and basic form of consciousness which uses neither memory or language. Some patients with neural problems may only have core consciousness; a significant number of animals probably also have it. *Extended consciousness* brings in such things as memory, particularly memory of one's own experiences. Patients devoid of hippocampus on both sides of their brain have core consciousness but no extended consciousness. Damasio also distinguishes emotion from feelings: *emotion* is visible to others and consists of the external signs of "emotion" as normally considered. Damasio uses *feelings* to describe the internal signs of emotion knowable only by the person who has emotion. Finally, *objects* refers broadly to virtually anything: specific pains or emotions, people, objects in the narrow sense (hammer, window).

Damasio bases his theory almost entirely on his own work with brain-damaged patients. These include not just those lacking memory, but also those lacking other brain regions. Loss of some brain regions causes coma, others cause loss of memory for particular classes of object. Other kinds of damage cause a person to lose *specific* memories: they recognize a person in general, but cannot recognize their relatives.

Most important, loss or damage to some brain regions causes loss of core consciousness, of which Damasio cites two cases: epileptic automation and akinetic mutism. In epileptic automation, patients show all signs of being awake, and may even perform actions as complex as rising from their chair and going outside. Yet they show no signs of knowing who or where they are. This automatism can go on for only a few seconds or for several minutes. Anything the patient does during it he or she will have completely forgotten when he comes out of it. Damasio suggests that such behavior gives an example of total lack of consciousness while remaining awake. One point he makes here is simple: most people would not attribute consciousness to ants or paramecia, even though they can show emotions, follow trails, and so on. Seen from that perspective, it's likely that some

kinds of brain damage might produce similar lack of consciousness in human beings.

Another feature of these states also deserves description: patients with this automatism also show no emotion during their automatic activity. Damasio suggests a simple reason for this: core consciousness, and feelings, come from very close or even identical brain areas. He goes even farther by suggesting that core consciousness *itself* constitutes a feeling, the feeling that I have feelings and knowledge. His discussion provides strong reasons for this idea. Yes, it is a feeling of which we normally fail to be aware unless we pay attention to how we feel. The book's title, *The Feeling of What Happens*, gives this point exactly. His discussion, in general, pays lots of attention to emotion, pointing out that feelings of one kind or another, strong or weak, never leave us, even when we do reasoning that may seem to lack them entirely.

His arguments with other notions of how consciousness works all proceed from careful analysis of one or another kind of brain damage, together with a deep knowledge of what we know about activities of the various regions in our brains. One nice feature of his

(continued on page 31)

The Baby Boomers' Guide to Living Forever: *The Promise and the Future Impact of Trying to Live Forever*

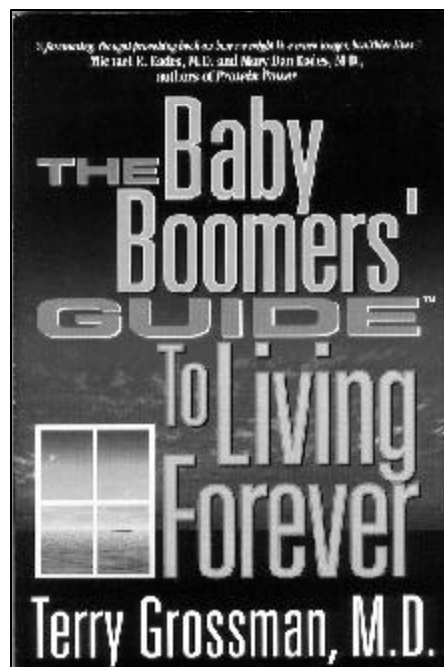
By Terry Grossman, M.D.

The Hubristic Press, 2000

Book Review by Mike Perry

This book is one of a growing number that takes seriously the proposition that immortality may be achievable, through remedies for aging and other afflictions, in the lifetimes of many of us now living. Particular focus is on those born in the years 1946–1964, the Boomer generation. Many of us in cryonics are in this group (myself included), and have seen our hopes alternately fade and brighten over the years as discoveries about aging have slowly piled up, while it and other biological killers remain at large.

“Slowly,” of course, is a relative term, and arguably does a disservice to those who are now producing astonishing discoveries in the biological fields, with the ever-present promise of indefinitely extending our lives in good health. In any case the book is fully in sympathy with the immortalist position that we want to survive to see the end of aging, or failing that, take steps through cryonics so that we can be reanimated, cured of our afflictions, and go on living. The right course to follow, then, is straightforward: do what you can to hold off aging and meanwhile, get signed up for cryonic suspension. Both approaches are advocated, though the greater part of the book is taken up with anti-aging medicine. This is to be expected for, as the author explains at the beginning, he operates clinics in Colo-



rado and California that specialize in anti-aging medicine and chelation therapy. (Here and henceforth I use “author” to refer to the principal author, Terry Grossman; actually there are ten coauthors.) The book, then, is in some degree promotional, though it is not written in an advertising style and its overall tone is reasonably dispassionate and objective.

Anti-aging medicine, though, is presently a controversial subject, and some of the approaches advocated in the book seem particularly open to criticism. The most glaring to me is homeopathic medicine, in which “very dilute” solutions of certain substances are used for

claimed beneficial purposes. The dilution factor is often so great that it is unlikely that a single molecule of the active ingredient remains in solution at all! This, I think, is going too far, though the author is enthusiastic. “The fact is that whatever its mechanism, homeopathy really *does* seem to work, and this has been proven again and again in double blind placebo controlled studies. The fact that we do not understand its mechanism relates more to our own level of scientific ignorance regarding energetics, quantum physics and subatomic medicine.”

I am not keen on “subatomic medicine,” and I have been unable to find any journal papers reporting positive results of double-blind testing of homeopathic medicine. But I did have a chance to speak to Terry Grossman at the recent Alcor conference in Asilomar, and this provided some additional perspective. He said that homeopathic remedies were not always so diluted as to exclude the original active ingredients, and that small amounts of said ingredients still present, could be responsible for the claimed effects, or some of them. However he did not come across as a strong proponent of homeopathic medicine. He said it had been offered because his clients wanted it, but that since the book was written he has discontin-

ued it.

But generally, what is now known as antiaging medicine I see as a grab bag of various substances and treatment modalities whose effectiveness, at best, is often unknown. Separating placebo from more substantial effects has not been undertaken with the care and objectivity it should have been. In any case, a fact acknowledged by the author is that there is *no* presently available strategy that can hold off the aging process very long. Interventive therapies that might be able to accomplish this, such as use of telomerase to reset the cellular aging clock, are possibilities for the future but remain undeveloped. The best bet today

for delaying senescence still seems to be calorie restriction, which is unpleasant for many but that is the way it is. Your approach, whatever it is, may gain you a few extra years, which is of greater significance with today's ongoing progress in the biological sciences, but it could still be too little, too late. So again, it makes considerable sense to also have cryonic suspension arrangements in place. The book is to be commended for taking this latter idea seriously. A major section, extending to several chapters, is on "immortality medicine" and offers details about making suspension arrangements, including funding through life insurance. (A list of cryonics

organizations is provided too.)

In other areas, such as dieting, the book offers what appears to be sound practical wisdom. Its philosophical outlook is bright and hopeful. Its weaknesses would, I think, make it an easy target for critics of the idea that substantial life extension is a serious prospect for our time, but in the long run it should not matter much. Good technological approaches will drive out the questionable, and progress continues. In the short run, the book will provoke some thoughtful consideration of the issues it addresses. The thinking person can benefit, knowing that all opinions must be weighed objectively and not simply accepted as dogmas. 1

(Donaldson, continued from page 29)

discussion consists of diagrams of those brain regions suspected to play a part in the features he discusses. For instance, some neuroscientists have suggested that even core consciousness requires language; Damasio argues against this by discussing patients who have lost all ability to speak or read and understand, but still show many signs of what he calls core consciousness. He also tells of other patients with lesser language faults. He gives other arguments, too, against any notion of language causing consciousness, all saying that core consciousness is definitely not linguistic. Later in the book, he discusses extended consciousness, again by looking at patients who lack part of it: some cannot name objects of specific kinds, others cannot remember their past. Each of these many kinds of consciousness exists on top of core con-

sciousness and cannot exist without it.

One notion of the brain areas involved in consciousness proposes that some part of the reticular activating system (an area in our lower brain which, among other functions, plays a major role in whether we're awake or asleep: damage to some parts causes permanent coma). Damasio specifically does not claim this area plays no role in consciousness, but he does claim that *other* areas must be involved also (and gives a brain diagram to show the areas and why they play such a role). Damasio also does not identify one special brain area with consciousness, suggesting instead that even core consciousness depends of operation of several brain areas.

Damasio doesn't claim he has a complete answer to the problem of consciousness. He explicitly points out that he's considering consciousness itself, not what he calls extended consciousness. Moreover

many of the more recent techniques (CT scans, MRIs) to see brain activity in undamaged people need to be used to verify his arguments. Animal experiments may also help: just as they suggest that some species have core consciousness they may specify (and perhaps strengthen) some of Damasio's proposals.

He wrote his book to be read by those interested in consciousness but not experts in neurological science. If interested, you'll find it fascinating. Most important for our own concerns, we want not *someone* to be revived, but *ourselves*. That may come only with our revival with extended consciousness (which requires survival of many memories), but core consciousness remains essential to such revivals. The book also has extensive notes with bibliographic citations, and an Appendix on relevant issues about the anatomy of human brains. 1

Visions of the Present, Visions of the Future, Visions of Unbounded Life

LifeQuest

Fictional stories reprinted from the late 1980s

The stories that follow appeared in *LifeQuest*, a semi-annual collection of life extension fiction, from May 1987 to November 1990. They ranged from practical cryotransport dilemmas to far-reaching possibilities of uploading, nanotechnology, and the deep-time aspects of living in space colonies. The contributors comprised a rapidly broadening group of authors at the time publication ceased in 1990.

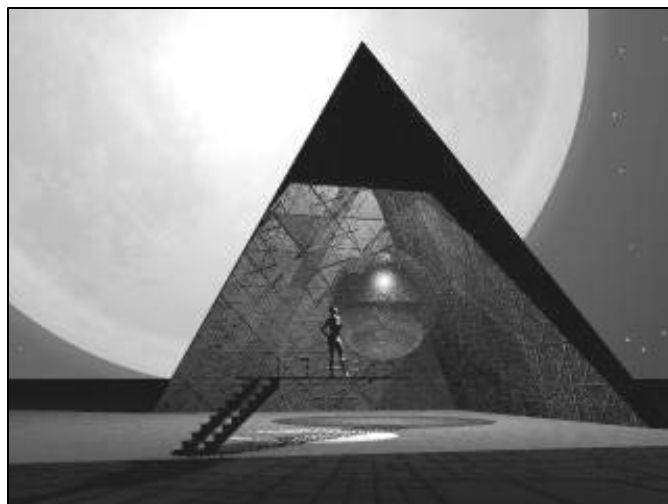
Now, in a special section of each issue of *Cryonics*, we bring you reprints from past issues of *LifeQuest*, along with new stories contributed by authors from our wide readership and other sources. If you are a professional science fiction writer, or even if you are not, we invite you to submit your stories for possible inclusion.

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Artwork by Tim Hubley

BLUE by Anthony Dunn

“We’re losing him, we’re losing him.” The soft female voice sounded frightened and distant.

The bed was firm and warm under my back. It seemed to contour itself around my body, supporting every inch, every nook and cranny of my six-foot frame perfectly. The gossamer touch of a thin fabric sheet betrayed its presence on my chest. It was taut and tight, faintly restraining.

“Cortical response weakening; he isn’t going to make it.” Panic in her voice this

time.

It was day time. At least it was light. Even with my eyes still closed it was bright enough for me to be able to see that. I didn't remember going to sleep; I didn't remember laying on this bed.

Where am I?

The thoughts seemed to crawl slowly into my mind, accompanied by a sharp stab of fear and a swaying, falling sense of disorientation.

Where am I?

The only way to find out is to open my eyes and look.

They won't open. I want them to, but they won't. Why? My arms, my hands, my legs—none of them move when I tell them to. Oh God why? Nothing moves, nothing's moving. In a stream of jumbled, panic-filled thought, one jostles to prominence. Nothing's moving, not even the slow, rhythmic rising and falling of my chest. I'm not breathing.

"He's dying, really dying" said another flat, dull, bored voice. "I told you he was too weak, waste of time; he was always going to die on us."

Dying?

I'm dying; that was why I wasn't breathing.

"Time to pull the plug; no need to waste anymore on this one." The dull voice again.

No, no, I don't want to die, not going to die, got to breathe, just got to breathe, one breath, just one deep breath. Show the dull one he's wrong. Got to breathe.

"Switching off support systems," the dull voice said.

"Wait, please." The soft female voice, pleading this time.

"He's dead, D.E.A.D.," the dull one replied.

I've got to breathe, got to breathe, don't want to die, not going to die, got to breathe.

Shards of sharp ice fill my lungs, freezing but invigorating, fresh air sucked in through painfully dry mouth and nose. It smells of clean sheets with a faint aroma of hospital waiting room.

"Yes!" The female voice, excited, happy this time.

Somewhere in the distance an alarm began to chime. It seemed to get softer and softer. I'm falling slowly in a long ever-darker descent, falling quickly into

sleep.

Where am I?

* * *

Spring was always my favorite time to fly over London. The green ocean of Richmond Park stretching out beyond the houses of Putney and Wimbledon looked at its freshest and brightest early in the year. Catching sight of it from the early morning flight home from the States was the best time to see it.

An hour later and thirty miles south and you were driving out of Gatwick Airport. At the end of the motorway approach road I was always tempted to turn south and head for Brighton and the coast. To escape back to the haunts of youth. The pebble beach, the pier, mingling with the crowds of day trippers escaping from the capital. That's how I had first met Carrie. She was down for the week with her friends from Harrow. I was only sixteen; she was older than me, by ten days. Her short dark hair, ebony skin, and graceful movements were the opposite of my pale complexion, blonde hair, and gangly clumsiness, but where we differed in appearance we were alike in mind. Space was everything. Not many people were really interested in peering at Mars through a telescope and keeping up with the latest interplanetary mission, but we were.

I knew from the first minute that I saw her that I loved Carrie; when she smiled at me it made the world a happier place, but, at first, I could never work out if she loved me or even really liked me. Our shared interests had kept us close. Then it was university that broke us up and, brought us together. She was studying at one end of the country; I was at the other. We didn't talk for three weeks. I was being strong, missing her, needing her, but too stubborn or stupid to call her.

Then one day she was there, in my room, unpacking her bags and making us tea.

"I've changed colleges, I'm here now," she said without stopping the unpacking.

"Oh," I replied.

"I missed you," she said.

"I love you," I blurted out.

She stopped for a moment.

"I know," she replied. "I just hadn't realized the feeling was mutual until now," and she leaned over to kiss me.

That was eight years ago. Eight years of setting up home together, sharing our lives together, building our careers together. We had gone from university to European Space Agency to working on the NASA Mars team together. It had been eight good years, but three months ago it had gotten even better. After years of trying, after years of not getting pregnant, of doctors and therapies and disappointment, along had come Jacob—a son for Carrie and Jack, doting parents, at last.

My four weeks at work in the States had been exciting but frustrating. A double shift—Joe's wife was sick, really sick, not going to get better sick. I had "volunteered" to cover his two weeks so that he could spend a last few days with her. All in all I had doubly missed Carrie, and missing so much time out of Jacob's young life had been almost too much to bear. He was only three months old, but the image of his smiling face, the sound of his cry, the twinkling of his blue eyes, were etched into my mind and soul.

I wanted—no, needed—to hold Jacob in my arms again and feel his head rest on my shoulder, hear him breathe, slowly, contentedly, in dad's embrace. Although he wasn't old enough to really appreciate the U.S.A. Teddy Bear I had bought him, I was sure he would learn to love it.

I had bought two bears, both the same except that one held a Stars and Stripes and one a Union Jack, but on the flight back a four-year-old sitting opposite me had seemed to fall in love with the British bear, so, amid mild protests from her parents, I had given it to her. She had looked happy and waved 'bye to me as I left the arrivals lounge. I reached over and stroked the soft, artificial fur of the remaining bear where it sat in the passenger seat and smiled as I thought of it nestling next to Jacob in his bed.

I only took my eyes off the road ahead for a moment, just a second or two, but when I looked up the lorry was hurtling toward me across the central reservation, smashing through the crash barrier. The metal of my car made a

strange, high-pitched squealing sound as it crumpled and crushed under the impact.

There was no pain. Just an instant of shock and fear and then darkness.

The bed felt warm against my back. The air smelled clean. My mind was still filled with dreams of crashing cars.

Where am I?

Hospital, yes hospital, it had the faint smell of hospital. The crash was real and now I was in the hospital. This time my eyes did open.

The bright light hurt; everything was blurred. It seemed like a hospital room, small, white, and filled with beeping machines. High on one wall was a window with something written in bold letters across it. The name of the hospital?

It was still too blurred; was it St. Agnes or Charring Cross? The blurred images coalesced into more distinct shapes. The writing became legible. ALCOR RESUSCITATION FACILITY, it read, and below it, in smaller letters, "Welcome back."

The bleep, bleep, bleep of machines pushed the images of crashing cars from my mind. ALCOR RESUSCITATION FACILITY? Suspension was cutting-edge science. Resuscitation was, at best, decades away. To be in resuscitation I would have had to be frozen. I would have had to be dead, but I wasn't dead—I was alive. The image of the lorry careening toward me flashed back. The instant of shock and the darkness. Could that have been it? Was this it?

Carrie had laughed when I first joined. She didn't believe that it could ever work. Too many problems, too many ifs and maybes was all she ever said when I tried to talk her into signing up. Had it really worked?

The wall farthest away from me held a door. It opened. A tall, thin, middle-aged man in a long white doctor's coat came in. He walked slowly, painfully, toward me and sank into a chair. His breathing was hard as if he had just run a two-hundred-meter sprint. Beads of perspiration hung on his forehead.

He wiped the sweat away from his icy blue eyes and over his bald, dark scalp.

"Too heavy," he said softly, as if to himself and then looked at me.

"Hello Mr. Roberts." He waited for a reply.

I stared silently at him as his breathing eased.

"Hello Mr. Roberts." He spoke slowly, carefully, as if he were trying his best to speak clearly in a foreign language.

"Hello Mr. Roberts." He began again.

"I can hear you," I replied, and tried to smile. The muscles in my face hurt. I winced in pain and they hurt even more.

"Try not to move; you've been gone for a long time; it will take a while for things to work normally again."

A long time. How long was a long time? The doctor sat and stared at me.

"How long?" I asked.

"I'm your resuscitation supporter. I'm here to help you recover and return, slowly," he replied.

"How long have I been . . . dead?" I asked again.

"Suspended," he corrected me. "For a long time," he answered.

"How long is a long time? Please. . ." I was in no condition to make demands; pleading was my only option.

He placed the fingers of his left hand against his temple and looked at the wall behind me. He shook his head and then nodded as if having a conversation with someone.

"You were badly injured; there was barely enough good material to store."

"How long?" I repeated.

He looked at the wall again. His lips moved rapidly but silently. Whoever he was talking to, however he was talking to them, his body language showed that they were arguing.

"It's too soon—you're not ready for it," he replied.

"Please." I tried to sound more plaintive this time.

He shrugged, glanced at the wall, and then looked at me.

"Two hundred and fifty years," he said in a matter-of-fact way.

Two hundred and fifty years. It had worked! I was alive, and it was the future already. I wanted to laugh, cheer, run around the room in celebration. Except everything hurt, and I couldn't really

move. Still it felt good to be alive, again. I couldn't wait to tell Carrie should just would not.

Two hundred and fifty years. It was a long time, too long. I was alive but Carrie would be gone, long gone. Even Jacob would be dead. I could still see his baby face in my mind. His smile . . . my baby son had grown old and died before I had ever had the chance to know him. The feeling of joy sank in an instant, and the cold touch of misery took its place.

Carrie, Jacob were both dead and gone; what was the point of me having survived? The room began to darken. In the distance an alarm began to gently bleep.

"Medical emergency!" the doctor shouted out.

It didn't matter. Everyone was gone. It didn't really matter what happened to me. The light dimmed and then everything went dark.

The morning routine always started the same way. A slow awakening from dreams of death or images of Carrie and Jacob all long gone now but still fresh in my mind and heart.

"Good morning Mr. Roberts." Doc sat in his chair.

"Call me Jack," I suggested for exactly the thirty-first time. A whole month of mornings since what I now thought of as my awakening.

"What would you like for breakfast Mr. Roberts?"

"Call me Jack."

He stifled a laugh. "We don't call anyone a Jack these days, well, not unless . . ." His voice trailed off.

He said strange things like this all the time. "Linking to the node," "imprinting information," "upgrading implant," but he would never explain what they meant.

The days had settled into a pattern. Breakfast followed by exercise in the little gym in the room next door and then two hours of catching up with the past. Two hours of watching old newsfilm of events that had happened after my suspension.

"Early Martian Colonies today," he said with an air of excitement.

I knew Mars, or least had known Mars. The imaging software on the first

sample return mission had been mine, well at least partly mine and several hundred others who had a hand in creating it. I knew Mars. I had watched the television images from the landers; I recognized its cold, harsh, desert surface. That was my Mars.

Not the new Mars, the enhanced atmosphere Mars, greening valleys and slowly filling oceans of the new world they had created using technology I just didn't understand. Why should I be interested in the Martian colonies? They didn't hold anything for me; nothing in this God-forsaken future did.

"What's your name?" I asked.

"You can call me Doc," he replied, as usual.

"Can I see someone else?" I asked.

"You're not ready." The usual reply, again.

"Can I go outside?"

"You're not ready."

"Can I find out what happened to my wife and son?"

He paused for an instant, knowing what would happen next, before giving the standard reply.

"You're not ready."

"I want to know about my child, my wife!" I shouted. "Am I a prisoner here? Tell me what's going on!"

This was all part of the morning pattern. A month of exercise had brought the strength back into my arms and legs but little knowledge of the world beyond the three rooms of my resuscitation suite. Only the little window in each chamber offered a glimpse outside, and all they revealed was a green, grassy lawn stretching uphill to meet with a usually blue and clear sky. Sometimes out of the gym window, just above the horizon, I caught glimpses of something moving, flying in the distance. Sometimes they were big enough to guess that they were silver spheres, but they travelled too fast. I could never really watch them for long enough to get any real idea of size or distance.

"Mr. Roberts." Doc looked and sounded serious. "We know what we're doing; we've been doing this for a hundred and fifty years. You're not ready." He sighed.

We had this conversation everyday.

"The consequences of giving you

information you're not ready for would be catastrophic. Emotional and intellectual overload can be fatal, believe me; people die, permanently die."

The words "permanently die" were uttered in a hushed, almost awed whisper.

"We give you information a little at a time, that way you can cope with it. That way you don't overload and die. You don't want to die, do you Jack?"

I didn't even hesitate before replying.

"I don't care; there's nothing for me here; I'd be better off dead!" I shouted back at him.

One thing, the only thing, I had come to know over the last month was that I shouldn't be here. Everything I knew was useless. What had been degree-level studies had become elementary school fodder within twenty-five years of my suspension. Fifty years on, about as far as they had let me learn, everything I had ever known was obsolete. All the skills I had developed were useless; everything had changed, even some of the bedrocks of social relationships and economic life—marriage, money, work—were different from anything anyone half a century earlier could have imagined. Now all of that was two hundred years in the past. Whatever kind of world it was out there wasn't a world for me. All I really wanted was to find out what had happened to Carrie and Jacob. To do that I had to get information either from here or from somewhere else.

"You're not ready," Doc intoned once more and walked into the gym. The morning argument always ended like this.

"When will I be ready?" I shouted.

He kept on walking. I waited a moment longer than usual before getting out of bed, quickly changing clothes and following him into the next room. I had to be sure he would be far enough away. If I acted fast enough, I wouldn't have to hurt him. I didn't want to hurt him.

"He's got it bad; worst case I ever saw." Doc was speaking softly, unguardedly, as I walked through the door. I didn't often overhear things, and even when I did they didn't make sense. He stopped talking as I entered the room, placed his right hand against his temple, and glanced at the wall at the far end of

the gym. It looked exactly like the other three walls. Tall, white, and plain but once, feigning exhaustion after a long bout on the rowing machine, I had rested against it. It was colder and smoother with the texture of glass, not concrete. I don't know if they knew what I was doing, but I was sure they were behind the glass wall. The ones who were watching, the ones who Doc talked to and somehow communicated with even when he wasn't talking. They must be the ones in charge. That was why he told me so little. He didn't know anything. They were the ones I needed to make an impression on.

That's when the plan had come together in my mind. The wall ahead, the little window on the right, and beyond that the floating spheres. Sometimes they added new machines to the gym and took away old ones. Not today. Thankfully everything was exactly where it had been yesterday, and now Doc was far enough away . . . perfect.

I walked over to the weightlifting area and took a medium weight from the bay. It felt cold and hard in my palm. With two rapid pirouettes, like a discus thrower, I launched it toward the far wall.

"No!" Doc screamed as it flew past him.

It crashed and smashed into the wall. With a loud crack the wall shattered into hundreds of shards. A woman sat behind it. She was shielding her face with her hands. She looked somehow familiar, but I didn't have time to stand and stare. I launched a second weight at the little window. It punched a hole through, not very big but maybe, just maybe, big enough for me to get through. I jumped onto the top of the chest-press machine and then dived out through the hole in the glass. Arms and head through, a sharp dagger of glass ripped the back of my clothing and cut deep into my shoulder blade. I could hear Doc running up behind me.

"No!" He sounded desperate.

Halfway out. I grabbed the short tufts of grass and pulled a few inches further forward. A stab of pain from the right knee, and then the ankle betrayed a long slashing cut down the calf. One leg out, one to go. Doc's hand grabbed and gripped my foot.

“No, you don’t understand!” he shouted.

All I had to do was kick out. A quick, sharp blow would force him backwards and I would be free. I could feel the grass and taste the fresh air. Just one kick and I could be up and running.

He held tight. I stopped trying to pull away. I wasn’t going to hurt him, not even for this. He must have felt me ease up and for an instant relaxed his grip. It was enough, just enough, for me to slip my foot out of the shoe he was holding and drag myself out of the window. I was out and free.

The lawn stretched upward to a crest a few dozen yards ahead. Blue sky and green grass were all I could see, but I knew that at the top of the hill there just had to be more. I glanced back, a stream of red flowed from my leg down the green grass back to the broken window. No one was following me, at least not through the window. Too dangerous. An alarm sounded, and people appeared from around the side of the building.

They ran toward me, but it was too late. I had already reached the top of the hill.

The city was away across the other side of the bay. It gleamed and shimmered in the sunlight as if it were made of crystal. Skyscrapers reached up and up, hundreds and hundreds of feet, and disappeared, unending, into the sky. Everywhere, everywhere, skimming across the clear blue water, weaving around the crystal towers, were what seemed to be people flying unaided and unencumbered, and above them the floating, flying spheres, thousands of them.

The sound of footsteps grew louder, but they were still too late. The world was already growing dark, and the pain in my chest had spread down my right arm. Breathing hurt. My legs couldn’t hold me up. The grass felt warm and soft against my cheek and forehead.

“He’s down!” one of them shouted as they reached me.

Five figures stood above me silhouetted against the sun.

“Medic coming through, give it space, give it space.”

They parted and a silver machine floated past them and hovered over me.

“Cardiac arrest, major damage.” The

words came from the machine.

“Can you do anything?” The tallest man, it was Doc, spoke to it as if it were another person. It hovered over me for a moment.

“No, nothing,” it replied.

No one moved. The machine had taken the decision. Had we come to this?

The pain got worse, the world became darker. I *wasn’t* ready—Doc had been right. The world was too different for me to just walk out into it. I wasn’t a prisoner; they were just preparing me for a different reality.

Doc fell on his knees next to me. “Well, I’m not just going to let you die you, you Jack.” At least the last few words seemed to be directed at me.

“Does anyone else know about mouth to mouth resuscitation?” he asked.

No one responded.

“Damn!” he exclaimed, and began to feel for my heartbeat as pain and darkness swept over me.

* * *

The familiar sound of the machines beeped gently in the background. I hadn’t dreamed. No lorries careening toward me. No images of Jacob. Just darkness, then consciousness. I opened my eyes. The room was the same—well, almost the same. Doc stood rather than sat at the end of my bed.

“Two weeks.” He intoned sternly and sighed.

I tried to speak, but my mouth was too dry. Doc gently put a glass of ice cold water to my lips.

“Why didn’t you let me die?” my voice was reedy and weak.

“This all costs money, Jack.” He called me by my first name and swept his arm in an arc gesturing to all the machines in the room. “And if you really want to die, you have an absolute, legal right to do so, but, you don’t have to. We don’t want you to. I don’t want you to.”

“You don’t know me. What does it matter to you, to anyone, if I die?” I spat back at him.

“It matters. It matters more than you know,” he replied, “but if you really want to die just pull another little stunt like the last one. We won’t be growing you any new hearts again; next time you run, next time you overexpose yourself to

information and stimuli, you will die—permanent death.” The last words were uttered in the same hushed tones. “If you run again Jack, no one will be running after you; no one will save you; you’ll just die. It’s up to you Jack.”

He didn’t wait for me to answer, he just turned away and walked toward the door. Halfway there he stopped, turned, and walked back. He repositioned the pillow behind my head, wiped the thin film of cold sweat from my forehead, and held the water to my lips again.

“If there’s anything you want Jack, anything at all, just ask.” He smiled and put the fingers of his right hand to his temple.

“Who are you talking to?” I asked.

“Talking to? I’m talking to you Jack.”

“No, who are you talking to on the other side of the wall?”

He looked at the wall.

“You’re not ready Jack,” he replied and walked away.

The same answer, always the same answer.

* * *

Doc winked as he placed the tumbler of orange juice in front of me. I knew what he meant. This was the one with gin in it. I didn’t know how he got the stuff in. It was strictly prohibited, but he knew I liked it, and somehow he got it.

For a guy who had had trouble walking three months ago, he was looking fit. Two rowing machines now rested against the far wall of the gym. One for me, one for him, and in the ten-minute race he always beat me.

“Time for some catch?” he asked.

I nodded and we ran out into the field at the front of my suite. Throwing the ball and catching it helped to redevelop hand-eye coordination. After an hour a day for the past five weeks I was almost back to normal. The ball flew toward me. It was high and wide, and without even thinking about it, I darted to my left, leapt, and caught it one-handed with ease. I stared at it nestled in the palm of my hand. Sport had never been my strong point. I could never, ever catch like this. I looked up toward Doc and caught him looking at me in an odd sort of way; a mix of relief and pride.

"I can't do this." I held the ball up in explanation.

He walked over, placed his hand on my shoulder and squeezed it gently. "You can now," he replied.

"No, no. You don't understand. I could never do this, not even before."

"You're better now, better than you've ever been." He stopped and looked at me as if he was unsure whether to say anymore. "We optimize you, rejuvenate you—biologically you're as good as you could ever be, or at least will be when you're fully recovered. As fast, as sharp, as clever as the human body can ever be, and then . . ." He stopped again, placed his fingers on his temple for a second, and then nodded slowly.

"And then we can implant—artificial implants, internal organs, whole limbs, brain chips. They make you better and stronger, and they last forever. That's forever Jack—you don't wear out. You never die Jack, never."

A medic sphere floated up and hovered next to me.

"Heart rate normal, cortical responses elevated 10 percent, nothing to worry about," it intoned softly.

Doc laughed.

"I really shouldn't have told you all of that. She didn't think you were ready," he gestured back toward the building. "But I thought you were."

I nodded and smiled back.

The last few weeks I had felt better as I got stronger and fitter. The days with Doc were good. The nights were a different story. Dreams of Carrie and Jacob, death, and waking full of fear and loneliness.

"Anything else you want to tell me?" I asked as nonchalantly as possible.

"Only that we're at the collapse of the Martian Colonies on the info reels, a hundred years after your suspension. Want to go and learn?" he turned and headed back toward the main building.

"What about Jacob, what about Carrie?" I shouted at him.

He stopped as if he had been frozen to the spot. For a second I thought he was going to give me a real answer. Then in a halting, pained voice he replied. "You're not ready. You're not ready."

I didn't wait for anymore. I ran back toward the main building. As I raced past

him, I scowled in his direction. Tears were running down his cheeks.

"Wait just a while longer, please just a while longer," he whispered to me as we passed. I had never seen him cry before.

* * *

It was dark. Even in the future night was still night. A single machine beeped in the background. Sleeping was becoming more and more difficult. Most nights I was awake for the three or four hours before dawn. I stepped out of bed and padded into the gym and then through to the learning area. The screen was still on. Doc left it on most nights. He must know that I couldn't sleep. At least I could watch the news from a hundred years ago to keep me occupied. Doc was a good man, not that I had any other twenty-third century males to compare him to. In the sixteen weeks since my awakening Doc, and the brief encounter with the men on the hill, had been my only contact with anyone. It was the tried and tested way of doing things, Doc told me. I liked him, he seemed to like me. We understood each other. In another time, another place, another set of circumstances, we could have been friends, good friends, but here. . . . How could he really understand how I felt?

How could he feel the sense of uselessness, hopelessness, loss that I did. I would be no good in his world. A Neanderthal trying to understand relativity—that was the reality of it all. What did this place, this time, offer me?

Inferiority, poverty, at best curiosity value. "Come see the savage from the past!" I could visualize the fairground freak show advertisements already and on top of it all the loneliness. Carrie and Jacob gone forever. It was too difficult, too much to bear. Deep down inside I knew I didn't want to be here.

The view screen flickered.

"When and where's the bar?" I asked it, wanting to know which events and years were restricted.

"The bar is off," it replied.

I waited a moment. No bar meant I could view anything.

"Today's news," I ordered.

An image of a woman, golden skinned, bleached-blond hair, sat behind a desk, filled the screen. She

talked in a clipped, odd accent. The words were mainly English, but there were words and phrases from other languages—Spanish, Japanese, and some that sounded completely unintelligible thrown in. The image switched to an outside view. A blue sky but all the plant life was red. Three huge moons hung. It wasn't Earth; it didn't seem like it could be anywhere in the solar system. A figure, tall, well dressed, green, and reptilian, stepped into view of the camera and began to talk in the same mixed-up language as the woman.

The world seemed to buckle under my feet. A falling, disoriented feeling came over me.

"Stop!" I shouted, and the viewscreen went blank.

I sat and waited. The Earth stopped moving, my heart stopped trying to break out of my ribcage. I sat and waited and thought about it for a long time and then slowly gave another order to the viewscreen.

"Display all information held on Carrie and Jacob Roberts."

It answered in an instant, before I had the chance to give it dates of birth or any other search-refining information. "All information on individuals held at City Records," it replied. "Password required for access," it concluded and waited for the password.

I didn't have it.

"System will be locked in thirty seconds without password."

I was too close to finding answers to lose now, but how could I give it a password I didn't know?

"System lock in twenty seconds."

It didn't care, it would just lock. It wasn't a smart machine, just a dumb servant. Trying to reason with it wouldn't be any use.

"System lock in ten seconds." I had to do something, now.

"Where is City Records?" I shouted out. It began to tell me the address and street reference.

"Print me a map."

As the last syllable rolled off my lips, SYSTEM LOCK flashed onto the screen in big red letters. Too late, I was too late.

A soft hum issued from the reproducer next to the screen. A map, a street map, with the City Records Office

marked with an X, slid out.

* * *

I had given Doc one last chance. "Please tell me about my family," I asked. "You're not ready," he replied.

Ready or not, today I was going to find out. The collector always called at this time of day. Long, cigar-shaped, and floating silently down the roadway that headed off toward the city. It stopped just long enough to be filled with boxes and trash and then floated back to where it had come from.

It was only the second time I had asked to be left alone to walk around the garden. Doc had looked suspicious when I asked him to leave me in peace for a while. I was sure that he knew I was planning something, but his little speech about not stopping me, or helping me, if I decided to run again, seemed to mean what it said. Just to be on the safe side I was still going to slip away rather than just walk through the gates.

The collector arrived, stopped, and opened its cargo doors. Carrier spheres brought out the trash already sorted and ready for recycling. It had taken me a while to realize that not all spheres were the same. These couldn't think; they just did a job, dumb machines. As the last boxes were packed, I jumped onboard. The hatch closed behind me, and a few seconds later I felt us jerk around and back toward the city. It had been so easy, perhaps too easy. I sat back and waited. The journey could be a long one.

We stopped twice. Two more places exactly like mine. Two other resuscitation areas? After the second one we set off slowly and then picked up more speed.

The journey went on for longer, and, even before we stopped, I could hear the sounds of the city. People talking. I couldn't really understand what they were saying, but there was enough English in there for me to be able to guess. Snatches of conversation about last night's sports results, an argument between a young boy and an adult about what time he had to be home, two female-sounding voices discussing holiday plans. The world may have changed, but people still seemed the same. The collector stopped, the cargo doors

opened, and I eased my way out into the street.

It was crystal, or at least very much like it. The ground, the walls, the buildings were clear like diamond. They shimmered rainbow colors in the sunlight. It felt cool and smooth; on the corners it was almost sharp enough to cut flesh—almost, but not quite. Everywhere was clean and bright, fountains of gently bubbling water stood at each intersection, flowers and plants decorated the concourses and perfumed the air, and all of this was in three not two dimensions. Stretching up as far as I could see were gardens and landing pads, fountains, flowers, and people.

"Can I help you sir?" A blue sphere floated down from high above. It intoned the question in a clipped, difficult-to-understand accent.

"Yes, I want to go to the Hall of Records."

"Follow me sir," it suggested and quickly shot back into the air. A few seconds later it returned.

"Follow me sir," it repeated and then slowly began to drift upwards.

"I want to walk," I called after it.

"Why?" it asked, a genuine sense of puzzlement in its voice.

"Because I would," was all I could think of saying.

It didn't ask any more questions. "Follow me sir," it said again and floated, just above my head, down the street.

The wide streets were busy, not many people walked along them, but there seemed to be a preference for siting restaurants and coffee shops outside and on terra firma. People still ate dinner, people still drank coffee, some even seemed to be reading little screens, which were probably the descendants of my morning newspaper. The only difference seemed to be that when they finished they floated up and away to wherever they had to be next. Money seemed to have completely disappeared. Thumbprints on more little screens seemed to be the method of payment for every transaction. This wasn't so different to my time. Things had changed, but in a working, eating, striving for a better tomorrow sort of way, people seemed much the same.

I followed the sphere around a corner

and stopped. A sharp intake of breath brought an all-too-familiar stabbing pain to my chest. An alien on the viewscreen had been a surprise. Meeting one in real life was jaw-droppingly unbelievable. It landed just in front of me and looked to be headed for the door behind me. It was half my size, a beak and three clawlike fingers on each hand. I stared at it and it stared at me until we were almost touching.

"Excuse me," it chirped in a high-pitched voice and side-stepped me before pushing past and through the door.

* * *

The chest pain wasn't getting any worse, but it wasn't getting any better either.

Another block and the sphere stopped at the bottom of a flight of stairs leading up to a Romanesque-style building, all columns and friezes. I stood on the bottom step and waited. Inside were the details of what had happened to Carrie and Jacob and all I had to do was wait for the pain in my chest and arm to ease a little and then I would be able to climb up and go in. The sphere had said something to me, but I was trying to concentrate on breathing slowly and calmly. After the third or fourth time that I failed to reply, it floated away. I couldn't be sure, but it sounded as if it was swearing and complaining about my lack of courtesy.

I glanced to either side of the building to see if there was a lift or ramp, but as everyone else seemed to be floating and gliding in and out and up and down, there was neither. The steps were there purely for decorative purposes. They made the building look important and civic in nature, but they also made it doubtful that I would ever get inside.

At the bottom of the steps, on the left corner stood a kiosk; small and rectangular and on its outside I recognized the emblem of the Martian Colonies.

"The Free Martian Colonies," the words on the badge now read.

I hadn't reached the part of the time line when they had gained independence from Earth, but for some reason I suddenly wanted to cheer. Slowly I shuffled over to take a closer look and see if the word "free" had a date attached.

As I stood outside examining the badge, a woman appeared. Her image shimmered and seemed blurred at the edges. I had seen holograms before but never quite as big or as clear as this one.

"Welcome to Mars," she said as three-dimensional images of that world appeared behind her. Mars seemed to be half finished. Half green and wet, half red and arid. The problems of terra-forming had been exacerbated by the changing politics and priorities of Earth-bound administrators and project leaders. The colonists had decided to go it alone, but funds were short and they needed finance and help.

"Please pledge us your credits or give us your time. Come and join us—Mars needs you." The woman disappeared from view.

It had been an interesting sales pitch, but I didn't have any credits, and the pain in my chest suggested that I didn't have much time.

The first few steps were fine. Halfway up I stopped and gasped for breath.

"Welcome to Mars," another interested somebody had activated the kiosk. I hoped they had more to offer than I could. Taking the steps one at a time and resting in between kept the pain down a little. Breathing was hard and painful. The ground moved and buckled beneath my feet. One more step and then I was at the door. If I took it carefully, slowly, I could get the information on Carrie and Jacob. I could know what had happened to them; I could find them before the pain beat me and carried me off to the long sleep, the permanent death. Just a few more minutes of life and consciousness, that's all I needed, all I wanted.

I stood at the top of the steps and looked into the records office. Out of the corner of my eye, I glimpsed the spinning, red, blue, green holograph of Mars.

"Come and join us—Mars needs you." Her words echoed around inside my head.

"Mars needs you."

Mars. Work to do, problems to solve, opportunities to seize. Why hadn't I seen it before?

I turned and staggered down the steps toward the spinning planetary image. The pain crushed my chest and

raced down my arm. The crystal steps felt hard and painful as my knees crashed into them, their cool smoothness pressed against my cheek as I slid to the floor. The pain was worse, a lot worse than ever before.

A crowd gathered and the darkness began to enfold me for the last time.

"Let me through, let me through!"

The distant voice sounded familiar. A tall, thin figure stood over me. He bent down and the accustomed feel of Doc's hand gripped my shoulder.

"I'm not going to let you die," he whispered into my ear, and then, cradling me in his arms, he lifted me from the floor and held me tight to his chest.

The world went dark

* * *

The cacophony of beeps broke my sleep. I opened my eyes. The room seemed full of machines. Doc sat on the edge of the bed watching me.

"Don't try to move, you're too weak," he said.

I nodded. It didn't hurt, but I didn't want to take any risks by trying to do more.

"Three weeks Jack, three weeks to put you back together. Do you know how much that cost, Jack? Do you know how much I had to beg and grovel to get agreement to get that done?"

I shook my head, at least the muscles in the my neck felt fine.

"But we still have a problem Jack. Do you know what that problem is?"

I shook my head again, it moved easily, painlessly from side to side, it was a good sign. I would be up and fit for action soon.

"You're the problem Jack."

I stopped moving my head and looked at Doc in amazement.

"What?!" I bellowed.

The voice sounded strong. My lungs must be okay. It was getting better all the time.

"You're the problem Jack," Doc continued. "We can't keep bringing you back like this. We can't afford it. We can't spend the time or the money on it so, it's up to you Jack, what do you want? Do you want to live? Or do you want to die? It's up to you. What do you want to do, Jack?"

He sat on the edge of the bed and looked at me waiting for an answer.

"I want to go to Mars," I replied.

"Mars?!" It was his turn to look amazed.

"Yes, Mars," the words burst out in a stutter of excitement. "There's so much to do, so many chances to make real a difference, so many . . . opportunities."

He didn't reply, he just looked at me in that odd, almost paternally proud way he sometimes did.

"You don't understand, Doc, you couldn't understand. Coming back after so many years presents you with a whole new world of experiences and opportunities. It has so much to offer, Doc, and I have so much to offer it. I can make my dreams come true and along the way do something worthwhile. When will I be well enough, when will I be ready to leave?"

This last question seemed to take him by surprise.

"What about Carrie, what about Jacob?" he asked.

I thought for a moment.

"I miss them Doc. I always will, but life can, life has to, go on." For the first time since I had been awakened, a tear rolled down my cheek and fell gently away.

Doc put his fingers to his temple and nodded. He stood up and walked over to the machines. One by one, he turned them off.

"Doc!" I shouted in panic.

"Don't worry, you're not going to die," he said. "You're fit and healthy. We just had to be sure."

I eased myself up. It felt good—no pain, no aches, no fatigue.

"Sure of what?" I asked.

He had turned off the last machine and was headed for the door.

"It happens to us all," he said, "the resuscitation blues, only you had it bad, real bad. But now you know, like we know, the future's bright; tomorrow's always going to be better. We have so many new opportunities," he stopped at the door.

"And, I think you're ready," he said and left the room.

What did he mean we? I was the one who had been awakened, not him. Why did he say we?

I jumped up and ran after him.

The gym was empty. I caught sight of Doc as he walked through a small, new door in the glass wall at the far end of the room. I ran after him.

The next room was small, dimly lit, and empty except for a chair placed exactly in its center. A woman sat facing me. I recognized the emblem of the Free Martian Colonies emblazoned on a badge across her chest. I recognized the dark-brown depth of her eyes, her smile,

the ebony sheen of her skin.

“Carrie?” my voice cracked and broke.

If I hadn’t been ready, the shock of seeing her would have killed me, permanent death.

She stood and raced over to me, took me in her arms, and our lips met for the first time in two hundred and fifty years. Her body felt warm, soft, and familiar in my hands. Carrie was here, awakened, alive and rejuvenated. I wasn’t alone, we

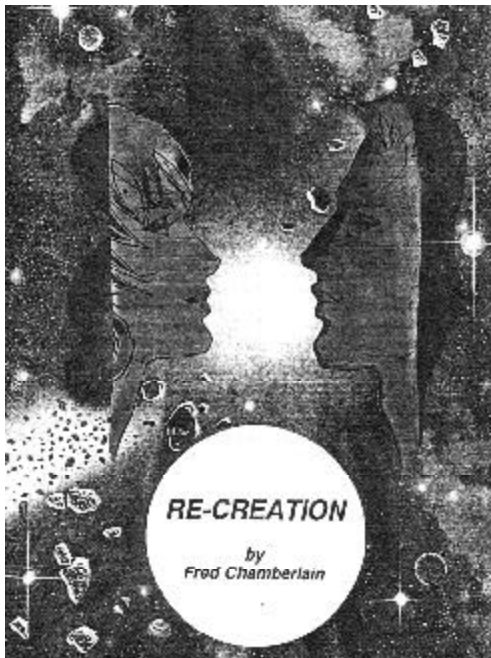
were together.

I pulled my head back and looked at her.

“Jacob, what happened to Jacob?” the words burst unexpectedly out of my mouth.

The familiar feel of Doc’s hand gripped my shoulder. “Hi Dad,” he whispered.

Carrie, Jack, and Jacob were together again, at last. 1



Re-Creation

by
Fred Chamberlain

As ODG-941 moved toward the podium, the hall silenced. 941’s great form was not that different from the others’, but the ID codes radiating from antennae at his wasplike midsection told those in attendance who he was. Leaning forward slightly as he approached the ramp to the stage, he rolled quickly to the higher level without the slightest flexing of lower appendages. His head, a spheroidal sensor assembly, swept about surveying the thousands who had attended the symposium. Finally, in the radio frequency voice of the Jankx, he spoke.

“As you have heard, it appears an alien species has taken residence on this planet,” he said. A current of low level

electronic commentary swept the hall.

The rumor was true! 941 was the world’s most eminent exobiologist, and though they had yet to discover evidence of life even on other planets of the local system, it was a passionate dream of theirs to do so. If 941 said he had discovered an alien species, here on their home planet, they were most reluctant to doubt it.

“It is the strangest thing. We find them only in the vicinity of volcanic vents in the deeps of the ocean, and they die quickly after being captured. It appears their immune systems cannot withstand the slightest contact with our microorganisms.”

941 displayed visuals, and most of the attendees captured them from video

terminals at their seats. The invaders appeared to be a very primitive sort, at best a hundred microns long, possessing no intelligence of significance.

“But how could such creatures have come through space?” came one question among many others from the audience, after he was finished. It was from ODG-123, an old friend of 941’s. 941 had no satisfactory answer, for this or for most of the other queries. The very existence of such a strange life form was sufficient reason for the conference, even though only the most preliminary results were available.

941 and 123 met for lunch. As they ingested silicon nuggets flavored with titanium and heavily salted with exotic crystals of carbon, 941 revealed private data not sufficiently analyzed for presentation in the open meeting.

“We’ve done electron microscopy of some of the creatures under cryogenic conditions,” 941 said. “The seat of their structure is a fascinating pattern of complex, carbon based molecules. Utterly indecipherable! Also, it looks as if they function by elementary oxidation, metabolically. They appear to have a queer and laborious energy conversion capable of functioning by sunlight, though these specimens were taken from an area where sunlight is totally absent.”

He paused. 123 was thoughtfully silent, then she swiveled in her seat and fixed all of her sensors on 941. “Can you tell me anything more about this pattern?” she said enticingly. Her upper appendages danced on the table in a way which would have been hypnotic to any small animal.

Even 941 was momentarily distracted. He had engaged in reproductive data mixing with 123 several times previously, and in the nuances of her question was a clear invitation. But she was an archaeologist, he could not let himself forget, and archaeologists and exobiologists were virulent rivals. She would not hesitate to exploit every kernel of information she could extract from him for her own papers, publishing them without a moment's delay.

Still, 941 could picture the two of them coiled in a reproduction sanctuary, blending data in a bridge from which would emerge a new entity. Some of their offspring were already preeminent in their own fields. Oh, what the hell! He couldn't resist. She could wind him around her slenderest appendage, and she knew it.

The first day of the symposium drew to an end. After a romantic dinner, at which they sipped frothing liquid nitrogen and downed chilled slices of dry ice coated with congealed hydrocarbons, 941 and 123 retired to the privacy of a hotel suite and began their fourth reproductive engagement. For weeks following the symposium, they would remain together in the most delicious experience a Jankx could imagine. Then the child would go to a growth center, self aware and able to supervise its own development. The days of extended parental child care were long past in the culture of the Jankx.

But there was a shocking disclosure that first night which changed everything. Teasingly, the first thing 123 wanted to probe was the information pattern that lay at the heart of the aliens. When 941 let her peek at it, she gasped and her barriers went up.

123 recoiled, as if she had been caught in the magnetic vortex of a transportation guideway. Her appendages drew in and she turned away. For a period of minutes, 941 lay beside her in frustration until 123 opened minimal communication channels. Inside, she seemed to be experiencing a kind of torment and disgust she could not express. All she would say was it was a mere hypothesis; she could not rest until she had explored it. The next morning, 123 broke her

engagement with 941 and left for her laboratory some thousands of miles away.

The remainder of the symposium was uneventful. More data was presented, but the enigmas remained. When the last words had been spoken, 941 had one thought in mind, to join 123 and find what had so violently distracted her that she had broken the engagement.

The train trip was brief, but enjoyable. The long, magnetically levitated vehicle raced over flat terrain at mach three, but when it encountered mountains it slowed to subsonic speeds and wound among the peaks and rivers. The part of the journey 941 enjoyed most was the section near the end, where the guideways ran sinuously through an enormous canyon, following the course of a river which had torn a gash nearly a mile deep in the overlying plateau.

The system designers could have taken a level route above the canyon and shaved ten minutes from the trip, but everyone agreed the longer journey was worth the extra time required. 123 had spent years in that canyon, tunneling into bedding planes in search of fossils. At the base of the canyon was one of her favorite resorts, where they planned to honeymoon in their current engagement before it was terminated. At the main continental terminal, on a hunch, 941 called the resort and sure enough, 123 was on the register. Twenty minutes later, he was back at the canyon and went in search of her.

It was in a side canyon he finally found her. Passing its entrance as he waded the main stream, he sensed 123's ID code faintly coming from the mouth of the tributary and followed it for a quarter mile until there she was, mulling over samples a quarter of the way up a rocky slope. When she saw him, she gave a joyous greeting and raced down the slope to the stream. There, her appendages wrapped around him and intertwined with his, she apologized and thanked him for coming after her.

"But why?" he said. "What's the matter?"

123 was silent for a moment. "Come with me," she said, and led the way to a high promontory overlooking the

canyon. On a ledge two thousand feet above the river, she had first shown him the site of a discovery of hers which had revolutionized the Jankx' understanding of their planet's past. Now, she withdrew into the shade of an overhang and invited 941 to join her. Then, slowly, she began a story she told him in advance she did not expect him to believe.

"Look into my thoughts, 941," she said. He let his communication appendages sink into her high bandwidth recesses and looked. "See the shapes?" 941 saw the skeletons of the ancient ones, long departed, who were the shapers of the land long before the Jankx evolved. As he watched, the pictures filled in and skeletons were covered by layer after layer of tissue and circulatory networks. Finally, an outer layer was added. 941 had seen these pictures before. Why was she showing them to him again?

"We modeled our current body designs, to the extent we could, after the evolved efficiencies of these creatures!" 123 cried. "We borrowed from their ancient machinery! We owe everything to them!"

It was a cry of agony. Why was she so upset?

"The tissue samples we reconstructed were three million years old, from the wastes of deserts in mountains south of the equatorial zone!"

The tones of her words distorted them almost to the point of incoherency. The pictures began to break down, washed with white noise, and 123's appendages began to quiver involuntarily. 941 tried, with a sense of futility, to comfort her. It was no use. He sensed her control centers driving her power supplies into overload, and there were spurious emissions of erratic transients indicating internal short circuits of kilovolt magnitudes.

"It's unforgivable! There's no way to atone for it! No decent Jankx could live with it!" 123 screamed, and with no other warning than that she moved quickly to the edge of the precipice and threw herself into space.

941 could not believe it and was momentarily immobile with horrified surprise; then he flung himself to the

brink and stared downward. Even before 123 smashed upon jagged rocks fifteen hundred feet below, the echoes of 941's cries of agonized despair reached those in the resort, and rescue groups were on the way.

The reconstruction of 123 was as good as it could be, but even the medical technology of the Jankx had its limits. Their bodies were evolved from colonies of inorganic assemblers, which multiplied and differentiated to form operative subassemblies according to designs which were encoded in such a way the Jankx scientists had yet to fully decipher many of them.

The Jankx traced their evolution back through several million years to a point known as the Great Discontinuity, when they appeared to have sprung into existence. Before that, a great profusion of other species had existed, and apparently all of them departed or vanished at the same time. A quest of the Jankx culture, a "holy grail" they sought to find, was the explanation of their origin and the fate of the earlier inhabitants of the planet.

The only things Jankx archaeologists had discovered were dried samples of countless species within which there were indecipherable patterns, patterns far too similar to the patterns 941 had shown 123 that night at the symposium. The archaeologists had been on the verge of publishing their pattern findings when the exobiologists had called their emergency meeting. The competitiveness and secrecy of the two groups defied explanation, yet it existed.

941 stayed with 123, day and night, for three full years. Within her, tiny assemblers sought to put the pieces back together. 941 warmed 123 when she cooled and drained her heat when her temperature rose. When she needed them, he supplied the purest of elements. Finally, when she began to stir with signs of consciousness, 941 held her, whispering when she softly called his name, which she had done throughout the fall to what she had expected would be her death. For a long while, it was not clear if 123 would ever truly be herself again.

One morning, as the sun rose and

light filtered into 123's recovery room, her sensors came into full focus. 941 woke immediately and held 123 as tightly as one Jankx could hold another without hurting. As she swam upward from a state of disorientation that pulsed still and seemed as if it would never end, 941 beckoned and coaxed her on. It took hours; then suddenly 123 was fully alert again. Shivers of the joy of life poured from her appendages into 941. She promised, in that moment, that she would never try to destroy herself again.

The aliens were an unspoken subject between them at first. 123 allowed herself to be drawn into an engagement with 941 again, and the two of them spent weeks away from civilization. Finally, a new offspring went to the growth center, and they were completely alone. In a hotel room near the growth center, 941 sensed it was time. He asked, "Why? What was it? That day on the ledge?"

123 trembled. Then she said, "Come with me to the Coastal Museum and I'll tell you." She would say no more.

Thus it was that one late afternoon they stood in front of portraits of the ancient ones, archives which survived the millions of years since the Great Discontinuity. 123 insisted they be seated. Hesitantly, she began to speak. As the minutes passed, she became engrossed in her subject. 941 relaxed. 123 seemed to be fully in control of herself. Perhaps this time it would go without difficulty.

"We arose from primitive assemblers, did we not?" 123 said.

941 nodded. It was an almost imperceptible movement of his head, but it served the purpose.

"And our designs, while not fully deciphered, are a rational form of an engineering systems approach?"

941 nodded again, uncertain of where this was headed.

"The culture of the ancient ones had this knowledge, and they could have designed us, but there are problems with that hypothesis."

"Why do you say that?"

123 gestured sarcastically. "Look at the early forms we took! Look at the first indications of specialization, as if the assemblers had stumbled by themselves on more efficient ways of cooperation!

Look at the first, clumsy steps toward locomotion, as if trial and error were being employed! See the interspecies competition in our predecessors, battling for survival. Would the ancient ones have designed these mutually destructive entities? Tell me!"

941's head inclined downward. It was his way of showing he was puzzled. "What are you trying to tell me?" he asked. "Why does it matter whether or not ancient ones designed us?"

123's tone was tense. "Our microorganisms, our primitive assemblers... they kill your 'aliens' at the volcanic sea floor vents. They dissolve my specimens from three million years ago if given the slightest chance. Every form of the profusion of life that was here before the Great Discontinuity suddenly vanished. Doesn't that tell you something?"

"What should it tell me?" 941 said, puzzled. His question was sincere, but in him a horror began to grow.

"The first assemblers, from which we arose, wiped out everything!" 123 practically shouted. "They dissolved everything except fossils and materials so remote they could not find them. Archaeologists' specimens, carefully preserved, and your 'aliens' from the ocean floor are all that remains of a world teeming with life. In its place we have the Jankx and a few primitive, competing species from which we arose!"

She could not go on. Jankx wept by a quivering release of pressurized gases. 123 was weeping.

941 contemplated the disaster of which she spoke. He saw primitive assemblers tearing down the huge life chain 123 had studied ever since she was old enough to have a purpose in life. The long vanished cities of the ancient ones? The trees, the animals, the sea life that once flourished? All those things which he and his fellow exobiologists sought in the void? They had been here, a few million years ago, and now they were gone, destroyed by primitive assemblers. And in their place? Jankx and a few other things made of assemblers!

A story from the literature of the ancient ones came to 941 suddenly. A little girl, Pandora, opened a box, and out came the evils of the world. 941 had a

flash of a new horror and rose in a panic. "Come with me," he shouted, and dragged 123 to her feet. He would not explain, as he rushed to his laboratory and confronted his supervisor.

"What are you upset about, 941?" 444 asked. 444 was the laboratory manager. He had never seen 941 like this. 941 stumbled through the story, assisted by 123.

"But what's the point?" asked 444. "It's project 877B," 941 said vehemently. "It's got to stop!"

"But that's your project!" "I know, but it has dangers we never considered."

"What?" "You've heard 123's hypothesis. What do you think of it?"

"Plausible!" "But then, what about 877B!" "What about it?"

"We're trying to synthesize organic life!"

123 added, "If you succeed, what you synthesize will be immune to our microorganisms."

"So?" 444 was showing signs of uneasiness.

"So if we create a form of organic life immune to our assemblers," 941 said, "perhaps it will be able to tear down assemblers. Suppose life like that were turned loose on our planet, to flourish; suppose it were able to dissolve the assemblers of which we're made. What would that mean to us?"

"It's too late," said 444.

"What do you mean?" demanded 941.

"You've been away for years, with 123," 444 reminded him. "In that time, 877B passed a major hurdle. The aliens? Your group found a way to modify the information pattern so the aliens are immune to our assemblers. They call the altered pattern XB4. It's like the original pattern with the addition of a diamond fiber web, and it replicates itself. Look out that window."

Outside the window, 941 and 123 could see little. "What's there to see?" 123 asked.

"Don't you see a faint, greenish tinge on those hills?" 941's circuits felt as if they were overloading.

"Don't tell me..."

"You were the one who always insisted life had to prove itself in the natural environment."

"But I didn't mean..."

"No matter what you meant. It's out there, now, and let's hope it doesn't have a taste for assemblers!"

"It doesn't," 123 laughed. "If it did, we wouldn't be here talking, now."

941 and 123 dined at the top of the tallest tower in the city that night. 123 could not contain her excitement.

"This is it, our chance to redeem ourselves," she said. "We can coax XB4 into patterns matching those specimens we archaeologists have preserved, thousands upon thousands of vanished life forms, safe and accounted for. These things can come to life again; the ancient ones can once more walk this Earth."

There was uncontrollable trembling as she spoke, nibbling on a sliver of icy quartz.

"941, you and your exobiologists had better get ready. Before you know it, you're going to have to deal with a truly extraordinary turn of events. We're going to recreate the all species in the life chain that created us. This time we can work together, to find ways we can protect each of us from the other." 1

BACK ISSUES OF *LifeQuest*

If you're enjoying these stories, you'll be happy to know that issues #1 and #2 of LifeQuest are already available on Alcor's website, under "links." For ease of finding them, the URLs are:

<http://www.alcor.org/lifeqst1.htm>

and

<http://www.alcor.org/lifeqst2.htm>

Issues #3 through #7 will, with time, be reprinted in Cryonics Magazine, but an influx of new fiction could make this a drawn-out process. If you would like to see the back issues posted to Alcor's website more quickly, let us know. We try to give first priority to projects we know will make the most Alcor Members safest and happiest.

How to Submit Stories to LifeQuest

Please send submissions to: *Cryonics* magazine, Alcor Life Extension Foundation, 7895 E. Acoma Drive #110, Scottsdale, AZ 85260, or email them to fred@alcor.org.

If in hard copy format, please also include a diskette (textfiles or one of these: Microsoft Word 97 & 6.0/95, or Pagemaker 6.5. Graphics (jpg/gif preferred) should be in color if available, as these are compatible with Alcor's web site. LifeQuest stories may be published on Alcor's web site barring agreed restrictions to the contrary.

Alcor's anticipated rights include one-time publication in *Cryonics* magazine and web site inclusion, nothing more, unless provided for in writing. Additional information on submissions may be found inside the front cover of *Cryonics*.

You *can* help others see why what Alcor does makes sense, by sharing your feelings, your deepest insights with them, in the form of LifeQuest fiction (short stories) or poems. If you have a vision, put it in writing and submit it for consideration.

Alcor Member Profile



KLAUS REINHARD

Profile Editor: Russell Cheney

With the Profile column, we wish to introduce the Alcor membership and the Cryonics Magazine readership to a wider view of itself, by communicating member ideas, beliefs and background. Alcor has hundreds of fascinating members who may now not be widely known in the cryonics community. We intend the Profile to be a relatively easy, informal medium to help provide some of these members the broader attention they deserve.

Member Name: Klaus Reinhard.

Profile Editor: Russell Cheney.

Date joined Alcor: September 16, 1991.

Place of birth: Braunschweig, Germany.

City and country of current residence: Kiel, Germany.

Date of birth: May 9, 1959.

Occupation: Computer programmer in a German bank.

Marital status: Single.

Children: None.

Educational background: Study in computer science. In high school and at the university, I had the best possible marks in the exams.

Height / Weight: 180 cm / 59 kg.

Favorite author: Arthur C. Clarke.

Favorite book: Engines of Creation by K. Eric Drexler.

Book you are currently reading: Diaspora by Greg Egan.

Favorite TV programs: Buck Rogers, Star Trek, Deep Space Nine, Babylon 5 (I recommend these only for entertainment, not because they contain any correct prognosis of the future).



Political affiliation: I agree to the positions of the Libertarians much more than to those of any other group, but unfortunately in Germany there is no Libertarian party.

Religion: In my life, cryonics plays a similar role as the religion in the life of other people. However, the reasons that I am a cryonicist (scientific evidence, logical considerations, and extrapolations of historical trends), are different from the reasons why most people believe in their religions.

Personal strengths: Logical thinking.

Personal weaknesses: My disease (juvenile-onset diabetes).

Personal philosophy: Leben und leben lassen (Live and let others live).

Short-term goal: To increase the number of cryonicists in Germany and to improve the possibilities for cryonics here.

Long-term goal: To live as long as possible, until all diseases including ageing can be cured (I do not believe that there is a high chance for me to reach this goal without cryonics, but as long as I can I will try).

Immediate goal upon reanimation: Enjoy my new body, which may be artificial or virtual, but will most likely not be handicapped by any disease.

Longer-term goals upon reanimation: 1. Help revive others; 2. Explore the universe.

Favorite subject in school: Mathematics.

Least-liked subject: Sports.

Greatest fear: Dying and not being preserved.

First became interested in life extension: I have always, even as a child, considered life as the highest value, and have never accepted an end of life. As a child and teenager I believed (without thinking too hard about it) that medicine would conquer all diseases within my life-time. Later, when I thought more about the complexity of problems in biology and medicine, I became interested in all means of life extension, including cryonics.

Most effective thing you've done to promote your own longevity (other than being an Alcor member): Consequent treatment of my disease; healthy eating (calorie restriction with adequate nutrition); not smoking; avoiding alcohol and other drugs.

Least: Not taking high doses of B-vitamins in my youth. If I had done this, I would eventually have prevented the diabetes. But at that time I did not know anything about the possible protective effect of B-vitamins against the auto-immune-reaction which destroys the insulin-producing cells.

Why you are a cryonicist: Because I see, as high probability, that future science will conquer death. I have even written a book about that. The full text is now online: <http://members.aol.com/klausrei/buch.htm>

Advice you have for other cryonicists: Despite all difficulties, do not give up. The unlimited life you can eventually win justifies all efforts.

(continued from page 22)

cryoprotective agent concentration, he said, close to the levels needed for vitrification. His work did not apply either extracellular cryoprotection nor freeze-blocking. With the addition of these measures, Dr. Fahy indicated that there is a high degree of confidence that vitrification can be obtained.

Dr. Fahy's presentation included discussion of experimental models, automated perfusion to accommodate his investigations, and descriptions of how his work would address both organ transplantation research and brain preservation studies. The complexity of

what he reported does not lend itself to even a summary as part of this review, however. Those who want those details will need to buy a copy of the videotape when it is released.

The work that Dr. Fahy reported is integral with the work of Dr. Wowk, whose talk preceded Fahy's. The same comments on Dr. Wowk are appropriate for Dr. Fahy, as to the implications of their work toward the development of what someday will be perfected human suspended animation. (It is intriguing, as well as deeply puzzling, that such work proceeds, almost invisible to the public who may soon benefit from it. Perhaps the imminent demonstration of organ

preservation in animals, with subsequent transplantation, will help to give their work more of the acknowledgement it deserves.)

This article covered only the scientific presentations of the first day of the conference. The evening event of the first day and the presentations of the final day will be the subject of a continuation article in the next issue.

1

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