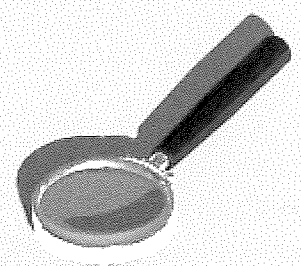
CRYONICS

1st Qtr. 1997 A PUBLICATION OF THE ALCOR LIFE EXTENSION FOUNDATION Volume 18:1

Max More examines the question. . .

Will Life Extension lead to OVERPOPULATION?



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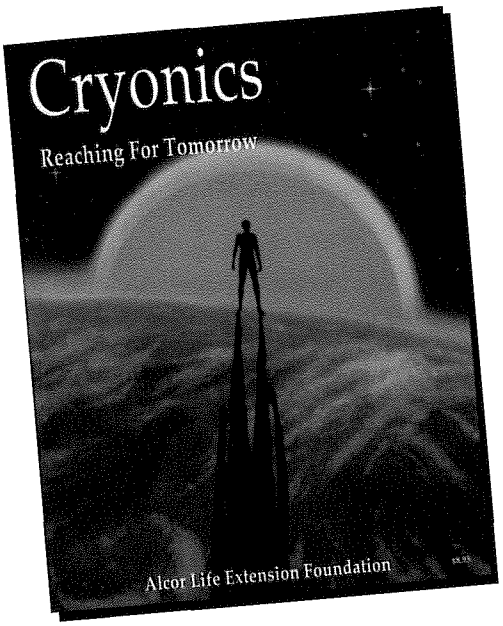
$4.50

"What *is* cryonics?"

Cryonics is the ultra-low-temperature preservation (biostasis) of terminal patients. The goal of biostasis and the technology of cryonics is the transport of today's terminal patients to a time in the future when cell and tissue repair technology will be available, and restoration to full function and health will be possible.

As human knowledge and medical technology continue to expand in scope, people considered beyond hope of restoration (by today's medical standards) will be restored to health. (This historical trend is very clear.) The coming control over living systems should allow fabrication of new organisms and sub-cell-sized devices. These molecular repair devices should be able to eliminate virtually all of today's diseases, including aging, and should allow for repair and revival of patients waiting in cryonic suspension. The challenge for cryonicists today is to devise techniques that will ensure the patients' survival.



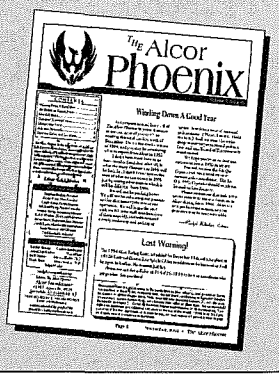
"How do I find out more?"

The best source of detailed introductory information about cryonics is *Cryonics: Reaching For Tomorrow.* Over 100 pages long, *Reaching For Tomorrow* presents a sweeping examination of the social, practical, and scientific arguments that support the continuing refinement of today's imperfect cryonic suspension techniques, in pursuit of a perfected "suspended animation" technology.

This new edition features an updated and lengthened chapter on revival, as well as the appendices "The Cryobiological Case for Cryonics" and "Suspension Pricing and the Cost of Patient Care." Order your copy for $7.95, or receive it FREE when you subscribe to *Cryonics* magazine for the first time. (See the Order Form on page 40 of this issue.)

For those considering Alcor Membership. . .

If you're intrigued enough with cryonics and Alcor that you're considering Membership, you might want to check out *The Alcor Phoenix*, Alcor's Membership newsletter. *The Phoenix* is a Membership benefit, so it's free to Members and Applicants, but anyone can receive it for $20/year ($25/year if you live overseas). It's released 8 times each year, on the "off months" of the quarterly *Cryonics* (February, March, May, June, August, September, November, and December). *The Phoenix* is shorter than *Cryonics*, but appears twice as often and is mailed First Class. Being a Membership newsletter, *The Phoenix* focuses on Membership issues such as financing cryonics, staff and management matters, developments in Patient Care and Emergency Response, etc. These issues will impact you directly if you decide to become a Member, and may help you make a more informed decision in the meantime.



Feature Articles

DEPARTMENTS

COLUMNS

ISSUE TO PRESS: December 20, 1996

UP FRONT

BY RALPH WHELAN, EDITOR

We are sorry to be so late with this issue. Your Editor is now working full-time as an internet specialist, and so has only been able to work on *Cryonics* part-time. Added to this were some incompatabilities with new computer hardware, followed by an attack of the flu.

We are calling this a combination 4th Quarter, 1996 and 1st Quarter, 1997 issue, to give us a chance to get back on the time track. We are discussing some different ways in which we might publish *Cryonics* to keep us up-to-date. All of your subscriptions will be advanced one issue.

On the facing page you'll see one of the more important news notes in this issue. I know you'll all want to join me in extending our heartfelt gratitude to Alcor President Steve Bridge for guiding Alcor through some difficult times. As Steve hands the reigns over to Alcor Co-Founder Fred Chamberlain III, we are perhaps as healthy and dynamic an organization as we have ever been. Thanks Steve, and good luck in all of your future endeavors.

If you have time to read only one other thing in this issue, turn right away to "A Rat Heart Beats After Being Frozen," on page 6. (Steve's column, on page 4, does make a nice introduction, though.)

And if your attempts to spread the word about cryonics have ever met with concerns about skyrocketing population figures or dwindling resources, pore over "Life Extension and Overpopulation" by Max More, Ph.D., and enter your next such debate armed to the gills!

Dear Editor:

On page 13 of the old *Cryonics: Reaching for Tomorrow* (3rd ed. Apr. 1991) there is a picture of a feline kidney with gross cracks, and a claim that this kind of damage is "in theory easily preventable" by not storing below -135 to -140° C. It says further that "Alcor is exploring alternative storage approaches which will allow for safe storage at -140° C, thus eliminating this kind of injury." That was a few short years ago. What alternative approaches has Alcor or the cryonics community come up with?

You may say that cracks will be fixed by the great cell repair devices of tomorrow. But why not prevent or mimimize them as far as possible today?

Yours truly,
David Kurzdorfer.

Dear Dave:

Of course we want to prevent as much damage as possible. However, we must remember that the goal of that proposal was not merely to prevent cracking. It was to keep the patient at some specific temperature which is cold enough to arrest all molecular activity, yet not so cold that the tissue cracks. Storage at -140° C has turned out to be a complex problem for several reasons.

1. Cracking may begin at temperatures higher than that which will halt molecular activity.

2. The precise temperature at which cracks occur appears to have much to do with the exact concentration of cryoprotectant which is in the patient. This concentration will vary from case to case — which could mean that each patient must be stored at a different temperature. If we change to new cryoprotectants in the future, we will be introducing more variables. A system in which each patient is stored at a different temperature is probably too expensive to be workable.

3. So far, the plans suggested for reliable, passive storage at even one temperature (-140° C) would require elaborate and expensive equipment and buildings. Most aspects of those plans are untested for practicality and reliability. Even if all research showed good results and a workable plan was eventually developed, constructing the first building (or room) would be extremely expensive.

4. Patients currently being stored at -196° C in liquid nitrogen could not be moved to storage at -140° C. The warm-up would likely cause further damage. Therefore, all current patient storage places would have to maintain two systems.

5. Funds for more focused research on this problem have not been available.

6. Evidence from research done by the Cryonics Institute (as well as from Alcor's experience in recent suspensions) suggests that most or all of the cracking damage can be prevented by slower freezing rates *at certain points in the cool-down process. The question of whether slower cooling rates introduces other kinds of damage has not been answered.*

Steve Bridge

PUBLICATION NOTES

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(Most of the first 160 issues—September, 1977 through December, 1993—were published on a monthly basis.)

About the Cover

The cover of this issue was designed by Ralph Whelan.

A Special Message from Alcor President Steve Bridge

Previously published in The Alcor Phoenix, *September, 1996*

The Coming Change in Alcor Presidency

As I have previously announced, I will be leaving my job as Alcor's President and CEO approximately February 1, 1997, after four years. This job has been exciting and rewarding in many ways (not financially, but one can't have everything—not in *this* century anyway). I have met some of the most interesting people in the world, and I feel good about my contributions to Alcor and to cryonics in general. However, cryonics management has increased my stress level beyond my comfort level, and the work load meant my personal life nearly disappeared.

So I will be moving back to Indianapolis, probably working as a public librarian again, and pursuing a new romance. I will remain an Alcor Director and plan to contribute my ideas, experience, and magazine articles for many years to come.

Fred Chamberlain to Become Alcor President in 1997

At the Alcor Board of Directors Meeting on Sunday, September 8, 1996, Alcor Directors chose Fred Chamberlain III as Alcor's next President, beginning in February. Fred and his wife Linda founded Alcor in 1972 and his father, Col. Fred Chamberlain, Jr., was Alcor's first suspension patient in 1976. Linda's mother, Arlene Fried, is also in cryonic suspension at Alcor.

Linda was the first president of Alcor and Fred was the second. Fred was an Alcor Director again from 1993-1994, and has been a special Alcor Advisor for the past two years. Linda is in her third year as an Alcor Director and her fourth as the head of Alcor's Patient Care Fund Investment Advisory Committee.

During the period when they were not Directors, Fred and Linda promoted Alcor and cryonics in general by organizing and hosting the annual Lake Tahoe Life Extension Festival, where many of us met for the first time. They are graduates of Alcor's Transport Training Class and have worked on suspensions in many capacities.

Fred was an electro-optical engineer at Jet Propulsion Laboratory from 1966-1979 and was responsible for portions of the Mariner Venus-Mercury and Voyager missions. After moving to Lake Tahoe, Fred and Linda ran a successful rental property management business. They are currently realtors in the mountain community of Payson, Arizona.

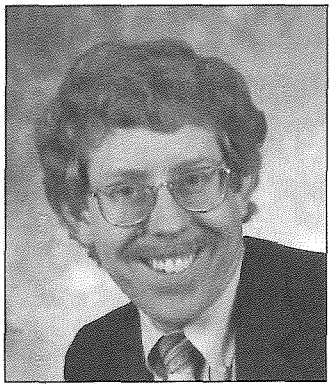
Fred will begin working at Alcor half-time about November 1st as Executive Director and full-time at the beginning of the year until he takes on the titles of President and CEO in February.

This will be the first time since at least the late '70s that Alcor will have a calm transition period in the change of CEO. I am looking forward to working with Fred in creating a smooth changeover. Frankly, with all of the other exciting things going on at Alcor, the usual acceleration that takes place with a new leader may be intensified. I hope all Alcor members will give Fred their support as he adjusts to the new responsibilities.

Linda Chamberlain to Become Suspension Services Assistant

At the same time as Fred is becoming Executive Director, Linda will become a half-time assistant to Tanya Jones, Alcor's Suspension Services Manager. Linda and Tanya will be working intensely to record and extend Alcor's suspension protocols and organization. As Linda becomes more familiar with the transport and suspension responsibilities, we anticipate that she will take over as Suspension Services Manager sometime later in 1997.

Both Linda and Fred are currently taking an EMT course to help prepare for their new duties.



Notes from the President by Stephen W. Bridge

A Turning Point in Cryonics Research?

Is 1996 the year that cryonics research was reanimated? Will we someday look back and say *this* was the year that the media finally found it acceptable to use the words "cryonics" and "science" in the same sentence?

Elsewhere in this issue you will read about two new research developments going on in cryonics. "Cryobiology Meets Cryonics — at Alcor" is about the joint involvement of Alcor and the Cryonics Institute in a new direction in organ cryopreservation. "Will the Prometheus Project Catch Fire?" concerns a new drive underway (outside of Alcor or other cryonics organizations) to develop a research company to solve the problem of reversible brain cryopreservation. These exciting new efforts show that the interest in cryonics-oriented research has taken a major leap forward. By the end of 1998, these two projected programs could be spending more money *per year* than all of the money spent on cryonics research in the history of this enterprise.

From Alcor's point of view, of course, we are most excited about the prospects of working on the discoveries of Michelle Olga Visser of South Africa. She has been able to take rat hearts—removed from the rat's body, but still beating—treat them with a new chemical, freeze them to the temperature of liquid nitrogen (-196° C or -320° F, the same temperature at which we maintain cryonic suspension patients), thaw the hearts, and watch them resume normal beating.

Alcor is working together with the Cryonics Institute (the organization presided over by Robert Ettinger, the founder of cryonics) to develop this technology for cryonics use. This relationship with CI has been a big step forward for us and we hope that more cooperation with other cryonics-related companies will be forthcoming. We cannot discuss the precise technology quite yet (until publication of Mrs. Visser's first paper on the subject late in 1996); but we hope to give you a more detailed picture of future research in the next issue of *Cryonics*.

The other development is the Prometheus Project, which is primarily the effort of Paul Wakfer, President of CryoSpan (the patient storage provider for CryoCare and American Cryonics Society). Paul, as an individual, not in his role with CryoSpan, has begun an immense personal and non-partisan project to raise pledges of $1 million per year for 10 years for brain preservation research.

The Prometheus Project has as its stated goal: "Convincingly demonstrated, scientifically proven and published, fully reversible, long-term brain cryopreservation within 10 years." While that may seem an extravagant goal, Paul has already solicited over $300,000 per year in pledges toward the formation of a company to achieve this. Alcor is not a sponsor of the Prometheus Project and is making no recommendation on it at this time; but we want our members and readers to be informed about the possibilities.

Previous to this year, most of the cryonics-related research taking place was on a considerably smaller scale. For instance, Alcor has achieved some modest but important technical developments in transport equipment, suspension computerization, and understanding the conditions under which frozen tissue may crack. Dr. Yuri Pichugin of the Ukraine, work-

ing with the Cryonics Institute, has also studied the cracking problem and seems to have made some progress in regaining coordinated bioelectrical activity in frozen-thawed rabbit brains. (Reported in *The Immortalist*, September and November, 1995.)

Mike Darwin's company, BioPreservation, has recently reported some impressive progress in research to use "liquid ventilation" to cool patients more rapidly in the early stages of transport. This involves filling the lungs with a cold fluid which can exchange oxygen and carbon dioxide. (Reported in *CryoCare Report*, April, 1996)

While these developments are all useful, they are minor when compared with the real goals of cryonics. Before a large number of people will take cryonics seriously, we have to put a lot of money into *proving it will work* — that we can indeed preserve human identity at -196° C in liquid nitrogen. I've been deeply involved in cryonics for almost twenty years and *I still want this proven.*

This new focus on research may represent a kind of turning point in cryonics, or perhaps a sign that a particular "critical mass" is being reached. It is especially important that cryonicists are now talking about the requirement of realistic budgets. Cryonics-transforming research simply cannot be done for $20,000 per year. We need to think about numbers in the millions, just to start with, like every other branch of science and technology does.

At Alcor, we are still exploring exactly which of dozens of possible directions we might take to explore the Visser discoveries. Even before an exact research plan is developed, research donations from our members and readers would be helpful in order to promote the planning. We would also like to begin hiring other scientists to help Alcor researcher Hugh Hixon with the initial steps. Once that is established, we will be asking for *major* donations from all of you and from others in the more "mainstream" areas of science.

> "...we are most excited about the prospects of working on the discoveries of Michelle Olga Visser of South Africa. She has been able to take rat hearts... freeze them to the temperature of liquid nitrogen (-196°C or -320°F, the same temperature at which we maintain cryonic suspension patients), thaw the hearts, and watch them resume normal beating."

One important result of the Visser discoveries may be a brand new interest in cryobiology, which seemed to have reached a dead end except for Dr. Gregory Fahy's vitrification research. Even that had been stifled in recent years by funding difficulties and government red tape. If many new scientists come into cryobiology and begin looking at the problem with fresh eyes and attitudes — and with adequate funding — I would expect to see completely unknown pathways being opened.

This Fall I have even noticed a serious change in attitude from media interviewers, who suddenly seem to have noticed that biological tissue can indeed be frozen and thawed. They are under-informed and overly excited; but perhaps that is an improvement on un-informed and indifferent. They actually seem to *want* cryonics to work.

When Ettinger's book, *The Prospect of Immortality*, was first published in 1964, there was a several-year period of cryonics enthusiasm from scientists and reporters; but when the early ideas went nowhere, the glow faded. Excitement with no results often produces a backlash which says, "I guess there was nothing to it after all" and the initially excited then feel cheated. They often become opponents of the idea which they had once championed.

Cryonics stayed pretty much out of the public eye until events of the middle and late 1980's. Eric Drexler's book, *Engines of Creation*, pointed out how nanotechnology might be able to resuscitate frozen humans. The Dora Kent suspension and Thomas Donaldson's attempt to gain a California court's permission for cryonic suspension before legal death brought the most media attention to cryonics since the publication of Ettinger's book. In the past three years, coinciding with Alcor's move to Arizona, the amount of intelligent attention being paid to cryonics has steadily increased.

In the next two or three years, cryonics may have its first opportunity to get serious media coverage for its *research*, for the *accomplishments* of cryonicists instead of just their neat ideas. I would very much like to see that happen. If we can accomplish some convincing research before the end of the century, then cryonics will never be in danger of dropping back to the state of public ignorance and indifference it held in the 1970's.

A Rat Heart Beats after being Frozen

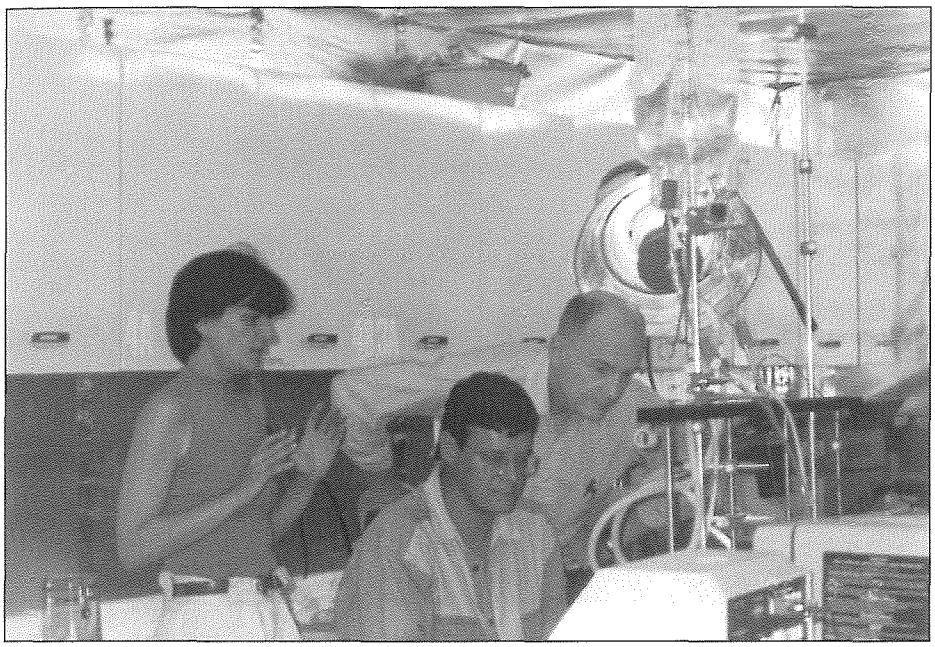
Cryobiology Meets Cryonics — at Alcor

Michelle Olga Visser, a researcher and Ph.D. candidate at the University of Pretoria, South Africa, has made news recently for an important accomplishment in organ preservation. Specifically, she has been able to restore rat hearts to beating condition after immersion in liquid nitrogen. The immersion has lasted up to 45 minutes—more than enough to chill the entire small organ down to liquid nitrogen temperature (-196° C). Potential applications include organ banks for transplantation—with the possibility that many lives could be saved.

Mrs. Visser's breakthrough in restoring rat hearts after liquid nitrogen immersion was in August 1995. A report was written; it was met with skepticism or indifference, and publication was apparently delayed by requests for revisions. The Vissers use a cryoprotectant that is a proprietary secret at present but should become public knowledge soon, when the report is published. She is interested in developing her cold storage technology mainly as a means of preserving organs for transplantation. Their technique is relatively simple and quick, and appears to hold considerable promise, yet much work remains before it can be applied in human medicine. Meanwhile—there is cryonics.

Adapted by Steve Bridge from a report first prepared by Mike Perry for *Venturist Monthly News* (September, 1996).

Mrs. Visser did not start out trying to develop a technique for cryonics, yet lately she and her husband, engineer Siegfried Visser, have become involved with cryonics organizations in the United States, and have visited one of their facilities. At the end of August, 1996 the Cryonics Institute and Alcor co-sponsored a visit and demonstration by the Vissers. At Alcor Foundation's headquarters in Scottsdale, Arizona, in a laboratory used and lent by CryoSearch, Inc., on September 1 the Vissers first successfully demonstrated their technique outside of South Africa. A rat heart beat, weakly, after immersion in liquid nitrogen and rewarming. In all it was difficult going—there were several failures in as many long days of work. The limitations of unfamiliar equipment



Michelle Olga Visser (left), Siegfried Visser (seated), and Fred Chamberlain keep a watchful eye as perfusion of the rat heart begins.

and the short time available for training Alcor personnel to assist the Vissers meant that the rat hearts at Alcor were frozen no longer than one and a half minutes. Three hearts resumed beating, another weak, and one strong. But there was unequivocal confirmation of the Visser technique.

The Vissers were assisted in their endeavors by Alcor personnel Hugh Hixon and Tanya Jones and by CryoSearch President Rhonda Iacuzzo. Witnesses included Steve Bridge, Mike Perry, Robert and Mae Ettinger, Fred and Linda Chamberlain, David Pizer, Paul Garfield, Ralph Whelan, Brian Shock, Derek Ryan and Mathew Sullivan. Michelle Boorstein, an Associated Press reporter, was also present and wrote an article, which has been widely printed around the United States. In all the Vissers spent nearly a week at the facility, and impressed everyone with both their scientific dedication and their kindness.

The connection between the Vissers and cryonics came as the result of an inquiry by Anatol Dolinoff, president of the Cryonics Society of France, who seems to have been one of the first people outside of South Africa to take their work seriously. He suggested the Vissers get in touch with Robert Ettinger. After an extensive e-mail correspondence, a visit was arranged to the Alcor facility in Scottsdale, where the Ettingers also live. (The Ettingers remain members of Cryonics Institute in Michigan, which they helped to start in 1976.) In return for their collaboration the Vissers received an undisclosed amount of funding support from Cryonics Institute and Alcor. Meanwhile the Vissers have given the two organizations exclusive license to use their present and future technology for cryonics purposes, which includes the right to sublicense.

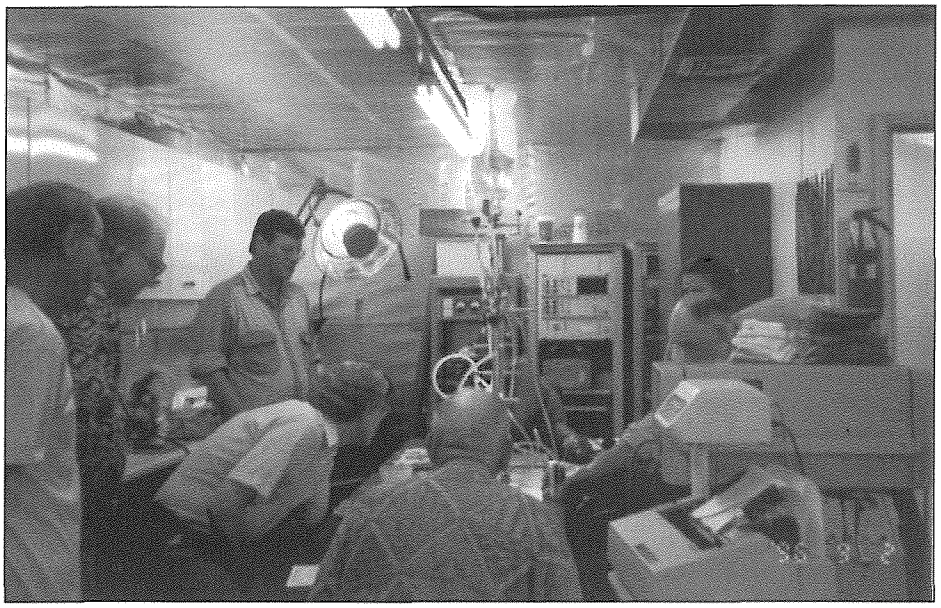
In addition to the research potential, two other important accomplishments of the Vissers' continuing involvement can be noted, both almost without precedent. (1) It is a serious, public collaborative effort involving both cryobiologists and cryonicists. (Despite the similarities of the two fields, cryobiologists have publicly disparaged cryonics in the past. The Society for Cryobiology, the leading organization of cryobiologists, has a written policy of barring individuals from membership based on their involvement in cryonics. Happily, the Vissers are free of this prejudice and welcome the opportunity to work with us.) (2) It is also a serious collaborative effort between two competing cryonics organizations.

Michelle Olga Visser is Head of Research, Department of Thoracic Surgery, Faculty of Medicine, at the University of Pretoria. By training and practice she is a perfusionist; but she is also working on a Ph.D. in cryobiology. In addition to working for the University hospital, she is also an independent contractor. She has been doing research in organ preservation for the last three years, after starting the first homograft bank in Pretoria eight years ago at her department. The bank was set up to store heart valves harvested for reimplantation, and uses standard cold-storage techniques based on dimethyl sulfoxide (DMSO). From this beginning she developed a strong interest in better procedures for organ preservation, which led to the work she is now pursuing. Her husband Siegfried ("Zigi") is a consulting engineer and acts as a lab partner. He is also the main business decision-maker in the Vissers' company, Cryopreservation Technologies cc.

In response to questions about more technical details, Alcor biochemist Hugh Hixon had this to say: "What we have had is a persuasive (but partial) demonstration by Visser that she can in fact cryoprotect a rat heart, cool it to very near LN_2 temperature [liquid nitrogen, -196° C or -320° F], rewarm it, decryoprotect it, and get it to beat again. This means that at least most of the muscle cells, the vasculature, and the heart's autonomic nervous system are all func-

tional, as are the cell membranes and portions of the protein biochemistry. Given the limitations of the beating heart preparation, this is very good performance."

How does this compare with previous cryobiological feats? Hugh comments, "Up to this point, all that has been taken to LN_2 temperature and survived are many types of individual cells, some vascular structures like heart valves where the underlying structure is more important than the cells that make it up, and arctic beetles that, while they have a 65% survival rate at dry ice temperature for a couple of months, die after exposure to LN_2 temperature. (But they stagger around a bit before they die, which used to be the most impressive performance anybody knew about.)"



The action was thin, but the drama was overwhelming: we were watching the first ever (on this side of the planet) recovery of a complete mammalian organ from liquid nitrogen temperature.

Though the results with the hearts were impressive, the important organ for cryonics is the brain. As yet it is unknown how well the cryoprotectant may preserve the brain, compared to other substances, though apparently it does penetrate the blood-brain barrier, a crucial property. Brain studies using the Visser cryoprotectant are now a high priority at Alcor.

Media coverage of the Visser experiments was assured by Associated Press reporter Michelle Boorstein who witnessed some of the proceedings at the Alcor lab. Her story, "Tiny heartbeat may be sound of transplant revolution," appeared September 23. Before that there was a report in a local Scottsdale paper, with follow-up coverage on radio and TV. (There has been some oversight in this coverage in that Alcor is given much credit while the vital role of Robert Ettinger of CI has gotten little mention. One hopes this deficiency may be remedied and full credit given where due.)

An interesting question is why the Vissers chose to collaborate in the first place. Apparently, they needed money for research and couldn't find investors in their controversial, unpublished technology through more conventional channels. Though not cryonicists they had no qualms about associating with cryonicists and were mindful of the special interests we would have, e.g. protecting the brain, which is not an organ used for transplants.

They followed Dolinoff's advice and contacted Ettinger because, according to Olga, "as the founder/father of cryonics, Professor Robert Ettinger was the obvious choice to initiate the cryonics potential of this technology." They also recognized that Alcor and CI together comprised a majority of the worldwide cryonics community, which would stand to benefit if an arrangement could be worked out. The fact that Ettinger is near the Alcor facility made collaboration between the two organizations more feasible.

During their visit the Vissers stayed with Mae and Robert Ettinger. They were, as Prof. Ettinger put it, "pleasant, considerate, and extremely interesting guests. There were many long conversations on a variety of topics—especially between the Vissers and Mae, since Bob was often tied up with other duties. ... Mrs. Visser, despite her amazing energy, drive, and perfectionism, is also kind and understanding."

The agreement with the Vissers involves only two cryonics organizations, but other groups will be able to use their basic approach for research as soon as their paper appears. Their work has certainly opened some new possibilities for cryonics, as well as more conventional cryobiology. We can cautiously hope that the dream of reversible cryopreservation has been moved closer to fulfillment, and that cryonics organizations will increasingly be accepted in the scientific community.

Sources (dates, authors in parentheses): (1) Press release (Sep. 9; Robert Ettinger and Stephen Bridge); CryoNet messages 6856 (Sep. 8; Robert Ettinger and Stephen Bridge); 6926 (Sep. 17; Hugh Hixon); 6940 (Sep. 19; Olga Visser); 6971 (Sep. 24; Mae Ettinger).

Life Extension and OVERPOPULATION

By Max More, Ph.D.

The prospect of living longer appeals to many people. Extending lifespan more drastically beyond the current genetic limit of 120 years appeals especially to persons of independent mind. These are people used to going their own way, questioning traditional beliefs, and asserting their values independently of those around them. Yet even even we independent thinkers are social beings. Many of our goals require the support of others, and achieving extended life is one of these. We can exercise, diet, and develop healthy psychologies mostly alone or with a few fellows, but scientific breakthroughs in longevity will not happen without broad support and funding. New treatments may be delayed or prohibited if the cultural and legal mindset moves against "interfering" with the human lifespan.

Recognizing these social factors, many of us frequently find ourselves persuading others that extending life is a desirable goal. In making the case for active support of life extension or cryonics, several arguments come up over and over again. We are told that our limited lifespan is natural, or that it is God's will, or that extreme longevity would drain life of meaning. More common than these objections, we hear fears about overpopulation. Since the 1960s, with the advent of bestsellers like Paul Ehrlich's *The Population Bomb*, writers have been getting rich by proclaiming humankind's impending doom due to overpopulation. In this essay, I hope to provide a compact response to this concern. For more

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detail, I urge the reader to consult the references at the end.

1. Let us assume for a moment that population growth is or will become a serious problem. Would this give us a strong reason for turning against the extension of human lifespan? No. Opposing extended life because it might add to existing problems would be an unethical response. Suppose you are a doctor given a child to treat who is suffering from pneumonia. Would you refuse to cure the child because then she would be well enough to run around, fall down, and skin her knees? Our first responsibility is to live long and vitally and to help others do the same. Once we are at work on this primary goal, we can focus more energy on solving other challenges. Life extension and optimal living for the individual certainly benefits from a healthy physical and social environment. The life extensionist may want to be part of the solution to any population issues, but dying is not a responsible or healthy way to solve anything. Besides, if we take seriously the idea of limiting lifespan to control population, why not be more active about it? Why not encourage suicide? Why not execute anyone reaching the age of 75?

2. Limiting population growth by opposing life extension not only fails the ethical test, it also fails the pragmatic test. Keeping the death rate up simply is not an *effective* way of slowing population growth. Population growth depends far more on how many children families have than on how long people live. In mathematical terms, longer life has no effect on the exponential growth rate. It only affects the constant of the equation. This means that it matters little how long we live after we have reproduced. Compare two societies: In country A, people live on average only to 40 years of age, each family producing 5 children. In country B, the lifespan is 90 years but couples have 4 children. Despite the much longer livespan in country B, their population growth rate will be much lower than that of country A. It makes little difference over the long term how many years people live after they have had children. The population growth rate is determined by how many children we have, not how long we live.

"It makes little difference over the long term how many years people live after they have had children. The population growth rate is determined by how many children we have, not how long we live."

Even the apparent short term upward effect on population due to a lower death rate may be cancelled by a delay in child-bearing. Many women in developed countries (those who will be first to have extended life) choose to bear children by their early '30s because their chances go down as they age. Extending the fertile period of women's lives would allow them to put off having children until later, while they concentrate on their careers. Not only will couples have children later, they will be better able to care for them, financially and psychologically.

Even if there is a population problem, extending the human life span will worsen the problem no more than will improving automobile safety or worker safety, or reducing violent crime. Who would want to keep these deadly threats high in order to combat population growth? If we want to slow population growth, we should focus on reducing births, not on raising or maintaining deaths. If we want to reduce births, we might voluntarily fund programs to provide contraceptives and family planning to couples in poorer countries. This will aid the natural developmental process of choosing to have fewer children. Couples will be able to have children by choice, not by accident. Women would also be encouraged to join the modern world by gaining the ability to pursue vocations other than child-raising.

3. We have seen that we have no reason to hesitate in prolonging life even if overpopulation really is a concern. But how much should we worry about the growing population? Is population growth accelerating out of control? Is expanding population causing major and unavoidable problems? The fad for popular books foretelling doom started in the 1960s, at the tail-end of the most rapid increase in population in human history. Growth has been slowing down, and we have sound reasons to ex-

Crude Birth Rates 1950-1980 and Crude Birth Rate Declines 1950-65, 1965-80, and 1950-80: Less Developed Countries

	CBR 1950	CBR1965	CBR 1980	% decline in CBR		
				1950-65	65-80	50-80
Africa	46.9	47.1	46.1	-0.2	2.4	2.2
Americas	42.2	40.2	32.4	5.8	19.6	24.7
Asia & Pacific	40.9	39.4	30.0	4.1	26.2	28.8
Total	41.8	40.5	32.6	3.7	22.3	24.9

Source: Mark Perlman, "The Role of Population Projections for the Year 2000" in *The Resourceful Earth*, eds. Julian L. Simon & Herman Kahn.

pect this trend to continue. In the Western world, population has stabilized. In some countries, such as Germany, the size of the population is actually falling, as more people die than are born. The population of the USA would be static were it not for an influx of new mind and muscle through immigration. The poorer countries, well below us in the development cycle, have also been experiencing a drastic reduction of population growth, despite extra decades of life bestowed by medical intervention and nutrition.

The peak average annual population growth rate was reached in 1970 at 2.07%. The rate for 1997 is expected to be 1.36%. Developmental trends suggest that this growth rate will drop below 1% in 2016, and fall to around 0.46% by 2049. Every year at present, the world population grows by around 80 million people. By 2050, we will be adding perhaps 40 million per year, a number that we can expect to continue dropping.[1] This slowing of population growth results from a falling birth rate. The birth rate in Asia and the Pacific, between 1950 and 1980 fell 28.8%, and in the Americas by 24.7%. Africa, further behind on the development curve, reduced its birth rate by 2.2% in the same period, all of it being in the second half of the period. Overall, for the less developed countries, birth rates fell 24.9% from 1950 to 1980. These figures are shown in table form above.

Why, though, should we expect people in less developed countries, even given contraceptives, to choose to have smaller families? This expectation is not merely speculation based on recent trends. Sound economic reasoning explains the continuing trend, and makes sense of why Africa is only just beginning to make the transition to fewer births.

Decelerating population growth appears to be an inevitable result of growing wealth. Early on in a country's developmental curve, children can be regarded "producer goods" (as economists would say). Parents put their children to work on the farm to generate food and revenue. Very little effort is put into caring for the child: no expensive health plans, special classes, trips to Disneyland, X-Men action figures, or mounting phone bills! As we become wealthier, children become "consumer goods". That is, we look on them more and more as little people to be enjoyed and pampered and educated, not beasts of burden to help keep the family alive. We spend thousands of dollars on children to keep them healthy, entertain them, and educate them. We come to prefer fewer children to a vast mob of little ones. This preference seems to have reinforced changing tastes resulting from improved education. The revenue vs. expense equation for extra children further shifts toward having fewer offspring as populations become urbanized. Children cost more to raise in cities and can produce less income than in the country.

Fertility declines for another reason: As poorer countries become wealthier, child mortality falls as a result of improved nutrition, sanitation, and health care. (Reduced child mortality in modern times can come about even without a rise in income.) People in poorer countries are not stupid: they adjust their childbearing plans to reflect changing conditions. When child death rates are high, research has shown that families have more children to ensure achieving a given family size. They have more children to make up for deaths, and often have additional children in anticipation of later deaths. Families reduce fertility as they realize that fewer births are needed to reach a desired family size.[2] Given the incentives to have fewer children as wealth grows and urbanization proceeds, reduced mortality leads to families

"Today, the USA has proven reserves sufficient to last hundreds or thousands of years. If one resource does begin to run low, rising prices will encourage a switch to alternatives. "

choosing to reduce family size.

Economic policy helps shape childbearing incentives. Many of the same people who have decried population growth have supported policies guaranteed to boost childbirths. More than that, they boost childbearing among those least able to raise and educate children well. If we want to encourage people to have more children, we will make it cheaper for them to do so. If we want to discourage fertility, or at least refrain from pushing it up, we will stop subsidizing it. Subsidies include free education (free to the parents, not to the taxpayers), free child health care, and additional welfare payments to women for each child they bear. If parents must personally bear the costs of having children, rather than everyone else paying, people will tend to have just the number of children for whom they can assume financial responsibility.

4. We can expect population growth to continue slowing until it reaches a stable size. That may be 12 billion, perhaps 15 billion. Can the Earth support such a number? We can take little comfort in stable numbers if those numbers are unsustainable. A detailed answer to this question demands far more space than I have here. References to excellent writings on the subject can be found in the Further Reading appendix. A few brief points will have to do here. A reading of economic and social history quickly makes one thing plain: Throughout history people have thought they saw overpopulation. Even the great nineteenth century social scientist W. Stanley Jevons in 1865 claimed that England's industrial expansion would soon cease due to the exhaustion of the country's coal supply. However, as shortages developed, prices rose. The profit motive stimulated entrepreneurs to find new sources, to develop better technology for finding and extracting coal, and to transport it to where it was needed. The crisis never happened. Today, the USA has proven reserves sufficient to last hundreds or thousands of years. If one resource does begin to run low, rising prices will encourage a switch to alternatives. Certainly, even a vastly bloated population cannot hope to exhaust energy supplies. (Solar energy and power from nuclear fission and soon fusion are practically endless.) So long as we have plentiful energy we can produce substitute resources and even generate more of existing resources, including food. Even if population continues to grow well beyond 15 billion, we can expect human intelligence and technology to comfortably handle the numbers.

5. Neither should we expect pollution to worsen as population grows. Contrary to popular belief, overall pollution in the more developed countries has been decreasing for decades. In the USA, levels of lead have dropped dramatically. Since the 1960s levels of sulphur dioxide, carbon monoxide, ozone, and organic compounds have fallen despite a growing population. Air quality in major urban areas continues to improve, and the Great Lakes are returning toward earlier levels of purity. This is no accident. As we become wealthier, we have more money to spare for a cleaner environment. When you are hungry for food and shelter and other basics, you will not spare much thought for the environment. So long as mechanisms exist for converting desires for cleaner air and water and space for recreation into the things themselves, we can expect it to happen.

Most effective at spurring the positive changes are markets—price signals creating incentives for moves in the right direction. If polluters must pay for what they produce because their activity intrudes on the property rights of others, they will search for ways to make things with less pollution. Pollution problems do exist. Most of them can be traced to a failure to enforce private property rights, so that resources are treated as free goods that need not be well-managed. Fishing in unowned bodies of water is an example of this. The desertification of collectively or government owned land in Africa is another. We can be reasonably confident that the trend towards less pollution with greater population will continue. Complacency is out of place however. We should press for responsible management of resources by privatising collectively owned resources to create incentives for

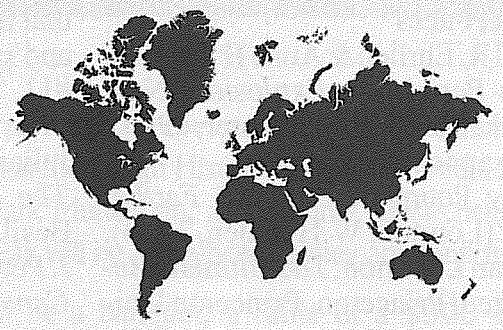
sound management and renewal.

6. Human intelligence, new technology, and a market economy will allow this planet to support many times the current population of 5.7 billion—it can support many more humans than we are likely to see, given trends toward lower birth rates. Many countries, including the USA, have a rather low population density. If the USA's population were as dense as Japan—hardly a crowded place overall—our population would be 3.5 billion rather than 265 million. If the USA had a population density equal to that of Singapore, we'd find almost 35 billion people here, or almost seven times the current world population. New technologies, from simple improvements in irrigation and management to current breakthroughs in genetic engineering, should continue to improve world food output. Fewer people are starving despite higher populations. This does not mean feeling satisfied. Millions still go hungry or are vulnerable to disruptions in supply. We need to push to remove trade barriers, abolish price controls on agriculture (which discourage production and investment), and pressure governments engaging in warfare and collectivization to change their ways.

So long as we continue to allow freedom to generate more wealth and better technology, we can expect pollution to continue abating. More efficient recycling, less polluting production processes, and better monitoring and detection of polluters, along with economic incentives making each producer responsible for their output, will allow us to continue improving our environment even as population grows. Far-sighted engineers foresee a day, not far off, when we will be able to completely control matter at the molecular level, a technology known as nanotechnology. If we achieve this level of mastery, we will have the keys to production without pollution. Another product of molecular manufacturing will be the disappearance of most large-scale, clumsy machinery. Less and less land will need to be used for manufacturing equipment, making more room for people to enjoy. Some manufacturing will be moved into space. The result of these and other changes (some of which are already underway) will be the freeing of the Earth from unwanted, but previously necessary, means and by-products of manufacturing.

Membership Status

Alcor has 400 Suspension Members, 469 Associate Members (includes 62 in the process of becoming Suspension Members), and 33 patients in suspension. These numbers are broken down by country below.



Country	Members	Applicants	Subscribers
Argentina	1	0	1
Australia	12	1	5
Austria	2	0	0
Belgium	0	1	0
Canada	10	2	13
China	1	0	0
France	0	0	2
Germany	2	1	1
Holland	0	0	1
Ireland	0	0	2
Italy	0	2	2
Japan	0	1	2

Country	Members	Applicants	Subscribers
Lithuania	0	0	2
Malaysia	0	0	1
New Zealand	0	0	2
Russia	0	0	5
South Africa	0	0	1
Spain	6	0	0
Sri Lanka	0	0	1
Sweden	0	0	2
U.K.	18	3	6
U.S.A.	348	51	357
Ukraine	0	0	1
TOTALS	400	62	407

Since we are considering the long term, here's a final thought: If the future feels too crowded for us, we can always leave and make a fresh start. Just as malcontents left Old Europe to come to America's New World, some of us will leave this planet to found new societies in the unlimited depths of space. New launch systems, new materials, molecular-scale manufacturing, and robotic construction will, in the coming century, open up the space frontier in an affordable manner. Adventurous folks, and those desiring experimentation and the freedom to make major changes, will blast out of the Earth's gravity well. They will create new habitats in space—not cramped little capsules, but grand, freewheeling, custom space habitats with the comforts of home but fewer of the limitations.

The population issue raises numerous factual, economic, and ethical concerns. I cannot hope to deal with them adequately here. I urge the interested reader to check into the sources listed in the References. I have only sketched lines of thinking showing that we would be severely misguided not to push for extended life out of fear of overpopulation. Let us move full speed ahead with extending lifespan. Once we have vanquished

aging, I would expect other threats to life, such as war and violent crime, will become even less acceptable. We can look forward to a long-lived society better off than previous generations not only in economic well-being but in security of life and health.

References

Paul R. Ehrlich & Anne H. Ehrlich, *The Population Explosion* (New York: Simon and Schuster, 1990). The apocalyptic view.

Jerry Pournelle, *A Step Farther Out* (London, W.H. Allen, 1980).

Julian L. Simon, *The Ultimate Resource* (Princeton, Princeton University Press, 1981).

—*Population Matters* (New Brunswick, N.J.: Transaction, 1990).

— "Resources, Population, Environment: An Over-Supply of False Bad News", *Science* 208, June 27, 1980, pp.1431-1437.

— "Bunkrapt: The Abstractions that lead to scares about resources and population growth," *Extropy* #11, Summer/Fall 1993, pp.34-41.

Julian L. Simon & H. Kahn, eds., *The Resourceful Earth* (Oxford: Basil Blackwell, Inc. 1984).

J. Peter Vajk, *Doomsday Has Been Cancelled* (Culver City, CA, Peace Press, 1978).

Acknowledgments

For comments on my first draft that helped improve the content and structure of the arguments, my thanks to Robin Hanson and Alexander "Sasha" Chislenko.

For an introduction to the works of Julian Simon, see my review essay, "Economist Against the Apocalyptics" in *Extropy* #9, Summer 1992.

[1] [Source: U.S. Bureau of the Census, International Data Base.]

[2] Julian L. Simon, *The Ultimate Resource*, p.184

Fund-Raising Update

By Steve Bridge

After several months of fundraising experience this year, primary fundraiser Dave Pizer decided that his original arrangement with Alcor was not in Alcor's best interests. You may recall that Dave was to be paid on a commission basis for donations he brought in, with the scale running as high as 25% for the first $200,000. In accordance with his suggestions, Alcor has entered into a more satisfactory fundraising agreement with Pizer Enterprises (Dave's company).

Dave Pizer will now (beginning October 1) be on a monthly salary of $200.00 for fundraising activities. Two helpers will receive $100.00 each per month. None will receive any commission for donations within the cryonics community (loosely defined as suspension members or signups from any organization, or other individuals who intend to become suspension members within the next year or two).

At the beginning of each January, Dave Pizer will set a goal for Alcor fundraising for the year. His salary for the year will be set at 5% of that goal, with two helpers set at 2.5% each. If the team exceeds the goal for the year, no extra will be paid to Dave or to the helpers. If the team falls short of the goal for the year, Pizer Enterprises will refund to Alcor the difference between the amount of fundraising salary paid (to all three workers) and the amount of commission that actually would have been earned if total pay was being figured on a commission basis of 10%.

In other words, if Dave decides the goal for 1997 is $48,000, Alcor would set his annual salary at $2,400 ($200 per month), and the helpers at $1,200 each ($100 per month). If Dave's team brings in $60,000, they earn no extra. If they bring in $40,000, Dave would have to refund $800 to Alcor.

This would seem to be an effective strategy for motivating the fund-raising team to set the goal as high as possible without going beyond what is realistic, and then working hard to achieve this goal. The team can still earn commissions if they set up special fundraising projects which target individuals or organizations outside of cryonics. Such an effort has never been tried before and would require a lot of work and creativity.

We hope this will relieve some cryonicists' concerns about the previous fundraising arrangement and increase their willingness to donate money to Alcor. Thank you to Dave for rethinking this plan for the good of Alcor.

Alcor Cryonics Technology Festival

January 31-February 2, 1997

Scottsdale, Arizona

The second Alcor Cryonics Technology Festival is almost upon us! Among the confirmed speakers for this year's festival are cryobiologist Michelle Olga Visser, Alcor researcher Hugh Hixon, Alcor CEO Fred Chamberlain, Cryonics Institute President Bob Ettinger, Alcor member Mark Muhlestein, and Biotime researchers Hal Sternberg and/or Paul Segall. (Other speakers tentatively slated to speak will be announced as they are confirmed.)

Besides the exciting panel of speakers and topics, there will be a banquet, a raffle of a $300 color lithograph (and other interesting items), a research demonstration, and plenty of time for socializing throughout the weekend. A full conference schedule of events will be published in the December *Phoenix*.

The festival will again be held at the Best Western Thunderbird Suites and the Alcor facility (both located in the Scottsdale Airpark). Registration is $75 in advance (prior to January 31), and $95 at the door. The registration fee pays for all conference events including the banquet, but does not include lodging or other meals.

We have arranged for attendees to receive a special price on a suite at the Thunderbird Suites (just a 5-minute drive from Alcor) in the Scottsdale Air Park. There is a limited number of rooms, and this is the busiest time of the winter in Scottsdale and Phoenix, so getting a room at the last minute will be very difficult. To find out more about room rates and features, or to make reservations, call Thunderbird Suites at (602) 951-4000. Call as soon as possible, and tell them you are attending the Alcor Life Extension Conference.

For more information about the festival or directions to Alcor, call us at (602) 922-9013, fax us at (602) 922-9027, or email Tanya Jones at tanya@alcor.org or Steve Bridge at steve@alcor.org.

Don't miss this exciting opportunity to meet with cryonics experts and cryonics activists in a stimulating environment!

☐ I wish to receive registration packages for ____ participants at $75 each.....Total:_____

☐ I'm not ready to register yet, but please send me more information as it becomes available.

☐ Check enclosed ☐ Visa / M.C. #:_____ Exp:_____

NAME_____ ADDRESS_____

CITY_____ STATE_____ ZIP_____ SIGNATURE_____

Send to:

Alcor Foundation

7895 E. Acoma Dr. #110

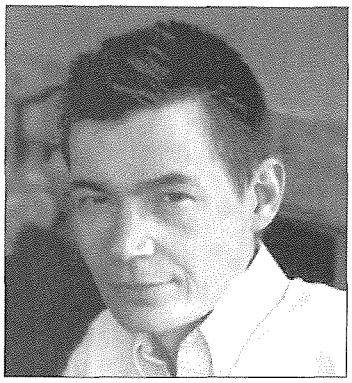
Scottsdale, AZ 85260

Or call us at:

602-922-9013

FAX: 602-922-9027

email: tanya@alcor.org



For the Record by R. Michael Perry, Ph.D.

Francis Bacon, Shaper of the Future

Francis Bacon holds an honored place in the rise of modern civilization, and also some special interest for immortalists, for he too was interested in the possibilities of life extension. . . .

Philosopher, politician and scientific advocate, Francis Bacon (1561-1626) holds an honored place in the rise of modern civilization, and also some special interest for immortalists, for he too was interested in the possibilities of life extension. A close contemporary of Shakespeare, Bacon lived at a time when modern science was in its infancy—though in a few decades the great work of Isaac Newton would open an era of unprecedented advancement that continues to this day. Bacon was not a scientific genius but his philosophical groundwork would guide the scientific revolution that was soon to break and would eventually transform the world. For all that, philosophy, too, was not his principal career, which instead was political.

Born in London, the son of a high government official under Queen Elizabeth I, Bacon began to study law when his father's death left him finanically straitened. At twenty-one he was admitted to the bar, and soon after that began his political career. He was a supporter and friend of Robert Devereux, Earl of Essex, a young and ambitious aristocrat who in return became a generous benefactor. But when, against Bacon's advice, Devereux hatched a plot against the queen, the lawyer Bacon withdrew his support and played an active role in the prosecution of his former friend for treason. Devereux was convicted and beheaded; for his role in the proceedings Bacon made his share of enemies. In 1603 Elizabeth died and was succeeded by King James I. Bacon's position steadily advanced until, in 1618, he was appointed Lord Chancellor of England, roughly equivalent to Chief Justice of the Supreme Court in the United States today. But three years later disaster struck: Bacon, the Supreme Judge, was exposed by his influential enemies for accepting bribes. This was a rather common practice, and Bacon claimed, not without

foundation, that the "gifts" had not affected his judgments—but the damage could not be undone. Bacon was deprived of his office, briefly imprisoned, then released by the king's intercession. Though free, his political career was ended and the sixty-year-old would spend his remaining days devoted to philosophy and literature, subjects he had already pursued with considerable success on the side.

Bacon's greatest achievement, in fact, was probably the *Novum Organum* or "New Instrument" he completed in 1620. In it he lays out his philosophy for how science should be pursued, establishing guidelines that have been followed, in broad outline, by scientists ever since. Noting the deficiencies of the philosophical tradition inherited from the ancient Greeks, Bacon calls for a new approach based on *observation and experiment*—one must *see* how the world works before one can expect to *understand* how it works!

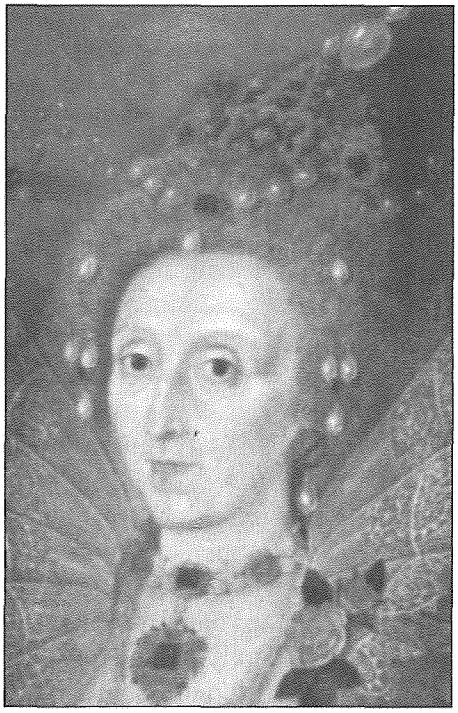
Trying to proceed in the other direction—theory first, observation later—has deadly pitfalls and, in the end, will stagnate the whole effort, as indeed had happened since the days of the Greeks. The medieval scholastics, for example, with their endless, finely reasoned arguments on remote theological and metaphysical issues, had done little to advance our understanding of such basic things as the world in which we live. Bacon saw four types of intellectual obstacles or "idols" that must be circumvented: perceptual illusions ("idols of the tribe"), personal biases ("idols of the cave"), linguistic confusion ("idols of the market place"), and dogmatic philosophies ("idols of the theatre"). With these in check, a reasonable scientific program could begin.

Bacon advocates, essentially, four steps to be followed in a scientific inquiry: (1) hypothesis, (2) experiment, (3) result, (4) conclusions. The conclusions can then lead to new hypotheses, new experiments, and so on. His approach is inductive—from experience we arrive at underlying principles. The spectacular successes of science since the publication of the *Organum* are a most eloquent testimony to the power of this approach. Bacon also advocated an inductive method in such matters as law, where there is certainly a need for experience in arriving at sound principles.

Francis Bacon

The *Organum* was not a work conceived in isolation but was intended to be part of a much larger work, the *Instauratio Magna* or "Great Renewal," in six parts. Part one was to review the present state of human knowledge; part two was to present a new method of scientific inquiry; part three would include a collection of empirical data; part four would have examples of application of the new scientific method; part five would have preliminary conclusions; and part six would be a synthesis of the knowledge gained. This grandiose project was never completed, but *The Advancement of Learning* (1605) and the *Organum* fifteen years later can be considered parts one and two. Bacon in addition produced other works on the philosophy of science that partly fill out the remaining parts, plus the *Essays*, a collection of wit and wisdom on many facets of life. His last major work, *The New Atlantis*, explores the possibilities of a utopian society where scientists will replace politicians.

Michael H. Hart, in his book *The 100*, ranks Bacon 78th among the most influential persons in history, mainly on the strength of the *Novum Organum*. (By comparison Newton is ranked 2nd, Shakespeare 36th, and Queen Elizabeth 95th.) The *Organum* was certainly important in shaping the world as we know it today, with our flowering of science and its offspring, technology, and for obvious reasons the importance will continue. (On the other hand, it must not be overrated; the works of Newton and some other scientists had greater influence and are rightly given priority.) Bacon, however, has additional interest for the immortalist. He was a *meliorist*—one who believed that the world can be made a better place through



Elizabeth I. Shrewd, intelligent, sometimes stern but more often kindly, "good Queen Bess" presided over an English Renaissance that featured such luminaries as Bacon and Shakespeare.

human effort rightly directed. His meliorism did not stop at such goals as a better standard of living but also included prolongation of life or prolongevity, though here Bacon was cautious about expressing his views. Many of his views, in fact, by advocating the use of reason to solve humanity's problems, suggested a weakening of ties to belief in the supernatural. A committed Christian, Bacon went to some lengths to disavow any imputation of atheism—which would have been dangerous in any case. He is thus sometimes at pains to justify a long earthly life and the use of scientific means to achieve it, but is able to do so on religious grounds, much as has been done more recently in cryonics. For religion, too, supports the continuance of life. In fact Bacon's view was that the divine powers wished us to be dissatisfied with the "defects of nature and art" and to seek remedies and betterment.

In *The New Atlantis* the utopian society's research center is known as Solomon's House. It is devoted to "the knowledge of causes, and secret motions of things; and the enlarging of the bounds of human empire, to the effecting of all things possible. ... the practical results are not only the means to improve human well-being. They are also the guarantee of truth." "There is a true rule in religion," Bacon continues, "that a man must show his faith by his works. The same rule holds good in natural philosophy. Science too must be known by its works. It is by the witness of works rather than by logic or even observation that the truth is revealed and established. It follows from this that the improvement of man's lot and the improvement of man's mind are one and the same thing." Science thus works to the betterment of the human race both materially and in other ways.

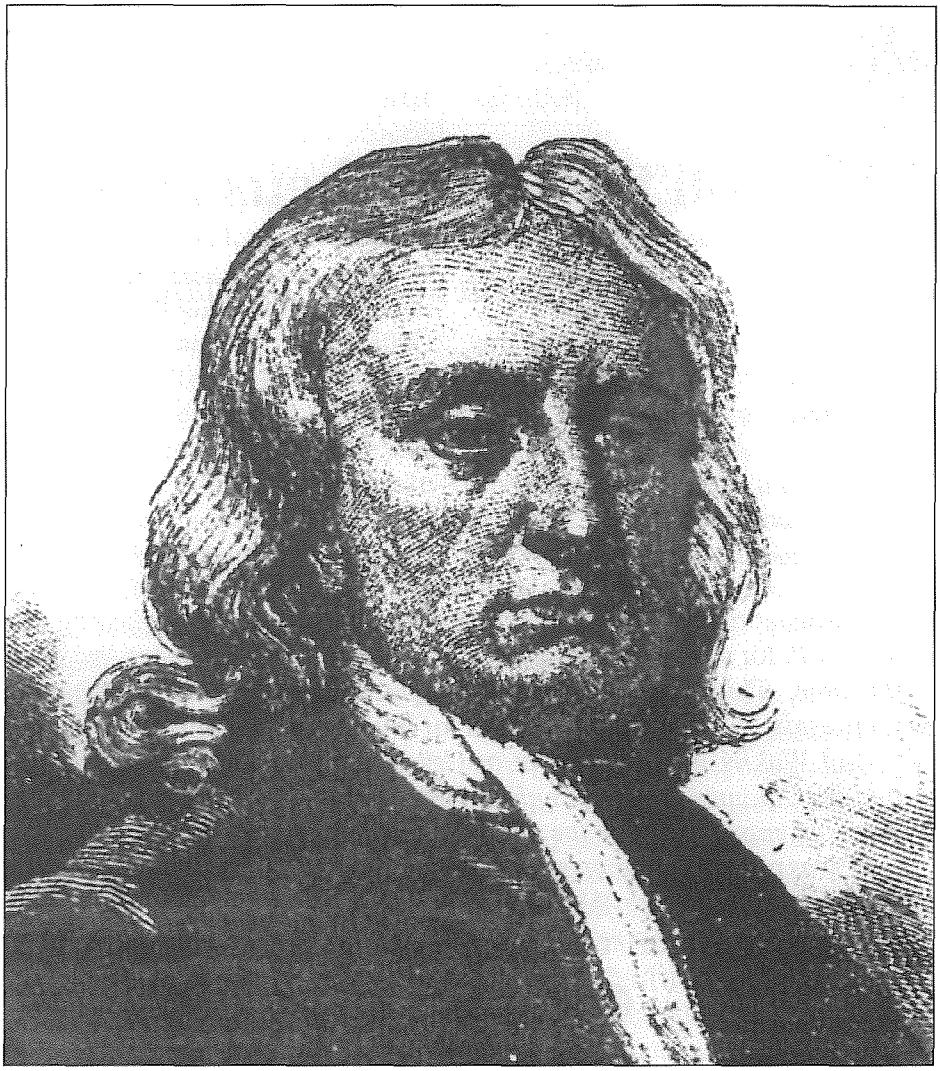
In *The Advancement of Learning* Bacon further expounds his ideas on prolonging human life: "... the lengthening of the thread of life itself, and the postponement for a time of that death which gradually steals on by natural dissolution and the decay of age, is a subject which no physician has handled in proportion to its dignity." He recognized, however, that extending life would be no simple matter: "... men should cease from trifling, nor be so credulous as to imagine that so great a work as this of delaying and turning back the course of nature can be effected by a morning draught or by the use of some precious drug; by potable gold, or essence of pearls, or suchlike toys." He also clearly distinguished between promoting health and prolonging life, though some treatments might work for both, as described in *The New Atlantis*. In Solomon's House "We have also ... all sorts of beasts and birds, which we use for ... dissection and trials; that thereby we may take light what may be wrought upon the body of man. ... we find many strange effects ... resuscitating of some that seem dead in appearance; and the like." Here then is animal research used to determine how treatments might affect humans: a forecast of experimental medicine. Moreover, in the "resuscitating of some that seem dead in appearance" death has lost some of its terror and is beginning to yield to scientific investigation.

Bacon made a more concerted effort to formulate a scientific basis for prolongevity in his *History of Life and Death*, which was to have formed a portion of part three of the *Instauratio*. Here his theories do not bear up under modern scrutiny and in fact are not very original. His explanation of senescence, for instance was based on vitalism and humoralism like Galen and Aristotle before him. Some of his proposed remedies were fanciful—such as coating the skin with oil to block the escape of "spirits" that carried the life force and were prone to attenuate with age. Others with possibly more substance involved the use of certain herbs and drugs, and appropriate diet and exercise. Here however we would properly say that at best health was improved and maintained, rather than senescence reversed—something which has still not been achieved. But one great accomplishment of this work, for all the shortcomings we can now discern, was to lend prestige to the idea of prolongevity through Bacon's endorsement.

Solomon's House was fictional, but in 1662, some decades after Bacon's death, it inspired the creation of the Royal Society of London. With the achievements of Newton, its most distinguished member, the Royal Society became the model for all scientific societies.

Bacon in one essay had voiced a wish to die "in an earnest pursuit, which is like one wounded in hot blood, who for the time scarce feels the hurt." This wish was granted over a matter that will seem ironic to a cryonicist: an experiment in prevention of decay through cold, or what we would call refrigeration. One day in March 1626, while out riding in his coach, Bacon was suddenly seized with desire to learn whether snow could retard the spoilage of food. Stopping at a cottage he purchased a fowl, killed it, and stuffed it with snow, but in doing so was attacked with chills and weakness. To ill to return home, he stopped at a friend's house. He reported enthusiastically that "the experiment ... succeeded excellently well" but could not recover his health and died the following month.

"Men are not animals erect," Bacon said, "but immortal gods." "The Creator has given us souls equal to all the world, and yet satiable not even with a world." Ever the keen student of human nature, Bacon distinguished three kinds of ambition. "The first is of those who desire to extend their power in their native country; which kind is vulgar and degenerate. The second is of those who labor to extend the power of their country and its covetousness. But if a man endeavor to extend the power and dominion of the human race itself over the universe, his ambition is without doubt both a more wholesome thing and a nobler than the other two." Bacon himself was not perfect and realized it—but also recognized a potential for self-betterment in humankind, despite all our weaknesses. Today we have behind us over three centuries of the scientific advances his philosophical work inspired, a perspective unparalleled in human history. A few of us, based on this heritage and its promise, are proclaiming a vision that would have seemed blasphemous in his day. Many today also find it unsettling: that immortality is attainable through science, that there are even things we can do right now to further our survival beyond the biological limits—such as making arrangements for cryonic suspension. Not many dare to take such possibilities seriously—yet—but we who do owe a debt to Bacon and the scientists who followed his lead.



The most famous scientist in history, Isaac Newton was among many who applied Bacon's principles.

Sources

1. "Bacon, Francis," *Encyclopaedia Britannica* **2** 883 (1948).
2. "Bacon, Francis," *The Oxford companion to philosophy* T. Honderich ed. Oxford 75 (1995).
3. Durant, W. *The story of philosophy* Simon and Schuster 83 (1953; some quotes from Bacon are from this source).
4. "Essex, Robert Devereux [2nd Earl of]," *Encyclopaedia Britannica* **8** 722 (1948).
5. Gruman, G. *A history of ideas about the prolongation of life.* Am. Phil. Soc. **56**(9) 80 (Dec. 1966; most quotes from Bacon are from this source).
6. Hart, H. *The 100* Galahad Books 4, 404 (1982).

Will the Prometheus Project Catch Fire?

$10 Million sought for major research initiative

The following report has been compiled from information supplied by Paul Wakfer, organizer of the Prometheus Project (PP, for short). Alcor is not a sponsor of the Prometheus Project and is making no recommendation on it at this time. This information is being supplied solely for the information of the readers of this magazine and no recommendation, offer, or solicitation of investment or donation is being made or implied.

Paul Wakfer is the President of CryoSpan, Inc., the major cryonics storage provider for CryoCare and the American Cryonics Society. Paul has been a cryonics activist since 1991. He has a Master's Degree in mathematics and was an entrepreneur in the computer business for many years.

PP was publicly announced in early July, 1996 on CryoNet, an electronic mailing list for cryonics activists. The primary information for this article was taken from the Prometheus Project FAQ (list of Frequently Asked Questions). The easiest access to further information is through the PP World Wide Web home page at:

http://www.access.digex.net/~kfl/les/cryonet/prometheus.html

What is the Prometheus Project?

The Prometheus Project is a major scientific research initiative with the goal of perfecting reversible long-term suspended animation of the human brain within 10 years. The project will cost an estimated $10,000,000 over 10 years. Support in the form of conditional pledges is currently being sought to establish the financial feasibility of the Project.

The more specific purpose of the Prometheus Project is to demonstrate the restoration to normal physiological and mental functioning of a mammalian brain that has been preserved and stored at a temperature below -140° Celsius for at least six months and that could be so stored for hundreds of years without additional damage. This demonstration must be by methods that will be applicable to a human brain, will convince the public, and will be publishable in a peer-reviewed scientific journal.

The Prometheus Project will be nonpartisan and should be strongly supported by all organizations because it is much too big for any one cryonics organization. We need all the ideas and help we can get from whatever source. In order to foster this I [Paul Wakfer] have pledged to promote the Project and discuss it with as little criticism of anyone as possible.

Why suspended animation of the brain?

Current technology only permits suspended animation of the body for about one hour (used during some types of neurosurgery). Extending this time indefinitely would permit true medical time travel, allowing sick people today to wait for years or even decades until cures for their illnesses are found.

Perfecting suspended animation of the brain is the first step toward achieving this breakthrough. It would be an assured means of radically extending human life (assuming future tissue regeneration technology).

How is this technology different from cryonics?

Cryonics today freezes people with highly damaging methods in the hope that future technologies (like nanotechnology) will be able to repair them, one molecule at a time if necessary. Whether memory or personality can survive such a process is currently unknown, and inherently

unknowable as long as freezing injuries remain irreversible.

Suspended animation of the brain would mean an end to this uncertainty. Brains would be preserved with no injury, even by present medical criteria. Nanotechnology would not be required for revival. Future tissue regeneration technology using biological approaches would suffice. Revival would come much sooner than for today's cryonics patients, greatly decreasing social displacement and "risk time" spent in storage. The most nagging uncertainties of cryonics would vanish.

What is the evidence the Project can succeed?

The science of organ cryopreservation is an established branch of cryobiology. Conventional medical research interests, such as the Red Cross, have made substantial investments over the past decade to perfect cryopreservation of transplantable organs. This work has shown steady progress, with viable kidneys now recoverable from temperatures as low as -45°C. Much colder temperatures are expected soon, as the most difficult technical problems now seem to be solved.

There is thus now a wealth of knowledge concerning organ cryopreservation that did not exist ten years ago. Much of this knowledge is directly translatable to the problems of cryopreserving *any* organ, including the brain. Furthermore, a "head start" of sorts exists for the brain, as it is already known to be recoverable by very simple methods from -20°C.

The project budget and timescale is a conservative estimate of the effort necessary to successfully adapt existing organ cryopreservation knowledge to the specific issues of brain preservation and to apply the neurobiological techniques necessary to show restoration of the memory and other mental attributes.

How will success be demonstrated?

The Project will likely proceed in three stages, each requiring perhaps 2 or 3 years for completion.

Stage 1: Development and demonstration of good histologic preservation by light and electron microscopy after rewarming from -140°C.

Stage 2: Recovery of mammalian brains after rewarming from -140°C, with viability and restoration of memory demonstrated by electrophysiological study of isolated brains.

Stage 3: Demonstration of complete neurological recovery in a large animal model after *in-situ* cryopreservation of the brain to low sub-zero temperatures.

What methods will be used?

A preliminary scientific plan is available. Early plans primarily consider the possibilities inherent in vitrification, which has shown the most promise for organ preservation over the past decade. However, the Project will choose scientists who are well versed in all known cryobiological methods and are totally open to use whichever method will best achieve the Project goal.

Who will work on the Project?

The Project will seek to retain the most qualified scientists available. Scientists with specific and proven expertise in organ cryopreservation and neuroscience will be sought. A state-of-the-art laboratory dedicated to the full-time pursuit of the project goal will be established.

How are funds being raised?

The Project is currently in the discussion stage. Before proceeding with detailed planning, it is necessary to determine whether sufficient support exists for this Project *in principle.*

At this time, the Prometheus Project is essentially a pledge campaign asking a strictly hypothetical question:

1) *If* $1M/yr in pledges for 10 years is collected, and
2) *if* satisfactory scientific and business plans are developed, and
3) *if* the researchers and their projects are satisfactory to you, and
4) *if* a corporation is formed to employ these scientists to execute these projects which issues a prospectus and share offering for that purpose,
4) *then* how much would you be willing to contribute, beginning in 1998, to purchase shares of equal amounts for up to 10 years, in that corporation?

Are investments being solicited?

No. No money is being requested and no investments are being solicited. If sufficient interest in the form of conditional pledges is demonstrated, a company will be formed, a prospectus issued, and investments solicited. Until that time, pledges and all other discussion of finances are purely hypothetical. Pledges will not be due and no money will be collected until pledgers who approve the scientific and business plans have signed share purchase agreements totaling $1,000,000 per year. Any pledger who does not approve these plans, in effect, withdraws his or her pledge before the Prometheus Project begins.

At this time only solid pledges of $1,000 or more per year for ten years, beginning in 1998, are being requested. When a total of over $1,000,000 per year has been pledged, a for-profit company will be formed to pursue the research purposes of the Project, an investment prospectus will be issued, and all pledgers will be invited to purchase shares. When $1,000,000 per year of shares for all ten years has been contracted for, the first year's payments will be

collected, the first year's shares will be issued, and the project will begin. In accordance with SEC regulations, I [Paul Wakfer] must state that I am only writing speculatively about events that I hope may happen. This is not a solicitation for the purpose of purchasing shares in any existing corporation.

Will cryonicists be able to pledge donations instead of investments?

[*Answer from Alcor:*] Paul Wakfer has asked that non-profit, tax-exempt organizations like Alcor accept charitable directed donations from individuals so that the organizations would then use the donations to purchase PP shares (if they are ever offered) under the same terms as other pledger/share purchasers. Alcor has made no decision yet about whether or not to participate in such an arrangement.

What is the pledge progress so far?

As of September 29, 1996, after about three months of promotion, pledges of $308,700 per year (making a grand total of $3,087,000 over a 10 year period) have been received by the Prometheus Project. These pledges range in annual value from $1,000 to $50,000 and have been made by 50 individuals and 2 organizations.

What if sufficient funding cannot be obtained?

It is hoped that sufficient "in principle" support for the Project can be obtained by late 1997, with pledgers approving the Project plans in time for a research start in early 1998. If more time is required, the pledge campaign will likely continue as long as is necessary to reach the funding goal.

What if the Project is not successful?

If reversible brain cryopreservation is not demonstrated within 10 years of research commencement, additional funding will be sought, and the Project will continue as long as necessary until this goal is accomplished.

Brain cryopreservation is largely virgin territory in cryobiology. The Prometheus Project will be directing 100 times more resources at this problem than has ever been directed at it before, under the anticipated direction of the best cryobiological minds in the world. Major (and publishable) advances are certain, and this will likely generate the additional interest necessary to keep the Project going for longer than 10 years if necessary.

What if the Project is successful?

The result will be published in a major scientific journal, with explicit mention of the profound medical implications. We believe that as a result cryonics will receive unprecedented scientific attention, and ethical debates will rage. The technology will be deployed among cryonics service providers, and options for legally challenging the status of cryonics patients as "dead" (and otherwise increasing their rights) will be considered.

The research company should then be able to raise additional funds to perfect suspended animation of the head, and ultimately all organs of the body. This additional fundraising will likely take place outside the cryonics community, perhaps through a public offering of non-voting shares, capitalizing on the publicity surrounding the Project success.

Who will have access to the technology?

It is anticipated that much (perhaps most) of the Project research results will be available in the public domain. Indeed, regular publication in peer-reviewed journals is an important Project objective. However, patent protection will be sought for the final perfusate formulas and other innovations that permit reversible brain cryopreservation. This will be done to ensure that Project contributors receive proper consideration for their support should any profits materialize from this development.

Project technology (perhaps in the form of pre-packaged perfusates) will be made available to all cryonics organizations at a reasonable cost. An incentive plan that would allow shareholders to return shares to the research company in exchange for products at discounted rates is currently under discussion.

How can I find out more?

For more information see the list of all CryoNet messages mentioning the project at:

http://www.access.digex.net/~kfl/les/cryonet/PrometheusProject.html

a description of the project, and testimonials at:

http://www.access.digex.net/~kfl/les/cryonet/prometheus.html

and the honor role of pledgers at:

http://www.access.digex.net/~kfl/les/cryonet/ppledges.html

In addition, keep reading the newsgroup sci.cryonics or subscribe to the CryoNet list for all the latest Prometheus Project news.

To subscribe to CryoNet, send email to: majordomo@cryonet.org with the following text in the *body* (not subject line) of the message:

subscribe cryonet

Or contact Paul Wakferdirectly:

email: 70023.3041@compuserve.com

In the U.S.: 1220 E Washington St #24, Colton, CA 92324
Voice/FAX: 909-481-4433
Pager: 800-805-2870

In Canada: 238 Davenport Rd #240, Toronto, ON M5R 1J6
Voice/FAX: 416-968-6291
Pager: 416-446-9461.

Can Cryonicists Be Organ Donors?

By Steve Bridge

About once a week I am asked if a cryonicist, especially one who has chosen neurosuspension, can also donate organs for transplant. The answer is a qualified "No." There are several barriers, any one of which makes post-mortem organ donation impossible for cryonics patients.

1. Alcor's ability to provide reasonable preservation for a member's brain is strongly dependent on how fast our transport team can begin cooling the member and adding protective chemicals. Forcing Alcor to wait several hours while surgeons remove a heart and kidneys is not good for your brain. We assume you are involved in cryonics because you want your brain treated with utmost care.

2. All states require evidence of "brain death" before a hospital can remove organs from a donor. "Brain death" typically means that the brain has had no circulation for 24 hours (*not* at all good for your brain) or has been obviously destroyed by injury. You don't want to wait for brain death before we freeze you. Your brain *is* you.

3. Even if you have chosen the neurosuspension option, Alcor's surgical team needs an intact vascular system, including the heart, to get cryoprotectants to the cells of your brain. Removing organs puts holes in that system.

4. From the hospital's point of view, they don't want organs that have had our solutions pumped through them, even though these solutions may be very protective. It would require many millions of dollars for research to prove that our particular combination of chemicals was safe and effective for transplants. It's not worth that.

Donations you CAN make

Many prospective cryonicists wish to contribute something to the health of others and feel uneasy about not donating organs. You can still help save many lives without causing problems for your suspension. You can donate while you are *alive.* I don't mean giving a kidney to a relative, either, although that might very rarely be possible. There is at least one organ donation nearly all of us can make — *blood.*

Donating blood is simple, can help save many lives, and can even be healthy for you. Yes, recent research appears to show that men who donate blood at least three times per year increase their average life-span to that of women. The most plausible theory for this is that iron accumulation in the blood is a primary cause of cardiovascular disease, and women have their own natural method of discarding iron—every month when they menstruate.

I hope none of our readers believe the idiotic, backwards folklore that donating blood can place you at risk for getting AIDS. Many people in the 1980's got AIDS from *receiving* blood transfusions; no one gets AIDS from giving blood. (Detailed testing of blood today makes it extremely unlikely for a person to be infected with AIDS even by receiving a transfusion.)

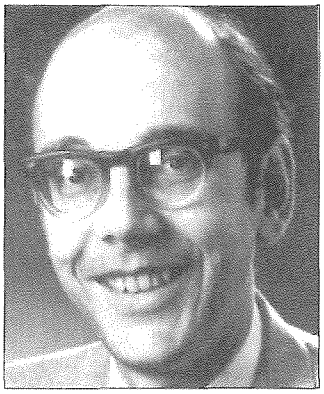
If you are in a serious accident, you certainly want other people in the community to have donated blood to save your life. It is only fair to put your share into the community pool to save other people's lives. Look in the Yellow Pages under "Blood Banks."

When you donate your blood, you could also add yourself to the list for *bone marrow donation.* Thousands of people per year, especially with certain forms of leukemia, could have their lives saved by a donation of bone marrow from a tissue-compatible individual.

Finding the level of compatibility required (near 100% for certain antigens) can be like searching for the proverbial needle in a haystack. Right now several million people have their antigen signatures listed in the National Marrow Donor Program (NMDP) data base; but every year many people die without finding a match. Antigen matching is especially difficult in the United States, with the nearly infinite mix of racial and cultural backgrounds of our residents. Adding your name to the NMDP Register could save a life. Making this effort as widespread as possible could also give *you* a chance at more life someday, should you be the one who gets the leukemia.

To find out more about bone marrow donation, visit your local blood bank or call the NMDP at 1-800-627-7692.

Cryonics is a way of saving your own life. It is selfish—and I mean that in a good way. Understanding your own self interest is essential for survival. Being selfish does not also mean that you can or should abandon your family and community. Doing good for each other makes all of our lives better and contributes to our own individual survival.



The Donaldson Perspective by Thomas Donaldson, Ph.D.

Why Aren't They All Signing Up?

This is a problem which has bedevilled us all for many years. Few reporters or media rank cryonics with faith healing, New Age, or any other "metaphysical" ideas. Cryonics societies are slowly becoming "accepted" in the sense that fewer people think that someone is simply crazy and deluded when they sign up for suspension. Yet we still see only a trickle of members.

Since we do wish to grow (and seen long term, we *must* add members constantly or no one will care for us when we ourselves need suspension), this Question remains important. People will give all kinds of reasons for not joining. I have one sister myself, a nurse, who would not dream of claiming that the idea is unreasonable, but backs away at once from any notion of joining. Why? Well ... I do not have an answer to the Question either. (Sorry, if that's why you started reading this column). However, I will consider here two different explanations which may be valid for lots of people, though hardly for all.

Authority and Relations with Authority. This idea, together with a book supporting it, came not from me but from someone attending the Alcor North meeting when it was held at my home in July. (I owe her an apology because I remembered the book she suggested but have not been able to recall her name!) She suggested that I read a book, *For Your Own Good*, by an Alice Miller, who (despite her name) has spent years working on psychiatry in Switzerland. In it, she describes her own ideas about the roots of our feelings: this time, not because of the repressed sexuality that Freudians favored, but due to violent treatment in very early childhood. She believes that such treatment lies at the root of the violence we see in the papers every day, and actually psychoanalyses *Hitler* as an instance of just how such treatment can affect a child.

Her book is certainly interesting. Along the way, it also raises a point which may relate very strongly to the question of my title. This violence occurs so early in the lives of children that they forget completely that it ever happened. Not only that, but it causes them *not* to have a will of their own. They judge what to do in their life not for themselves, but always by referring to an Authority: at first their parents, who they see as loving and caring, and later other Authorities.

As with the original Freudian theories, this training happened so early that those subject to it fail completely to remember it, and see their stern parents (punishing them for transgressions) as doing so out of love rather than violence (and so mix love up with violence irretrievably). Spanking, humiliation, isolation they see as instances of parental love. Miller takes her theories into many areas, some of which don't pertain especially to cryonics. Yet I was very interested indeed in the notion that even in the U.S. there may be a significant number of people who have

been trained up so that they quite literally *cannot* form any opinions of their own. In one way we might think of them as empty vessels, conscious but lacking a Self.

That's hardly a fortunate condition. It would also be interesting to find out how many people in the U.S. it might fit (clearly we cannot find that out by circulating a Survey asking people to check YES or NO to the question of whether or not they have a Self). I think it unlikely that over 50% of people suffer this problem, mainly because the US, though not the freest country on Earth, has remained a fairly free country (and enough such people would mean the U.S. would be far more authoritarian than it is). Still, it may well explain why some people simply never show any interest at all: none of their Authorities do, and that (for them) is sufficient.

A second, more recent book, by Massimo Piattelli-Palmarini, *Inevitable Illusions*, may tell us of one more way many people find it impossible to sign up. This book is a very interesting exposition of the idea that we have *cognitive illusions* in the same way that we have visual illusions: many people, even experts in a field, when faced with particular ideas and situations, will automatically respond in one way, which turns out to be consistently wrong. Piatelli-Palmarini himself does research in cognition; the idea of cognitive illusions came from two other researchers, Tversky and Kahneman.

As with Miller's book, this book is also very interesting, and discusses issues which have no direct pertinence to answering our Question. It mainly discusses how we use various intuitive strategies to decide between different possibilities, and how those strategies can often turn out to be quite wrong. Along the way, we see that many such cognitive illusions happen when you are asked to choose between two different events, both of which have a probability attached to them, or again choose between one certain event and another to which at best a probability may be attached. (A bit of background may help here: given a gambling choice, say a 50% chance of winning $100, your *Expected Value* is $50, or the product of 50% and $100).

The book makes one major fact about the way people make choices very clear indeed: even with no loss involved, many people will choose a certain $100 over an expected value much larger (say, the chance of winning $1000 at the toss of a fair coin). The justification for calling this a cognitive illusion rather than a simple error comes from the fact that even *statisticians* and others who should know better will commit the very same error if the question is framed innocuously so that it does not at first seem to be one on which their expertise might be used. (And yes, these illusions are very important, and not just for us. For instance, juries and doctors can decide wrongly on the basis of evidence given to them if that evidence implicitly or explicitly involves probabilities). Not only that, but for cryonics one other fact looks very relevant: people, even experts, will defend their choice vehemently and feel that it is right because it fits their intuition. To do so they will find all kinds of justifications.

Cryonics gives the type-case of *uncertainty*, in big red neon letters. And many people simply don't want uncertainty of any kind. Such feelings lie behind totally foolish regulations such as the Delaney Amendment, which required that drugs and foods have *zero* probability of causing cancer. In cryonics, we see all the time how many people will prefer a certain death over an uncertain chance at life.

These two books suggest two different reasons why people may refuse the opportunity of cryonics. I do not claim they give all possible reasons, only some. It is still good to think about this issue; an understanding of the *real* reasons why someone does not sign up, as opposed to the reasons they may give to us, may help us to raise the number of those signing up.

REVIEW

White Gloves: How We Create Ourselves Through Memory

by John Kotre, Free Press, NY, 1995

The Invention of Memory

by Israel Rosenfield, Basic Books, NY, 1988

Reviewed by Thomas Donaldson, Ph.D.

The first of these books is now 8 years old; the second appeared last year. I am reviewing them both because they both help explain one another, and also because both of them explain one important trait of a major kind of memory, a trait still often forgotten, but also one that anyone thinking about memory should keep in mind. Although both authors wrote for a popular audience, their books still contrast sharply with one another. Rosenfield discusses memory at a physiological, neurological level; Kotre discusses psychological studies of memory, with much less attention to underlying physiology.

Since many different kinds of memory exist, each with its own properties, I shall explain one distinction Kotre makes first of all. Kotre's book is not about all the different memories but about one particular kind: *autobiographical memory*. That is, he discusses in detail what psychologists know about our memory of our own lives. Rosenfield discusses memory more generally, but has some important insights bearing on autobiographical memory (and other kinds, too). Perhaps because he wrote his book eight years ago, and lots more has been found out about the different memories since then, some of what he says has become outmoded, particularly his argument for Edelman's theories of memory. At the same time he makes an important point to which subsequent thinking about memory still hasn't fully adjusted.

By now, in the computer world, with such notions as evolutionary computation and neural nets becoming prominent, Rosenfield's argument may seem a bit easier than it was when first proposed. The time he spends on it might be reduced for a later audience; but it's still critically important. Basically, Rosenfield points out first that we never learn images or simple facts. Instead we always learn *procedures*, even for the simplest kinds of learning such as learning the Roman alphabet. (A little thought makes this very clear: learning the Roman alphabet involves learning to recognize its letters in all kinds of lighting and colors, and many different written versions, both fonts and handwriting.) Second, and just as important, we do not inherit these procedures or learn them as any standard set of activities: our brain works them out for itself.

The interesting points come when we think about what this means. We worked out the memory procedures because we cared, for one reason or another, just what the outcome of each procedure would be. (We do not learn without some kind of emotion.) Again, no procedure works in isolation from its context; part of that context is our own emotions, and part is the situation in which we apply it. When we learn a procedure we also learn that context, and of course as time passes not only does the context change but so do our emotions about that context and the procedure. (A single letter of the alphabet means nothing to us without a context in which we read it.) Moreover, since our life and situation changes constantly, we never cease to change these procedures: we learn to read a new handwriting, we learn the meaning of the letters I-B-M or N-A-T-O. There is no such thing as memory in the sense of a fixed image to which we refer other events and images, but instead a set of brain (and sometimes body) activities which respond to various contexts. Nor do our brains store every image and movement we have ever performed. (A procedural theory of memory means, among other points, that our brains need not have nearly the capacity required for photographic storage of every image we have ever seen—even if we were somehow to use image compression techniques).

One interesting point made by both Rosenfield and Kotre comes directly from this insight into just what our brains do when we remember. In early studies of memory, Walter Penfield found that he could evoke scenes by electrical stimulation, which his patients said were from their own past. Later research-

ers went farther from this, actually trying to verify that the scenes and events caused by electrical stimulation had really happened. Despite the strong feeling of their truth that such patients had, it turned out that less than 10% of these evoked memories matched real past events at all. If we think of evoked memories as procedures, then we'd expect that to happen: our brain, finding itself carrying out a procedure without context, invents one to match. The most accurate memories (if we can rank them at all) came not from stimulating the brain cortex of patients but from stimulating their limbic system, the circuitry by which we feel emotions. That again comes from this account of memory as procedures: on stimulating an emotion, the patients' brains would again try to work out a reason, and that reason would come most likely from events at which they felt that emotion strongly.

This way of understanding memory does not impugn our ability to remember the inverse-square law of gravity, or F = ma. In learning physics, chemistry, or even how to drive a car, we learn procedures quite explicitly. Indeed, part of learning physics (say, the inverse-square law) comes exactly from learning just the proper contexts to apply it. Yet it does raise serious questions about such things as our memory of how we, personally, first learned F = ma. That memory, too, as we remember it now, comes from other procedures we learned before and even after we learned our physics, and since subsequent experiences would change these procedures they would also change our "memory" of that event.

It is that kind of memory, autobiographical memory, on which Kotre concentrates. In discussing this kind of memory, he tells of the many cases in which we, even if we feel quite certain that some event happened to us in the past, can turn out to be badly mistaken. In criminology this phenomenon has been very well studied, though its implications haven't seeped into the minds of as many judges and police as they should. When shown a lineup of "criminals", a witness may feel quite certain just which one he saw attacking someone, or running away. . . yet turn out to be quite wrong when objective evidence arises. In a few cases, people have even come to be convinced that they actually committed crimes of which they were innocent. (Various methods can be used to minimize the chance of any such inaccurate recall, by either witnesses or others, but their use hasn't as yet spread widely.)

One implication of such studies bears on our own personal memories of our past. Kotre chose the title of his book from his own memory (which when he examined it logically could not have happened) of white gloves worn by his father, who gave up his life as a musician to support his family. For some time he thought of the image of these white gloves as something that he had remembered since childhood; yet from other evidence he worked out, in middle age, that the earliest time he could have seen the white gloves of his father would have been in early adulthood.

In terms of cryonics, some might then ask, if our memories are so very labile, why then should we want to preserve them? I would say that Kotre himself answers that question (though he does not, of course, discuss cryonics at all). The subtitle of his book, after all, is "How we create ourselves through memory." What happens is that some memories, true or not, become very important to us, defining us to ourselves and even to others. Kotre's father gave up music, and all intellectual pursuits, to support his family. Kotre himself had pulled himself out of that to take up such activities, saying to himself: I know I have it in my genes, I will not do what my father has done but instead follow the path he once wanted to take. In his mind, the image of his father's white gloves had become a symbol of that aspiration. When he learned that his image could not have been "true", that did not disturb him: he had still defined himself through it. We define ourselves by such memories, and to lose them would be to lose our identity.

"In early studies of memory, Walter Penfield found that he could evoke scenes by electrical stimulation, which his patients said were from their own past. . . . Despite the strong feeling of their truth that such patients had, it turned out that less than 10% of these evoked memories matched real past events at all."

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Memory, Identity, and the Brain

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About the Alcor Foundation

The Alcor Life Extension Foundation is a non-profit tax-exempt scientific and educational organization dedicated to advancing the science of cryonics and promoting it as a rational option. Alcor currently cares for 31 patients in cryonic suspension, and has hundreds of signed up Members. Being an Alcor Member means knowing that—should the worst happen—Alcor's Emergency Response Team is ready to respond for you, 24 hours a day and 365 days a year.

Alcor's Emergency Response capability includes equipment and trained technicians in Arizona, New York, Indiana, Northern California, Southern California, and England, and a cool-down and perfusion facility in Florida. Alcor's Arizona facility includes a full-time staff with employees present 24 hours a day. The facility also has a fully equipped research laboratory, an ambulance for local response, an operating room, and a patient care facility using state-of-the-art storage vessels.

Meetings

Board of Directors Meetings

Alcor business meetings are held on the first Sunday of every other month: January, March, May, July, September, and November. (The July and September meetings are on the second Sunday.) Guests are welcome. Meetings start at 1 PM. For more information, contact Alcor at:

ALCOR
7895 East Acoma Dr., #110
Scottsdale, AZ 85260
(602) 922-9013

Directions: *Take the 10 to the 17 Northbound, exit Thunderbird Road heading East. Thunderbird will turn into Cactus St, stay on Cactus until you turn left on Tatum, and then right on Thunderbird (which will turn into Redfield in about 3 miles), then (after a quarter mile on Redfield) left on 76th Place. 76th Place turns into Acoma Drive; Alcor is on the right at 7895 Acoma Dr., Suite 110.*

Southern California

The Southern California chapter of Alcor meets every month in an informal setting in one of our member's homes. Meetings are on the fourth Sunday of the month. For more information, call Michael Riskin at (714) 879-3994.

Boston

There is a cryonics discussion group in the Boston area meeting on the second Sunday each month. Further information may be obtained by contacting Tony Reno at (508) 433-5574 (home), (617) 345-2625 (work), 90 Harbor St., Pepperell, MA 01463, or reno@tfn.com (email). Information can also be obtained from David Greenstein at (508) 879-3234 or (617) 323-3338 or 71774.741@compuserve.com (email).

District of Columbia

Life Extension Society, Inc. is a new cryonics and life extension group with members from Washington, D.C., Virginia, and Maryland. Meetings are held monthly. Call Mark Mugler at (703) 534-7277 (home), or write him at 990 N. Powhatan St.; Arlington, VA 22205.

Bay Area

Alcor Northern California meetings: Potluck suppers to meet and socialize are held the second Sunday of the month beginning at 6:00 PM. All members and guests are welcome to attend. There is a business meeting before the potluck at 4:00. For meeting information, call Alcor at 1-602-922-9013

England

There is an Alcor chapter in England, with a full suspension and laboratory facility south of London. Its members are working to build a solid emergency response, transport, and suspension capability. *Meetings are held on the first Sunday of the month* at the Alcor UK facility, and may include classes and tours. The meeting commences at 11:00 A.M., and ends late afternoon. The address of the facility is:

Alcor UK
18 Potts Marsh Estate
Westham
East Sussex
Tel: 01323 460257

Directions: *From Victoria Station, catch a train for Pevensey Westham railway station. When you arrive at Pevensey Westham turn left as you leave the station and the road crosses the railway track. Carry on down the road for a couple of hundred yards and Alcor UK is on the trading estate on your right.*

If you're coming to an AUK meeting you should phone ahead since meetings are sometimes rescheduled. Call Garret Smyth on 0181 789 1045 or

Garret@theoffice.net

or Mike Price on 0181 845 0203 or Alan Sinclair on 01273 612 071. Note: the email address listed above for Gattet is different from the previous erroneous listing.

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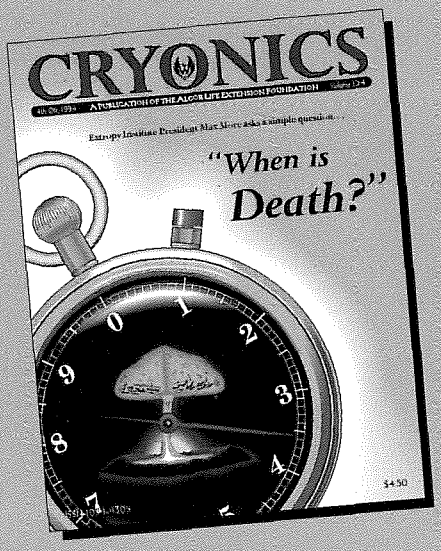

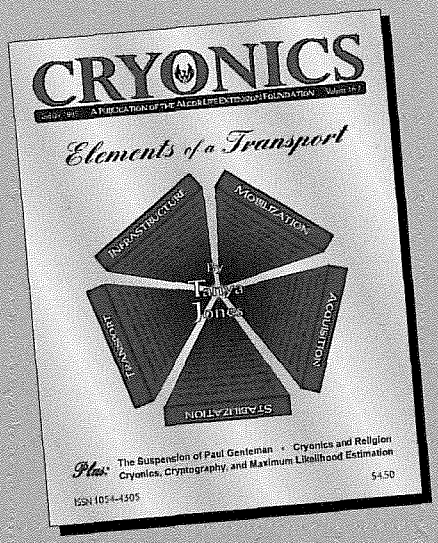

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