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CRYONICS

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THE HIGH PRICE OF LIFE ON HOLD: SHESKIN'S STUDY AND OTHER REFLECTIONS ON CRYONICS IN NEW YORK

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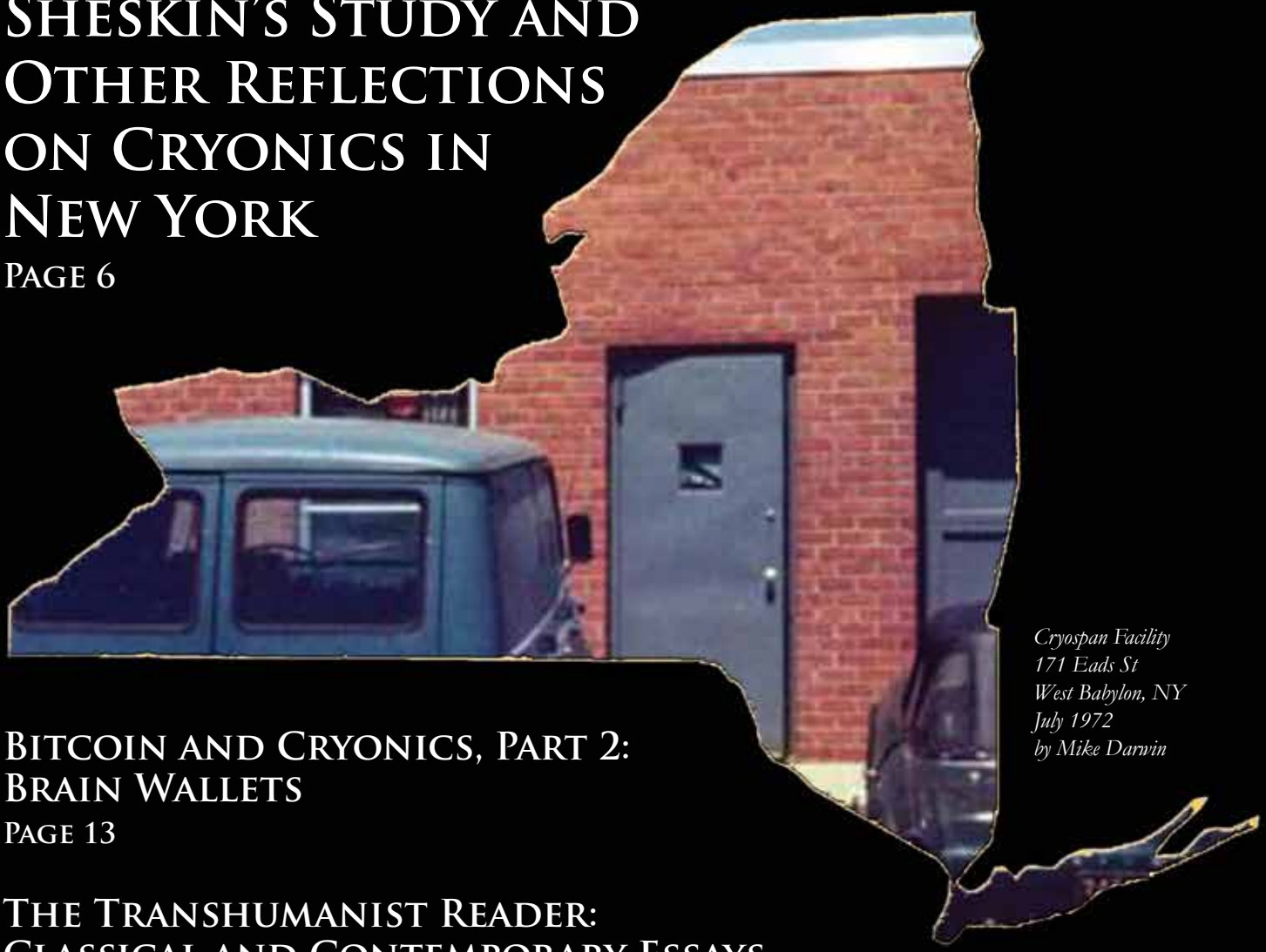

Cryospan Facility
171 Eads St
West Babylon, NY
July 1972
by Mike Darwin

BITCOIN AND CRYONICS, PART 2: BRAIN WALLETS

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THE TRANSHUMANIST READER: CLASSICAL AND CONTEMPORARY ESSAYS ON THE SCIENCE, TECHNOLOGY, AND PHILOSOPHY OF THE HUMAN FUTURE

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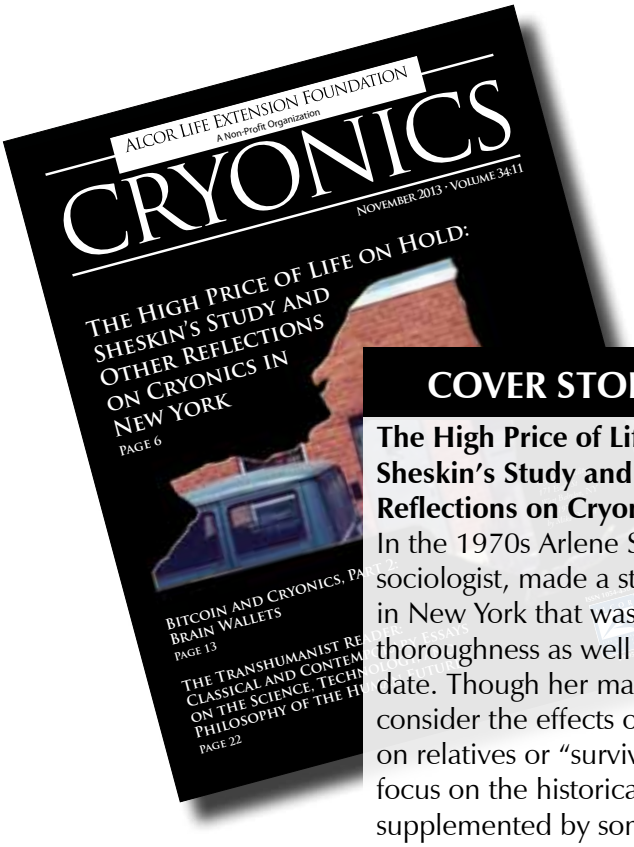

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The High Price of Life on Hold: Sheskin's Study and Other Reflections on Cryonics in New York

In the 1970s Arlene Sheskin, a sociologist, made a study of cryonics in New York that was unique in its thoroughness as well as its early date. Though her main thrust was to consider the effects of cryopreservation on relatives or "survivors," here we focus on the historical narrative, supplemented by some lively commentary by contemporary cryonicists, mainly Curtis Henderson.

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QUOD INCEPIMUS CONFICIEMUS

Photo: Cryo-Care Equipment Corporation at 2340 E. Washington St., Phoenix, AZ. Dr. Bedford's "home" in 1970 or 1971.

ULTRASTRUCTURAL SIGNATURES OF INFORMATION-THEORETIC DEATH By Aschwin de Wolf

On October 11, 2013, the *Wall Street Journal* featured a cover story about the unintended consequences of Norway's long-time insistence on "plastic graves" ("Grave Problem: Nothing is Rotting in the State of Norway"). You see, after World War II the Norwegians wrapped the dead in plastic prior to burial and now they are faced with…corpses that are not decomposing. Since cemetery real estate is scarce in Norway this creates a rather complicated and sensitive problem. One of the solutions is to poke holes in the ground and plastic to inject a lime-based solution to accelerate decomposition.

Not many people would expect the brains of these plastic-preserved Norwegian corpses to be in pristine condition at the ultrastructural level but this strange story does illustrate that decomposition is a process that is highly sensitive to variables like the presence of oxygen, water, micro-organisms, and temperature. Of course, some of these variables are related. When temperatures are lower there will be reduced microbial activity. As a consequence, at cold temperatures the rate of decomposition can be even slower than what one would predict based on the decrease of the brain's metabolism alone. Cold ischemia is not just warm ischemia slowed down (and vice versa).

My company Advanced Neural Biosciences, Inc. is currently collaborating with Alcor to produce a series of electron micrographs of brain tissue exposed to very long times of cold ischemia (0 degrees Celsius). One of the reasons we are doing this project is to bring actual data to the decision making process concerning the question when to accept and when no longer to accept a patient who has been stored at low temperatures prior to contacting Alcor for cryonics arrangements.

Ultimately, what we are looking for is an ultrastructural signature of "information-theoretic death." This presents a formidable problem because information-theoretic death is not an unambiguous identifiable property of an image but concerns our best guestimate about how much structure a future technology might still be able to infer from a given state of damage. For existing patients and members who want to be preserved under *any* conditions this is not a directly relevant question (the future will tell). But when you have to make a decision whether to accept a third-party "post-mortem" patient, arbitrary decisions *have* to be made because Alcor simply cannot accept every case brought to its attention.

We have now produced electron micrographs of up to 1 month of cold ischemia. When we shared the one month images with the Alcor Research and Development committee one member remarked that he "would not have guessed that so much structure could remain after one month." When we presented an image from this series at a recent conference, attendees were also surprised about this level of preservation.

Of course, this is not the end of the story because a patient with such a long period of cold ischemia will still need to be cooled to cryogenic temperatures for long-term care and a "straight freeze" on top of such extensive ischemic damage could tip the balance towards information-theoretic death. These results raise one interesting possibility, however. If the damage of a straight freeze is a lot worse than the damage from moderate times of cold ischemia, cryoprotecting the brain (or both hemispheres separately) by soaking it in cryoprotectant could be a superior protocol for a select number of Alcor cases. There is still much to be learned. ■

THE HIGH PRICE OF LIFE ON HOLD:
SHESKIN'S STUDY AND OTHER REFLECTIONS ON CRYONICS IN NEW YORK

By R. Michael Perry

Whaaat? the reader may ask. Yet another column on cryonics in New York?! Yes, indeed (and one more is planned after this!). But not without good reason, as I hope you will agree. New York, was, after all, an important early staging area for cryonics, and its history has important lessons to teach, besides being just downright interesting.

With assistance from other sources, the present column is based around Arlene Sheskin's 1970s study, *Cryonics: A Sociology of Death and Bereavement.* Unique in cryonics literature both for its thoroughness and its early date, this book attempts to assess the then-fledgling movement from a mainstream though sympathetic perspective, comparing it to other systems of beliefs and practices relating to life's number one problem, death. My perspective is different, what Sheskin would call that of a "believer," which I think applies also to most readers. So here I am not interested in simply summarizing the book or in offering a "review" as usually conceived, but instead the objectives are twofold. First, there is a historical problem, to report on what actually transpired with the early cryonics group in New York that is not covered or to be covered elsewhere. A small decipherment issue is that Sheskin went to lengths to use pseudonyms in her study, both for individuals and organizations. It is not difficult to restore the real names in important cases, however, and I have done so as a convenience to readers without, I hope, unduly invading privacy, inasmuch as these details have long been public. As a second objective, I will consider the various assessments and judgments of cryonics, cryonics organizations, and people that Sheskin makes and offer my own perspective. The other main source I've used is the 1992 interview, "Thus Spake Curtis Henderson," parts 4 and 5.

First, then, an overview. The book deals mainly with a single cryonics organization, the "Eastern Cryonics Society" or Cryonics Society of New York (CSNY) and covers the gamut of its history from the startup phase in the mid-1960s to about 1975, when its activity had virtually ceased. Emphasis is on the latter, "twilight" period, when the study was made and on "survivors" who had relatives cryogenically stored and were available for interview. (The interviews alone constitute important source material not duplicated elsewhere.) Reasons are offered for the burnout, the brief history of two splinter groups is related, and the problems of the survivors are considered in detail. Comparatively little attention is devoted to the question of whether cryonics patients can eventually be resuscitated, or the technical details of procedures used in cryoprotection and cooldown. The overall attitude is not to minutely examine or question the basic premise or procedures, but to treat cryonics as on par with other of what I shall call, for want of a better term (does anyone know of one?) *mortic systems,* that is to say, systems of attitudes, beliefs, and practices for coping with the problem of death. The thrust of the book is to situate cryonics within the panoply of mortic systems in our culture and compare it with the others on issues such as the demands made on adherents for acceptance and participation, survivors' bereavement, and so on. I am not so much interested in comparisons of this sort as I am in what can be found in the book about the people and history of New York cryonics in the twilight of its early period, from a different perspective than is found in the rather scanty coverage elsewhere (newsletters for instance).

Going on, then, to the history of CSNY, the following is pieced together from interviews in the book with Curtis Henderson and Saul Kent, respectively president and vice president of CSNY. These appear to date from around 1975, when no more patients were being maintained.[1]

SHESKIN: What is the state of CSNY now?

HENDERSON: CSNY never did amount to much more than me and Saul Kent … Nobody else was willing to do any of the work that was necessary to keep it going.

SHESKIN: What happened to make you stop your efforts in cryonics?

KENT: I wouldn't say that I stopped

my efforts. I would say that when what we were doing wasn't any good we changed. I haven't by any means given up on the idea. It's a good idea. But you're talking about freezing an individual and all I can say is that whoever does it better have plenty of money because I'm not paying for it. As far as the Society—the time and effort we put into it—it was me and Henderson who carried the idea. That's all it ever was.

SHESKIN: When did things start to decline?

HENDERSON: Things didn't progress in the way that we expected. We began to get discouraged. We were losing money and we didn't accomplish the goals we set out for.

SHESKIN: What were those goals?

HENDERSON: To become a large organization that would generate a lot of funds and information, promote the idea effectively and also sign up large numbers of persons to be frozen. We hadn't done any of those things. Publicity was all we succeeded in doing. So it didn't look as if we were going anywhere. And stopping was really all my decision. If I was still doing all the things I was doing before, there would still be an organization. In our group, the activities were more centered in two or three individuals than in other groups but more was done in our group than in the others. [But now, w]e don't even bother with the membership. We used to have members and we used to have meetings. It's just that this kind of organization is not suited for what we wanted to do.

SHESKIN: Why?

HENDERSON: I'm not sure but if you have a model airplane club, everyone makes model airplanes. In a political club, everyone goes out to try to get the votes to get a job out of it. These things all have activities that tend to hold people together. They can all participate on some level. Cryonics is not something a whole bunch of people can do. We put out the newsletter—a propaganda sheet—and got involved in the actual freezing of bodies. There's only a limited number of people who can participate, there just wasn't that much going on.

Other problems too were important in the shutdown. As background, for years CSNY stored its patients in a garage on the grounds of Washington Memorial Park Cemetery in Coram, NY. Finally, about September 1971, they had to move. Curtis Henderson reminisced about this in the 1992 interview.[2]

"Paul [Segall] and Harry [Waitz, of CSNY's volunteer staff and antiaging researchers on the side] would go handing out cryonics literature at funerals, wearing their long hair and beads. This didn't go over too well with the cemetery management at Washington Memorial Park. Cryonics was a constant media attraction; camera crews and journalists were always coming around and reporters would enquire about cryonics at the cemetery offices. It was a terrible hassle for them. Campbell, the cemetery director had left, and another person came in. They wanted more rent, but basically they wanted us out of there. We were a lot of trouble for them and the constant media presence wasn't conducive to the nice, quiet, 'final resting place' they were selling to the dearly beloved. And we weren't happy there, because we were keeping bodies in the garage, and the people who worked on the grounds were always joking about the frozen bodies and leaving their lunch on the dry-ice boxes.

"Another thing that was a real problem was that there was no way for us to lock the door. The groundskeepers used the room where the bodies were stored as a lunch room and they would throw their cigarette butts on the floor. This used to enrage Nick DeBlasio [whose wife Ann had been frozen by CSNY and was stored there in an upright capsule, the 'Forever Flask.'] He said it was disrespectful, and it was. However, there was nothing we could do about it. The facility was used to store grounds keeping equipment and supplies for the cemetery, and that was just the way it was. If you're going to do this, you've really got to have your own place, so you can control the situation, so people aren't always coming in, and so family can visit and you can be sure that the place will be clean and orderly."

A sporadic attempt by some to open a new storage center ended in humiliation.

"There was a group of CSNY members that wanted to find another facility. They were unhappy about the way I was doing things. They found a church in Suffolk County, and bought it. Thought they could store cryonics patients legally in a cemetery. They decided they would dig under the church and build a facility. They

PHOTO CREDIT: https://www.facebook.com/arlene.sheskin, accessed 22 Oct. 2013.

Arlene Sheskin

didn't tell the people who were using the church every Sunday. DeBlasio went down to Brookhaven Town Hall and asked for a building permit to store bodies. They turned him down, so he went ahead without it. Halloween night, the local citizens all gathered around this church with torches. That was the end of their operation which, ironically, they called Cryo-Crypt."

The group was still not ready to rejoin CSNY however.

"—So, we had a parting of the ways. Nick Deblasio, John Bull, Mrs. Mandell, they split off from CSNY and formed their own organization, [the short-lived] Cryonics Unlimited.[3] DeBlasio came and got his wife and carted her off to a hole in the ground [Robert] Nelson[, president of the Cryonics Society of California] and he had dug in a cemetery in Butler, New Jersey. Nelson showed up at Washington Memorial Park, crated up Steven Mandell in our tank, and took him off to his other hole in the ground in a cemetery in Chatsworth, California. I packed up our remaining patient, [Paul Hurst,] and we rented this industrial bay in West Babylon; 171 Eads Street, unit C. We sublet most of the space to the business next door and just occupied the front; we had the small office and some of the open space behind it and the roll up door. It wasn't much, but it was ours, and we could control what went on there, and who came and who went."

It's often said, however, that "you get what you pay for," and though the West Babylon site was affordable and in some ways convenient, these benefits came with a peculiar downside.

"I think one of the reasons the place

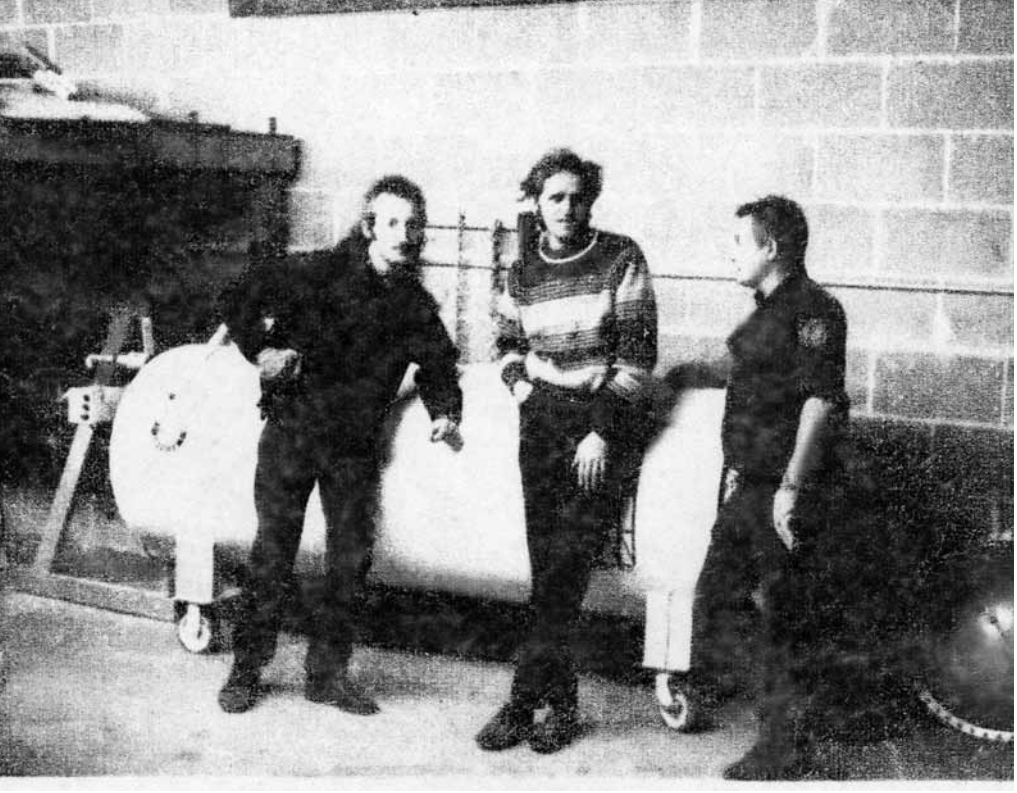

PHOTO CREDIT: *The Outlook*, Nov. 1971, cover.

After the move to the new facility in West Babylon, about September 1971. From left: Bruce Cohen, Saul Kent, Curtis Henderson.

came so cheap was that it was located right in the middle of a bunch of cemeteries with a landfill just a street or two over. The landfill was this gigantic heap of garbage several stories tall. It was a skyscraper of garbage with thousands of gulls constantly circling around it. In the summer, well, let's just say the aroma coming off it wasn't Chanel Number 5."

The need to move is described from a different perspective in Sheskin's book. There were three patients in the Coram facility (Steven Mandell, Ann Deblasio, Paul Hurst). According to Pauline Mandell, mother of Steven, "He [the person in charge of maintaining the capsules, Curtis Henderson?] would come around at all hours of the night to put in liquid nitrogen. They [the cemetery owners] said he always looked terrible and that they didn't want anything more to do with him because he was a circus clown." Mrs. Mandell added, "[Curtis Henderson] was told that he couldn't bring [in] any more bodies. When [Beverly Greenberg] called about having her father [Herman] suspended [cryopreserved], we [Mrs. Mandell and another, unnamed relative of a CSNY patient, possibly Nick DeBlasio] told him not to do it. But he did it anyway and kept the body on dry ice while he pressured the cemetery to allow another body. The cemetery couldn't stand the pressure and made us all move."[4]

At the time of Beverly's call, her father had been briefly buried, thus had to be exhumed for cryopreservation. She immediately became an official in the Society, which caused others, rightly or wrongly, to question the motives of the president in the actions that were taken.[5] After the move, Greenberg was added to the Hurst capsule, which was built for two occupants like the others. Both the Hurst and DeBlasio capsules were upright, while Mandell's container was an older-style, horizontal unit that also required constant pumping to harden its vacuum jacket and keep the nitrogen boiloff to manageable levels.

Though Hurst and Greenberg were retained, the move deprived CSNY of its other two patients, Steven Mandell and Ann DeBlasio. In both cases, as we've seen, Robert Nelson of the rival Cryonics Society of California (CSC) was instrumental in finding new locations, at the insistence of the survivors. Though Henderson had an enduring dislike for Nelson he was grudgingly grateful, as expressed in the 1992 interview. "[A]ctually, much as I hate Nelson, in a way he did me great favors. He took these people away from me! He stole that tank [the horizontal capsule of Steven Mandell]. You know, I clapped when he loaded it on a truck and ran out of here. Mandell's mother had no intention of paying, she never did pay anything. We had paid about $2,000 for the liquid nitrogen to keep that tank cold. And you had to run that pump day and night. Every time the power utility gave us a brownout, not only would the pump stop and lose the vacuum, but the end of the tank would fall off! I had C-clamps on it so it wouldn't fall off. When the power failed and the vacuum pump quit running, the suction from the vacuum in [the] tank would suck the oil out of the vacuum pump. All that oil loaded with crap from the air would be pulled into the vacuum space, and no amount of valves or anything seemed to stop that. It was a horrendous tank. Nelson took that one."[6]

Going back to the survivors, Sheskin reports how the move to West Babylon was from "a cemetery to a warehouse" and this was upsetting to Mrs. Mandell. "I didn't feel that I wanted my son's body in a warehouse. The fact that they're frozen shouldn't mean that they have an undignified resting place. A cemetery is dignified—that's where they should be." Mr. DeBlasio, also dissatisfied, thought his new, below-ground facility (constructed using funds from a medical malpractice suit over the death of his now-frozen wife[7]) was better. "We were trying to keep out undesirables [CSNY officials]. I understand how it's a business to them and how they want to make profits. But you must understand that it's a very emotional thing. My facility looks like a furnished basement. We shied away from an industrial area—it's an underground facility. After all, there's a certain amount of dignity involved in this."[8]

Another (anonymous) cryonicist saw it quite differently. "I don't like holes in the ground or cemeteries and actually if you are a gung ho cryonicist the last place you'd want to put your relative or yourself is in a cemetery. What could be more final than in a cemetery? After all, the idea of this is that it's a long term scientific experiment. …"[9]

As for complaints of survivors, relatives of "the man in the can," Curtis Henderson commented: "The man in

the can, he ain't going to bother you… These people running around outside, their lives change, things happen to them. Pretty soon they start saying they never liked that old geezer anyway. See? Now you've got troubles, because they don't like to admit that. I went through this with any number of people. They don't want to actually say, 'Oh, I don't want to keep him frozen, pop him in the ground.' They start with complaining that I'm charging too much, the liquid nitrogen level isn't high enough, and why didn't I get them on the last TV show. That was one of the biggest complaints. They come here and see people making a TV show, and they complain if I don't get them on it. … we didn't ever get all the money up front. That was a mistake."[10]

members of SACS. Again Mrs. Mandell reports: "A minimum of $25,000, in the form of insurance, trust, or other personal funds, is required, to be divided as follows. (1) a minimum of $20,000 for the individual's perfusion, capsule, storage, etc., with the balance to be placed in an individual trust fund. It is hoped the interest from the trust will cover costs of maintenance, storage, repairs, and new capsules when necessary. It is anticipated that any funds beyond these requirements will be reinvested, so the trust itself will grow. (2) A minimum of $5,000 is to go to SACS, upon the individual's death, to be used exclusively for research in cryonic sciences."

The high hopes of these two organizations, however, were not fulfilled.

"Comparatively little attention is devoted to the question of whether cryonics patients can eventually be resuscitated, or the technical details of procedures used in cryoprotection and cooldown."

Pauline Mandell, paradoxically, was not interested in cryonics for herself. "I don't think I'd want another chance at this life," she said in a newspaper interview shortly after her son's freezing, "but I can see where a man like my son would."[11] Though apparently unwilling to pay for the capsule maintenance (a habit that continued after the capsule was taken to Nelson's facility[12]), she both insisted on continuing the freezing and also, when dissatisfaction led to the rupture with CSNY, started her own organization, the Society for Advancement of Cryonic Sciences, offering this comment: "SACS is being set up exclusively for scientific research and education within the field of cryonics. We are seeking classification which would make contributions tax deductible. A minimum of 10% of all dues collected for membership in this organization shall be devoted exclusively to scientific research in cryonics. Any donor may specify whether funds shall be used for research, education (SACS report, Bulletins, etc.) or both."[13]

Accompanying SACS was another organization, Cryonics Unlimited (CU), which would do cryopreservations and whose patients were required to leave specified amounts of funding and to be

CU never did any cryopreservations and both organizations (along with the aforementioned Cryo-Crypt) effectively ceased to function within a short time and accomplished little beyond brief notice in some newsletters. Sheskin, in analyzing this failure, noted that while CSNY had its problems, it stayed active longer and was more successful because it had at people (Curtis Henderson, Saul Kent) who could devote full time to its needs and tenaciously persevere in the face of obstacles.[14] The two simply worked harder and longer than the others, despite eventually giving up the effort (though not their involvement in cryonics).

Two more freezings are treated in Sheskin's book, one entirely by CSNY (Clara Dostal, 1972), the other a Trans Time case assisted by Curtis Henderson ("Frank Riley," 1974). The Dostal children, a son and a daughter, are presented as having firm doubts that their frozen mother would ever return to life, believing instead that "dead is dead" so the cryopreservation was done only because the mother wanted it. (After two years of frustrating, expensive effort they decided "enough was enough" and had her buried.)[15] For Riley, the survivors, a wife and a son, thought of cryonics as an experiment with a quite uncertain prognosis but not a hopeless prospect to be pursued only at the whim of the decedent. (Riley is now at Alcor, along with his wife, both converted to neuropreservation when funding ran low; the son who had no cryonics arrangements was killed in an accident and was not cryopreserved.)[16]

Overall, Sheskin offers a positive assessment of cryonics, comparing it to conventional medicine: "In its concentration on the critically ill and the initiation of new technologies to service them, medical science is not very different from cryonics where the emphasis is on investing in someone who has been declared dead. Both place tremendous efforts and resources on a small sector of the population to the exclusion of the rest. This is not to say that catastrophic disease should be left unattended while medical researchers devote themselves to curing everyday diseases like the common cold, but if cryonics is considered a waste of resources, then is not the emphasis on life preservation in medical science a similar misuse? How is one to know when life preservation and extension is legitimate and when it is worth the costs involved?"[17]

However, cryonics is not given an unqualified endorsement, mainly because it is viewed from the perspective of survivors who often underwent emotional as well as financial hardship to maintain a freezing. When pressed, Sheskin is inclined to treat cryonics as on par with other forms of disposition such as burial or cremation, that is to say, in accordance with the dictum that "dead is dead": "If individuals, for example, who wanted to be cremated explained their reasons to relatives and helped them overcome their aversion to the practice, cremation might be assured. However, there is always the possibility that relatives will not be convinced—that they will be unable to accept cremation, cryonics, donating a body to science, or a living will. When this possibility is considered, the perils of legislation in this area become apparent. Legislation that assures the rights of the dying or dead over the disposition of their bodies might consign survivors to a difficult, and perhaps irresolvable, bereavement. Survivors, then, must have the right to choose a death disposition with which they can live—no matter what the desire of the dying or deceased. In

short, the rights of the dead must recede in the face of the living."[18]

The problem with this reasoning for cryonicists is, of course, that "dead" is not necessarily dead, and we view cryonics as a type of medical practice not a mortuary practice. Cryonics is not simply another means of "disposal" like cremation and burial. The cryopreserved patient instead has the status of someone in a deep coma who could possibly regain consciousness and for which the termination of life support (in this case thawing and burial or cremation) must not be left to the whim of relatives. Yet cryonics is expensive. Few of those in the early days who had relatives frozen had substantial wealth. To accommodate the less well-to-do, full up-front payment at the start of a freezing was not demanded but, in keeping with an American tradition, interested parties could get the desired service (freezing the relative) "on payments"—only the payments had to continue indefinitely. This was a disastrous error, as shown in the fact that nearly all the early freezings terminated with thawing and loss after only a few years (including all the ones considered here except the Rileys as noted). Today, in general, up-front payments are required, with maintenance costs to be paid from interest income. The high cost can be managed through means such as life insurance for the less wealthy (but arrangements need to be made in advance of need, in a state of good health. A few needy people have also been helped by fundraising efforts, though resources and opportunities for this are limited[19]). When this is taken into account, the objections of Ms. Sheskin lose much of their force, though it is fair to admit that those who are not able to make the upfront payment may find it more difficult than in earlier times to arrange cryopreservation in the first place. In practice, though, cryopreservation need not impose an ongoing financial burden on the survivors and differs little from other forms of disposition—other than the hope it offers for those who endorse it.

One additional feature of Sheskin's study emerged when, early on, she tried to tell others about it—their response was not what she thought it would be. "When I began the research, I expected friends to find cryonics interesting and perhaps unusual. I was most surprised to find that reactions to the research as well as to the practice were extreme and sometimes hostile. People told me that cryonicists were 'sick' and that I must have something wrong with me to be spending time with them. Individuals who felt it wrong and/or depressing to talk about death charged that cryonicists had unresolved problems with death that a 'normal' person did not. When I talked about the possible benefits to be accrued from the suspension of one's relatives, a friend told me that she would not and could not discuss her mother's death and that she did not think she could survive the eventual event. Consequently, she could not bring herself to discuss any possible benefits, or detriments, of cryonics since she could not bring herself to accept the conditions which would precipitate the practice. Of course, many others told me that there was a time to live and a time to die and that it was unnatural to affect these times through freezing, although they all admitted to being in favor of curing terminal disease. Finally one friend—a nurse—walked out of the room whenever cryonics was discussed because she felt it to be an unnatural practice."[20]

In short, cryonics was very widely seen as disturbing, unnatural, and repulsive, something that "normal" people would not feel a need for and would not be involved in. Though the study ended nearly four decades ago, and though people are usually polite when we talk to them, this prejudice appears to be largely still in place. So we are waiting for an "attitude changing event"—a research breakthrough perhaps—that will make such thinking less tenable and encourage the mainstream to consider a proactive response to clinical death that is aimed at alleviating it. ■

SOURCES:

Abbreviations as indicated are used in note references.

("Thus Spake Curtis Henderson" is a 6-part interview conducted in 1992 by Charles Platt and annotated by Mike Darwin, now online.)

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3. Original gives the name as "Cryonics International" but it appears the correct name was "Cryonics Unlimited," cf. note 13.
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COOLER MINDS PREVAIL

AN END TO THE VIRUS

By Chana de Wolf

Breakthroughs in medicine have increased substantially over the last hundred years, and most would agree that the introduction of antibiotics in 1942 has been one of the largest milestones in the history of medicine thus far. The success in treating bacterial infection has only accentuated the glaring lack of progress in developing effective therapeutics for those other enemies of the immune system, viruses. But Dr. Todd Rider and his team at MIT have dropped a bombshell with their announcement of a new broad spectrum antiviral therapeutic, DRACO, which appears not only to cure the common cold, but to halt or prevent infections by *all* known viruses.

Before talking specifically about this exciting news, let us first review viral biology and why viral infections have been so difficult to treat.

As you may recall from your early education, a virus particle, or *virion*, consists of DNA or RNA surrounded only by a protein coat (i.e., naked virus) or, occasionally, a protein coat and a lipid membrane (i.e., enveloped virus). Viruses have no organelles or metabolism and do not reproduce on their own, so they cannot function without using the cellular machinery of a host (bacteria, plant, or animal).

Viruses can be found all throughout our environment and are easily picked up and transferred to areas where they may enter our bodies, usually through the nose, mouth, or breaks in the skin. Once inside the host, the virus particle finds a host cell to infect so it can reproduce.

There are two ways that viruses reproduce. The first way is by attaching to the host cell and entering it or injecting viral DNA/RNA into the cell. This causes the host cell to make copies of the viral DNA and translate that DNA to make viral proteins. The host cell assembles new viruses and releases them when the cells break apart and die, or it buds the new viruses off, which preserves the host cell. This approach is called the *lytic cycle.*

The second way that viruses reproduce is to use the host cell's own materials. A viral enzyme called reverse transcriptase makes a segment of DNA from its RNA using host materials. The DNA segment gets incorporated into the host cell's DNA. There, the viral DNA lies dormant and gets reproduced with the host cell. When some environmental cue happens, the viral DNA takes over, makes viral RNA and proteins, and uses the host cell machinery to assemble new viruses. The new viruses bud off. This approach is call the *lysogenic cycle;* these viruses are called *retroviruses* and include herpes viruses and HIV.

Once free from the host cell the new viruses can attack other cells and produce thousands more virus particles, spreading quickly throughout the body. The immune system responds quickly by producing proteins to interfere with viral replication, pyrogenic chemicals to raise body temperature, and the induction of cell death (apoptosis). In some cases simply continuing the natural immune response is enough to eventually halt viral infection. But the virus kills many host cells in the meantime, leading to symptoms ranging from the characteristic runny nose and sore throat of a cold (rhinovirus) to the muscle aches and coughing associated with the flu (influenza virus).

"...Dr. Todd Rider and his team at MIT have dropped a bombshell with their announcement of a new broad spectrum antiviral therapeutic, DRACO, which appears not only to cure the common cold, but to halt or prevent infections by all known viruses."

Any virus can be deadly, especially to hosts with a weakened immune system, such as the elderly, small children, and persons with AIDS (though death is actually often due to a secondary bacterial infection). And any viral infection will cause pain and suffering, making treatment a very worthwhile goal. So far, the most successful approach to stopping viral

infections has been prevention through the ubiquitous use of vaccines. The vaccine—either a weakened form of a particular virus or a mimic of one—stimulates the immune system to produce antibodies specific to that virus, thereby preventing infection when the virus is encountered in the environment. In another approach, antiviral medications are administered post-infection and work by targeting some of the specific ways that viruses reproduce.

"An interesting question is whether any viruses are actually beneficial and whether wiping all viruses out of an organismal system may have negative consequences..."

However, viruses are very difficult to defeat. They vary enormously in genetic composition and physical conformation, making it difficult to develop a treatment that works for more than one specific virus. The immense number of viral types in nature makes even their classification a monumental job as there is more enormous structural diversity among viruses. Viruses have been evolving much longer than any cells have even existed and they have evolved methods to avoid detection and to overcome attempts to block replication. So, while we have made some progress in individual battles, those pesky viruses have definitely been winning the war.

Which is why the announcement of a broad spectrum antiviral therapeutic agent is such huge news. In their paper, Rider et al. describe a drug that is able to identify cells infected by any type of virus and which is then able to specifically kill *only the infected cells* to terminate the infection. The drug, named DRACO (which stands for **D**ouble-stranded **R**NA (dsRNA) **A**ctivated **C**aspase **O**ligomerizer), was tested against 15 viruses including rhinoviruses, H1N1 influenza, polio virus, and several types of hemorrhagic fever. And it was effective against every virus it was pitted against.

Dr. Rider looked closely at living cells' own defense mechanisms in order to design DRACO. First, he observed that all known viruses make long strings of double-stranded RNA (dsRNA) during replication inside of a host cell, and that dsRNA is not found in human or other cells. As part of the natural immune response, human cells have proteins that latch onto dsRNA and start a biochemical cascade that prevents viral replication. But many viruses have evolved to overcome this response quite easily. So Rider combined dsRNA detection with a more potent weapon: apoptosis, or cell suicide.

Basically, the DRACO consists of two ends. One end identifies dsRNA and the other end induces cells to undergo apoptosis. When the DRACO binds to dsRNA it signals the other end of the DRACO to initiate cell suicide, thus killing the infected cell and terminating the infection. Beautifully, the DRACO also carries a protein that allows it to cross cell membranes and enter any human or animal cell. But if no dsRNA is present, it simply does nothing, leaving the cell unharmed.

An interesting question is whether any viruses are actually beneficial and whether wiping all viruses out of an organismal system may have negative consequences (as happens when antibiotic treatment eradicates both invading pathogenic bacteria and non-pathogenic flora, often leading to symptoms such as digestive upset). After his recent presentation at the 6th Strategies for Engineered Negligible Senescence (SENS) conference in September 2013, Dr. Rider fielded this question and stated quite adamantly that there are no known beneficial, symbiotic, or non-harmful viruses.

"Basically, the DRACO consists of two ends. One end identifies dsRNA and the other end induces cells to undergo apoptosis."

This point is further emphasized in a recently published interview in which he is asked whether DRACO-triggered cell death could lead to a lesion in a tissue or organ. Rider responds that "Virtually *all* viruses will kill the host cell on the way out. Of the hand-full that don't, your own immune system will try to kill those infected cells. So we're not really killing any more cells with our approach than we already have been. It's just that we're killing them at an early enough stage before they infect and ultimately kill more cells. So, if anything, this limits the amount of cell death."

So far, DRACO has been tested in cellular culture and in mouse models against a variety of very different virus types. Rider hopes to license DRACO to a pharmaceutical company so that it can be assessed in larger animal trials and, ultimately, human trials. Unfortunately, it may take a decade or more to complete this process and make the drug available for human therapeutic purposes, and that's only if there is enough interest to do so. Amazingly, the DRACO project was started over 11 years ago and has barely survived during that period due to lack of interest and funding. Even now, after the DRACOs have been successfully engineered, produced, and tested, no one has yet reached out to Rider about taking them beyond the basic research stage. Let us hope that those of us who *do* find this work unbelievably exciting can make enough noise that Rider's work continues to the benefit of all mankind. ■

BITCOIN AND CRYONICS, PART 2:
BRAIN WALLETS

By Keegan Macintosh

In my last article, I introduced the cryptocurrency, Bitcoin from a technological and conceptual perspective, giving a brief history of its origin and mysterious creator, Satoshi Nakamoto, and its subsequent development and eventual rise into the mainstream consciousness. I also pointed out some (I think interesting) early connections between the Bitcoin and cryonics communities. In this article, I will be considering the legal status of bitcoins, both in the abstract as well as some concrete (albeit early) examples of regulatory treatment. I will briefly canvas some other risks and concerns that are sometimes raised in connection with Bitcoin. The remainder of the article will be devoted to exploring some cryonics-specific uses for Bitcoin.

LEGAL STATUS OF BITCOINS

Part of the reason Bitcoin is difficult for lawmakers and regulators to categorize is because it does not lend itself to analogy very well. Or perhaps it does this *too* well—that is to say Bitcoin can be meaningfully analogized to different and competing schemas. Fundamentally, as I discussed in the first part, Bitcoin is a ledger of transactions. But normally, a ledger of transactions refers to a unit which represents some *physical thing*, and even if that physical thing rarely actually changes hands in the vast majority of transactions of it, somewhere there is some form of *property*, in the legal sense, that the ledger is tracking. Even where this property is just a "right" to something else (think shares in a company), there's usually some material thing (often money) at the end of the line.

Even bank notes and coins, the physical manifestations of traditional currency, are "referring" to something else—namely the respective territorial government's acceptance of that currency for payment of taxes, etc., and its authority to insist that merchants within the territory accept the currency as "legal tender." Sometimes the governments will have some kind of reserve of another valuable thing (like gold) in place to "back" the value of its currency, but in more recent times this has become less common, and a territory's currency has value by government fiat. Bitcoin defies all this. There is nothing "backing" Bitcoin, only communal trust in the protocol itself, which is basically faith in cryptography and in the Bitcoin community's collective will to see the project succeed. And so, Bitcoin defies or at least confuses the current legal conceptualization of what property *is*. Could it be said that a Bitcoin user has "rights" to particular bitcoins, even though they don't actually exist anywhere other than on a ledger? Or does it make more sense to say they have exclusive rights to the address and private key that they have claimed for themselves—even though those were generated by a publicly available algorithm, with some real (but very, very, *very* small) chance that someone else could randomly generate the exact same ones, and be able to transact any bitcoins happening to be there..?

Other virtual currencies, like World of Warcraft "gold" and Amazon coins, while conceptualized as currency, derive their value, and any legal rights their users may have, from the contract agreed upon between issuer and user (however cursory that agreement may have been). Often, these agreements actually bar the user from trading the virtual currency to another user in exchange for traditional currency, and the issuer reserves the right to unilaterally change the contract on notice to the user. Nevertheless, the users of these currencies do have some legal rights, arising out of contract.

"There is nothing "backing" Bitcoin, only communal trust in the protocol itself, which is basically faith in cryptography and in the Bitcoin community's collective will to see the project succeed."

Bitcoin defies this too. There is no single issuer, and no one entity has the ability to change the Bitcoin protocol. The limit of the "powers" of those most closely

involved with developing the protocol, is to release an update to the basic client, which is open source, and suggest that the update be adopted by the many users of the network—miners in particular. For major changes, all users must accept the update or risk a "hard fork" of the blockchain, with two parallel ledgers each purporting to be a true representation of the state of the network. Thus, it needs to already be a foregone conclusion that a large majority of the network will accept such major changes before it is even released, else doing so will undermine the project itself. In legal terms, we could perhaps conceive of the Bitcoin protocol as a multi-party, majority-guided, consensus-driven contract regarding the formulation of a ledger of transmissions of a unit that all the contractors accept have *some* value—value derived from the nature of the system thus described. But this "contract" is written in computer code, and is constantly self-executing (or to continue the metaphor, self-enforcing) in real time all the world over. And far from a simple contract of sale or services, or even a complex corporate transaction, the Bitcoin contract describes an entire economic system, not tied in any way to the geographic territories its users reside in, or, more importantly, the laws of those territories. Bitcoin is living law, created, sustained and refined by the supranational community of its users.

Now, with all that said, it is still completely within the purview of courts and lawmakers to "admit" bitcoins as a form of property. And while it is still early days, it appears that at least one court has done just that. In an early ruling in the prosecution of a rather notorious Ponzi scheme involving Bitcoins, a Texas District Court judge ruled that "Bitcoin is a currency or form of money," and thus the defendant's claim that Bitcoin was not money and therefore his offerings were not securities within the jurisdiction of the SEC was baseless.[1] Also, the Financial Crimes Enforcement Network ("FinCEN"), the anti-money laundering enforcement agency of the U.S. Treasury has stated that both bitcoin exchanges as well as miners that exchange their newly-mined bitcoins for money are money transmitters subject to state licensing requirements—though how and why this would be enforced against the latter group is unclear to say the least.[2]

Meanwhile, up north, the Canada Revenue Agency has indicated that the rules which apply to bartering apply to trades involving bitcoin, which means that purchases of goods, services, or other currencies with bitcoins will result in taxable capital gains (or losses) if the value of the bitcoins (in Canadian dollars) has increased or decreased since they were acquired.[3] And, in contrast with the U.S., Canada's Financial Transactions and Reports Analysis Centre ("FINTRAC"; agency equivalent to FinCEN) has informed bitcoin exchanges that they are *not* subject to regulation as money services businesses under the applicable anti-money laundering laws (for the time being, at least).[4]

OTHER CONCERNS REGARDING THE TECHNOLOGY

Aside from uncertain, sometimes conflicting legal classification and treatment, other concerns have been raised regarding the use of bitcoins in illegal drug and weapons trade, and for money laundering by criminals and terrorists. However, these arguments flounder somewhat when faced with the simple fact that as a *public* ledger, it is technically *easier* to trace dirty bitcoins than it is to trace dirty cash. That said, bitcoin mixing (read: laundering) services have sprung up for bitcoins too. It is worth noting here that the Silk Road, one of the largest marketplaces for all things illegal, operating on the near-anonymous Tor network and using bitcoin as its primary trade currency, was recently shut down by the U.S. government—its alleged operator arrested on drug charges and conspiracy to murder.[5]

Others point to the fact that it is possible to use the Bitcoin protocol to encode other kinds of content into the blockchain—including illegal content, like links to child pornography—immortalizing it there in the computers of every user of the network (whether they have the means or the desire to decode the content or not). Of course, this is not a new argument—it has been leveled against the Internet itself. And like the Internet, the Bitcoin protocol cannot be held responsible for the moral acts of its users, good or bad. Law enforcement agencies will simply adapt, as they already are doing.

The above is by no means an exhaustive analysis of the legal status of Bitcoin or of any particular uses for the technology, it is just meant to give you an idea. Generally speaking, owning and using bitcoins seems to be legal, but doing things with Bitcoin that would be illegal to do with money or with the Internet, remain illegal. It's as simple as that.

CRYONICS-SPECIFIC USES FOR BITCOINS

(1) Asset preservation

It has been suggested that since bitcoins appear to store value (in a somewhat erratic, volatile fashion, if that isn't a contradiction in terms), they could provide an alternate means to those currently employed by cryonicists seeking to maintain possession of their accumulated wealth during their period of cryopreservation (namely, asset preservation trusts). And in fact, since Bitcoin is designed to be a deflationary currency[6], assuming that it survives and is adopted widely, wealth stored as bitcoins will likely be worth much more in the future than it is now. This might be attractive to cryonicists for whom volatility on shorter timescales is not terribly concerning.

So how could cryonicists accomplish this? The all-important piece of information that gives a particular person the ability to send bitcoins stored at a particular address is the private key for that address. Trouble is, no matter how that private key is stored, whether digitally on a computer owned by the cryonicist, or on a secure cloud server controlled by the cryonicist under some agreement entered into with the cloud server provider, or even written down on a simple piece of paper (the so-called "paper wallet"), none of these records of the private key will escape the effects of estate law if they remain the cryonicist's property upon legal death. Thus the information required to transmit the cryonicist's bitcoins would end up in the hands of beneficiaries—beneficiaries who today might not even know what to do

with them! This could result in either the loss of the bitcoins to the cryonicist, or the permanent loss of the bitcoins altogether, since if the private key is outright lost, the bitcoins stored at that address are no longer accessible.

The only way to avoid this would be to use essentially the same mechanism currently used for cryonics asset preservation, i.e. giving the medium with the private key on it to a trustee to hold for the cryonicist until they are successfully resuscitated. But then we haven't actually come up with a new solution to the problem we set out to solve, because this trust will have to be drafted in more or less the same way as other cryonics asset preservation trusts, such as the Alcor Model Trust, with an interim beneficiary standing in for the cryonicist while they are not a legal person. And there is nothing wrong with that in principle, but since bitcoins are informational in nature, there might be another way of preserving them for later use, without using trust law mechanics—perhaps as a way of hedging oneself against the possible failure of the trust for one reason or another.

This alternate method relies on the fact that, as information, bitcoin private keys can be *memorized*. However, private keys are even longer than bitcoin addresses themselves, and thus not the easiest things to memorize. So, some clever people have devised a way of generating private keys by hashing series of words that are much easier for the average human being to remember, like "correct horse battery staple."[7] These approaches to securing bitcoins are referred to as *brain wallets*. Fair warning, though: short, simple combinations of ordinary words are vulnerable to "dictionary attacks." For similar reasons, a beloved section of poetry, in unaltered form, is not a wise choice of phrase to generate a private key either. As with ordinary passwords, addition of numbers, special characters, and variations of case are advisable.

In their brain wallet, the cryonicist stores some of their wealth in bitcoins using a secret passphrase known only to them. Upon resuscitation, they generate the private key from the passphrase, and they have everything they need to transact with the bitcoins as they desire. Conceivably, brain wallets could even be used to incentivize resuscitation, by telling your cryonics provider about the bitcoins and promising them some portion of them upon your return.[8] Of course, that idea leads to a potential pitfall of storing the key to your wealth in your brain, as it makes your brain potentially quite valuable—that is, valuable to people other than yourself and those that care about you for *you*. If it became common knowledge that cryonicists were using this as a strategy for asset preservation, mightn't this make cryonics facilities attractive to the future's version of tomb-raiders, lusting after the riches locked away in cryopreserved brains? The best case scenario there would be that the technology exists to somehow "read" the private key from a brain while still cryopreserved. A worse scenario would be that the cryonicist, having been abducted from their long-term care provider, is later resuscitated under rather different circumstances than they intended—as hostages of their resuscitators, and only of continued value to them until they give up the goods, as it were. I will say however that both those scenarios sound more like premises for science fiction stories than likely futures.

Another, less fantastical problem with using brain wallets for asset preservation is the possibility that part of the cryonicist's brain that is involved in storing the private key—or more likely the passphrase used to generate it—is damaged during cryopreservation in a way that is not reparable. However, without delving too far into the subject, I wonder if there are mnemonic strategies that would reduce the likelihood of this undesirable outcome. Even something as simple as ritualized, periodic recall of the passphrase to continually reactivate the memory and strengthen it might result in a memory that has sufficient physical redundancy in the brain to resist some amount of damage.

Lastly, there is always the chance that during the patient's cryopreservation, Bitcoin fails for some reason, either because some major flaw in the protocol is discovered and exploited, or a successor technology comes along, and the value and wealth currently stored in Bitcoin drains out of it into the successor. That said, Bitcoin still has a strong first mover advantage, and as a protocol, any deficiencies identified through experimentation with the numerous "altcoins" that exist can simply be implemented into Bitcoin, which has considerable network effect favouring its competitive survival. However, due to this and the aforementioned risks, it would be seriously inadvisable to make storing wealth in Bitcoin brain wallets one's *only* asset preservation strategy.

(2) Collection of donations, and payments for services

Case in point: I created a Bitcoin address for the Institute for Evidence Based Cryonics just before the symposium on Resuscitation of Cryonics Patients in May, and ***merely because we accepted bitcoins,*** someone in the audience, with whom we had no prior relationship, made a donation. And all he had to do was scan the QR code of IEBC's public address that was on my phone.

In addition to soliciting donations this way, cryonics service providers could also accept member dues and lump-sum prepayments via Bitcoin. Compared with the transaction fees charged by credit card companies and PayPal, which are generally a percentage of the value of the transaction itself, the default suggested transaction fee is only 0.0001, or at today's exchange rate a little over one cent[9]. And historically, as the price of bitcoins has increased, the default transaction fee has been reduced, since transaction fees only need to be a small component of the miners' incentive while the block reward is still quite high. Anyway, this is much cheaper than the competition, and also much faster, as Bitcoin transactions "settle" securely in about an hour, and realistically can be relied on even sooner when dealing with relatively small transactions, as the risk of a double-spend attempt is very low there due to the cost of the computing power required to successfully pull it off.

However, for organizations worried about the extra level of accounting complexity created by accepting payments in a currency with a value that fluctuates relative to their home currency, there is an

alternative. Numerous payment companies are springing up in the Bitcoin service layer that aim to make accepting bitcoins easier on companies, Coinbase being a well-funded frontrunner that gives merchants the option to have incoming bitcoin transactions converted immediately into USD at the current exchange rate, plus a 1% service fee (which is still significantly cheaper than credit cards and PayPal).[10]

OTHER CRYONICS-RELEVANT USES

The surface has only just been scratched with respect to what the Bitcoin protocol is capable of. Blockchain technology is an incredibly powerful tool, that has already been adapted for use as a cryptographically secure, peer-to-peer messaging system[11], as well as a decentralized domain name system[12]. Automated contracts with built-in dispute resolution mechanisms, aka "smart contracts" are in the works, and "smart wills" should be possible as well, though cryonicists will probably be more interested in ways of maintaining personal control over their wealth, as described above.

CONCLUSION

Hopefully, this article and the last have served as an understandable yet accurate introduction to Bitcoin, from both a technical and a legal perspective, with special attention to its historical connections to the cryonics community, and its possible future uses for cryonics. ■

FOOTNOTES

1. Securities and Exchange Commission v. Shavers, No. 4: 13-CV-416 (E.D. Tex. Aug. 6, 2013).
2. "Application of FinCEN's Regulations to Persons Administering, Exchanging, or Using Virtual Currencies," FIN-2013-G001. Available at http://fincen.gov/statutes_regs/guidance/html/FIN-2013-G001.html
3. http://www.cbc.ca/news/business/revenue-canada-says-bitcoins-aren-t-tax-exempt-1.1395075
4. http://www.theregister.co.uk/2013/05/20/canada_welcomes_bitcoin_traders_fintrac_letter/
5. http://www.reuters.com/article/2013/10/02/us-crime-silkroad-raid-idUSBRE9910TR20131002
6. The mining reward will halve approximately every 4 years, resulting in the total number of bitcoins never exceeding 21 million—the design rationale being that over time the number of transactions on the network will increase to the point where competition for rapid inclusion in blocks (and thus, faster confirmation of the transactions) will result in sufficient transaction fees to incentivize miners' continued support of the network without the block reward. So while technically the supply of bitcoins is increasing, it is expected to eventually behave like a deflationary currency, relative to traditional currencies. Since 25 new bitcoins are created approximately every 10 minutes, at present over $3,000 USD worth of "new money" in traditional currencies needs to enter the bitcoin market just for the price of bitcoins to remain flat; thus, the rising price of Bitcoin, while appearing like deflation, is actually merely a function of supply versus demand (and also exchange bottlenecks).
7. This example is rather famous in the Bitcoin community, as it was used in the popular online comic strip, xkcd: http://xkcd.com/936/
8. I must credit this idea to Danila Medvedev, who floated it on Cryonet Asset Preservation mailing list in August: http://groups.yahoo.com/neo/groups/New_Cryonet/conversations/messages/5448 (requires joining the mailing list to view).
9. Remembering that the transaction fee is only required if you want your transaction confirmed relatively quickly. If there is no rush on the recipient's end, one can send bitcoins without any fee at all, though it may take some time to be included in blocks, as transaction fees are part of the miners' incentive, though for now a relatively small incentive compared with the 25 bitcoin block reward... but this will change over time.
10. https://coinbase.com/merchants
11. https://bitmessage.org/
12. http://dot-bit.org/

Already a Bitcoin user? Consider making a donation to the Lifespan Society of British Columbia using the address in the article above. The Institute for Evidence Based Cryonics (www.evidencebasedcryonics.org) also accepts bitcoins, at 1Mouv8BcRUmqVHRRNPaQPmFkzskMqoiSDk. (see QR code to the right)

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Twenty Minutes Into the Future?

By Mark Plus

***The Transhumanist Wager*, by Zoltan Istvan. Futurity Imagine Media LLC, 2013. ISBN 978 0988616110.**

A BOOK REVIEW OF *THE TRANSHUMANIST WAGER*

Zoltan Istvan [1], a former freelance writer for *National Geographic,* has stated in interviews[2,3] that he learned about cryonics and transhumanism during his college days at Columbia University in the early 1990s. After graduating from Columbia and going on a solo sea voyage around the world, he visited places remote from the lives of most *National Geographic* readers; nearly detonated a landmine in one of the countries he explored and learned to appreciate the fragility of his life; wrote stories and made videos[4] about his adventures; and then returned to the U.S. Eventually, after marrying a physician and establishing himself in business for his livelihood[5], he decided to write a novel about the transhumanist issues which, he claims, have preoccupied him for years.

This novel, *The Transhumanist Wager,* suffers from many of the flaws of novice efforts at novel writing, notably by featuring a hero named Jethro Knights who acts as an idealized avatar for the author. Yet it also shows a level of energy and passion for the one thing cryonicists tend to care about above all else, namely, what the Transhumanist Wager refers to, as explained by Knights:

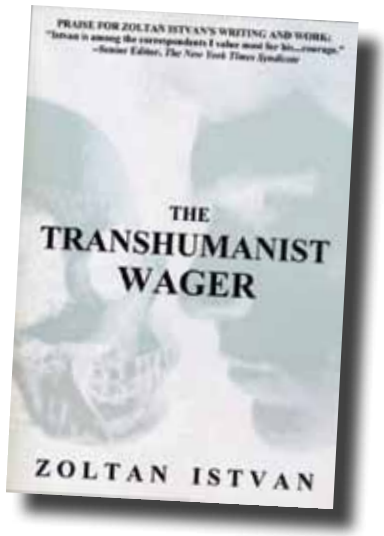
> "The Wager is the most logical conclusion to arrive at for any sensible human being: We love life and therefore want to live as long as possible—we desire to be immortal. It's impossible to know if we're going to be immortal once we die. To do nothing doesn't help our odds of attaining immortality, since it seems evident that we're going to die someday and possibly cease to exist. To attempt something scientifically constructive towards ensuring immortality beforehand is the most logical solution."

The novel's associated website[6] says it more clearly:

> The Problem: You're going to die. The Solution: The Transhumanist Wager

The novel then goes to show how Knights, a philosophy major at the fictional "Victoria University" in the novel, acts on the implications of this Wager as he develops and spreads a transhumanist philosophy he calls "Teleological Egocentric Functionalism," or TEF. This story happens in a world recognizably based on our own, but set perhaps "twenty minutes into the future."

Without giving too much of the plot away, the novel left me ambivalent, with a tendency to warm up to some of its message as I've thought about it and reread parts of it since my first reading in April of this year. Cryonics does feature in the plot as a Wager-oriented technology, though not in a form as currently practiced. In the novel, physicians work for cryonics organizations, and they make judgments about which patients could benefit from cryopreservation and which probably could not. The novel even shows a thwarted terrorist attack on one of these cryonics facilities. Yet, despite the stricter standards for who qualifies for cryopreservation, a fragment of the brain of a main character goes into cryo because another character



has the authority to make that happen, despite the poor survival prospects. The cryopreserved character's fate remains unresolved at the end of the novel. (Apparently Istvan plans to write a sequel.)

However, the novel's portrayal of cryonics presents us with the "cryonics and something else" (CASE) problem, which Aschwin de Wolf has discussed in *Cryonics* magazine recently. We can defend cryonics on its own terms as a form of experimental medicine and applied neuroscience to try to turn death from a permanent off-state into a temporary and reversible off-state. Cryonics therefore doesn't need the "help" of speculations about dubious future technologies, predictions of imminent "immortality" or arguments based on fringe ideologies about its ethical necessity or historical inevitability.

As an example of this novel's CASE

baggage, Ayn Rand's novels way over-inspired Istvan in writing *The Transhumanist Wager*. Knights appears at first as a cross between Howard Roark and John Galt, despite his education in the classics of literature and philosophy. But then we've known all along that personality doesn't derive from reason or education. Istvan indicates that Knights enjoys reading the great books as a means of personal development, which separates Knights from the way Rand portrays her protagonists[7]; yet Istvan doesn't show that Knights's exposure to the best that others have thought throughout the ages changes or matures him. Knights stays pretty much the same focused, obsessive, and self-absorbed character throughout the novel, despite his romance and marriage with a transhumanist physician character named Zoe Bach who advocates more of a Buddhist form of transhumanism. Knights knows that this relationship threatens to turn him into a gentler and more compassionate individual, especially after Zoe talks him into starting a family; but he resists the influence because it interferes with his goal of becoming a transhuman master of the universe called an "omnipotender," whatever that would mean in real life.

Ironically the Randian aspect of the novel can alienate people on both sides of the Rand fandom divide. People who disdain Rand may not like the novel because of the Randian influence; while the Kool-Aid drinkers may not like it because they think Rand got her philosophy right the first time around, and they dismiss Istvan as a "second-hander" for trying to appropriate or supplant Rand's greatness.

Related to the Ayn Rand influence, Knights also sounds at times like a badass Nietzschean from a pulp novel or comic book. Again, cryonicists don't necessarily need advocates like that, though they might come in useful under different circumstances. (More on that below.)

The novel heads into controversial territory when Knights organizes the world's transhumanist men and women of the mind and persuades them to join him on a technologically advanced seastead called Transhumania. Knights uses this seastead as a stronghold to establish a technocratic dictatorship over the planet. In the novel's climax, Knights deploys advanced drones produced by his transhumanist engineers to destroy the world's capitals of faith and force—religious compounds like Vatican City and political structures like the White House—to clear the way so that he can enforce his new order of affairs which allegedly demonstrates "transhumanism" in power.

Uh, no, I don't think cryonicists would necessarily want to associate cryonics with that goal. Though at times I can understand the temptation. …

And this gets to the heart of the problem I have with Istvan's novel: I've seen a movie rather like this, titled *Things to Come* (1936), based on the philosophy of H.G. Wells. Knights basically acts like Raymond Massey's character in the film, John Cabal, who saves civilization after decades of war and dysfunction by organizing the technical people and taking power away from the warriors and politicians. Cabal calls his organization, based on 1930's ideas about "futuristic" aircraft, "Wings over the World." Knights uses his "Drones over the World" to accomplish similar goals.

The idea of doing away with warriors and politicians has some merit, given their history in mismanaging societies. But Wells had more on his agenda than that in his writings. In his nonfiction book, *Anticipations of the Reaction of Mechanical and Scientific Progress upon Human Life and Thought* (1902)[8], Wells writes about a precursor to the idea of a technocratic global governance which he calls the New Republic, and he proposes the following philosophy for it:

> The new ethics will hold life to be a privilege and a responsibility, not a sort of night refuge for base spirits out of the void; and the alternative in right conduct between living fully, beautifully, and efficiently will be to die. For a multitude of contemptible and silly creatures, fear-driven and helpless and useless, unhappy or hatefully happy in the midst of squalid dishonour, feeble, ugly, inefficient, born of unrestrained lusts, and increasing and multiplying through sheer incontinence and stupidity, the men of the New Republic will have little pity and less benevolence. To make life convenient for the breeding of such people will seem to them not the most virtuous and amiable thing in the world, as it is held to be now, but an exceedingly abominable proceeding. Procreation is an avoidable thing for sane persons of even the most furious passions, and the men of the New Republic will hold that the procreation of children who, by the circumstances of their parentage, must be diseased bodily or mentally—I do not think it will be difficult for the medical science of the coming time to define such circumstances—is absolutely the most loathsome of all conceivable sins. They will hold, I anticipate, that a certain portion of the population—the small minority, for example, afflicted with indisputably transmissible diseases, with transmissible mental disorders, with such hideous incurable habits of mind as the craving for intoxication—exists only on sufferance, out of pity and patience, and on the understanding that they do not propagate; and I do not foresee any reason to suppose that they will hesitate to kill when that sufferance is abused. And I imagine also the plea and proof that a grave criminal is also insane will be regarded by them not as a reason for mercy, but as an added reason for death. I do not see how they can think otherwise on the principles they will profess.

I can see why this part of Wells's agenda didn't make it into the film.

Compare this with Knights's pronouncement about the fate of allegedly inadequate people, which sounds like a post on the LessWrong website. Just replace "friendly AI" for "omnipotenders" and "singularitarian" for "transhuman:"

> The optimum transhuman trajectory of civilization is that which creates the most efficient way to produce omnipotenders. Currently, the best way to accomplish this is to achieve as expediently as possible

the highest amount of productive transhuman life hours in the maximum amount of human beings; however not all human beings will be a net-positive in producing omnipotenders. *Any individual who ultimately hampers the optimum transhuman trajectory of civilization should be eliminated* [emphasis added]. The Humanicide Formula addresses this issue directly. It determines whether an individual should live or die based on an algorithm measuring transhuman productivity in terms of that individual's remaining life hours, their resource consumption in a finite system, and their past, present, and potential future contributions.

Do cryonicists want to associate cryonics with the idea of a "humanicide" of the people who don't meet some geek's standards for measuring their transhuman usefulness? Robert Ettinger, by contrast, argues in his writings[9] that biologically disadvantaged people don't deserve death; cryonics could give them a chance to enjoy better lives someday. The ordinary guy could, upon revival, receive upgrades to make him competitive with Ettinger's example of Winston Churchill in his prime as a high-functioning individual.

Istvan's novel seems to reflect at least some of his real views, but I can't tell how seriously he takes the parts about destroying religious and political institutions and exterminating the weak. I hope he has assumed these poses for dramatic purposes instead of presenting them as real proposals.

Nonetheless, Istvan's vision does intrigue me despite its flaws and some horrific implications. He wants to start a conversation that cryonicists really should have: How badly do we want to survive? And how should we respond to the people who throw up barriers in our way? The time might come when we'll need to find and actualize our inner Nietzscheans to confront real enemies to the cryonics project who want to ensure that we die irreversibly and "on schedule" like everyone else.

Read *The Transhumanist Wager* at your own risk. It has received recognition on the kinds of websites transhumanists and science fiction fans tend to visit[10], and it does expose people to a CASE version of the cryonics idea. Perhaps some readers new to this view of "the future" will want to unbundle the cryonics part from the "something else," namely Istvan's philosophy of TEF, and examine cryonics on its own terms. ■

Zoltan Istvan, an American-Hungarian, began a solo, multi-year sailing journey around the world at the age of 21. His main cargo was 500 handpicked books, mostly classics. He's explored over 100 countries—many as a journalist for the National Geographic Channel—writing, filming, and appearing in dozens of television stories, articles, and webcasts. His work has also been featured by The New York Times Syndicate, Outside, San Francisco Chronicle, BBC Radio, NBC, ABC, CBS, FOX, Animal Planet, and the Travel Channel. He is a philosophy and religious studies graduate of Columbia University and resides in San Francisco with his daughter and physician wife. *The Transhumanist Wager* is his first novel. (see http://www.goodreads.com/author/show/7032826.Zoltan_Istvan, accessed 4 Nov. 2013).

FOOTNOTES

1. Mr. Istvan identifies his ethnicity as "American-Hungarian."
2. Zoltan Istvan: The Transhumanist Wager Is A Choice We'll All Have To Make. http://www.singularityweblog.com/zoltan-istvan-the-transhumanist-wager-is-a-choice-well-all-have-to-make/
3. http://www.simulet.com/2013/05/12/9-author-of-the-transhumanist-wager-zoltan-istvan-on-the-techno-optimist-podcast/
4. Go to YouTube and find the video of Istvan's "volcano boarding"!
5. http://ziventures.com/
6. http://ziventures.com/TranshumanistWager.html
7. In *The Fountainhead*, Ayn Rand shows that the novel's villain, Ellsworth Toohey, lives as a parasite on the minds of others by having a home library and reading constantly. By contrast, Rand's heroes own few or no books, and apparently seldom read anyway.
8. http://www.gutenberg.org/files/19229/19229-h/19229-h.htm
9. For example, scroll down to "The Fallacy of Just-Freeze-the-Elite": http://www.cryonics.org/1chapter11.html
10. See, for example: "*The Transhumanist Wager* and the terrifying struggle for the future": http://io9.com/the-transhumanist-wager-and-the-terrifying-struggle-for-510012440

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THE TRANSHUMANIST READER:
CLASSICAL AND CONTEMPORARY ESSAYS ON THE SCIENCE, TECHNOLOGY, AND PHILOSOPHY OF THE HUMAN FUTURE

Edited by Max More and Natasha Vita-More (Chichester, West Sussex, UK: Wiley-Blackwell, 2013).

BOOK REVIEW BY R. MICHAEL PERRY

The work under review is a compilation of writings about the idea of transcending human limitations, such as aging and disabilities, through advanced future technology, something now called *transhumanism*. Different definitions of this concept are offered, the best in my view for the uninitiated being: "the intellectual and cultural movement that affirms the possibility and desirability of fundamentally improving the human condition through applied reason, especially by developing and making widely available technologies to eliminate aging and to greatly enhance human intellectual, physical, and psychological capacities." To "eliminate aging" should grant us near-immortality (with time for additional progress). If we add to that "great enhancement of human intellectual, physical, and psychological capacities," we are effectively transitioning to godhood. Is there something wrong with this grand vision? It is, after all, really nothing new in our thinking. Variations of it have been wanted, sought, promised, and believed in, since time immemorial, and many cultures have approved or even demanded endorsement of one or another of these variants.

The grand, transhumanist vision might thus be naively supposed to be a fairly uncontroversial one, not arousing more concern than the numerous immortality hopes that coexist in today's world, many connected with ancient religious traditions. But transhumanists have more than just hopes. Today we see such innovations as self-driving automobiles, the cloning of mammals, and surgical changes of gender, all of which are technological and, it appears, will soon be overshadowed by even greater accomplishments covering these and many other facets of life. It is seriously proposed that the grand vision is not something to be realized only through divine or other outside help, at an unknown future time when others besides ourselves deem it suitable, but something instead that we can realize for ourselves, as an outcome of our own, continuing advances. By "ourselves" the possibility is included that we individually will develop in the course of our progress, through wisely applied enhancements, to form an ever-strengthening talent pool for engineering further advances. (Thus we may eventually be influential on an astronomical or cosmic scale, ever seeking more of a life with meaning and purpose and reaching levels of advancement scarcely imaginable today.)

Such possibilities understandably raise concerns about misuse. Could more harm than good follow from some technology that seems, on the face of it, to be of possibly great benefit? One such possibility, feared by some, is the elimination of aging or radical life extension, which is seen as leading to overpopulation with its many attendant ills, including adverse environmental impact affecting civilization as a whole. Concerns extend more generally over a wide field of possible new technologies with the changes they might bring. In response a "precautionary principle" has been proposed. It urges that it is more important to prevent the possibility of harm "to human health or to the environment" than to allow an activity that might cause such harm. Prevention should follow, at least in one notable version, "even if the causal link between the activity and the possible harm has not been proven or the causal link is weak and the harm is unlikely to occur."

This line of thinking, needless to say, will not get an enthusiastic endorsement from transhumanists. Max More, in *The Transhumanist Reader,* offers a counter-proposal, a "proactionary principle," based on a careful assessment of benefits and risks. Certainly we do not want to be recklessly risk-prone, but also not foolishly fearful, forgoing advances that might benefit us greatly. Moreover, something of potentially great enough benefit might justify taking some extra, carefully considered risk. Continuing technological innovation is vital and we do not want to block it for what, in our best judgment, are insufficient reasons. A good, short statement of the principle Max offers is: "Protect the freedom to innovate and progress while thinking and planning intelligently for collateral effects."

Those who are more fearful about the possible negative effects of advancing technology than hopeful about the positive effects will continue in their opposition to any suggestion of radical innovations that might impact human life. A few years ago it seemed possible that such people might

gain enough influence to seriously impede progress. For example, Leon Kass, who was chairman of the (U.S.) President's Council on Bioethics 2001-2005[1] said, "… unqualified endorsement of medical progress, and the unlimited pursuit of longevity, cannot be the counsel of wisdom …."[2]

The years since Kass's Council tenure have fortunately, by impression, not witnessed any particularly virulent or mounting opposition to transhumanism. Instead the subject appears to be slowly gaining in acceptance and respectability, even as advancing technology is slowly making the case for transhumanism more plausible, and able defenders are fielding questions and answering objections. *The Transhumanist Reader* seems comfortably situated within this positive evolutionary trend, a reference for the calm inquirer more than either a revolutionary manifesto or a beleaguered apology. With over 450 pages of closely-printed text it offers a linkup to many avenues of transhumanist thought, some of it stretching back two decades, though not exactly light reading. Much of this is speculation about what should or might be possible in the future, but some current practices such as cryonics also are treated.

The book is divided into nine major parts, each in turn consisting of several differently-authored chapters. Part 1 is, appropriately, about "roots and core themes," keynoted by Max More's chapter on the philosophy of transhumanism. Natasha Vita-More introduces the theme of aesthetics: "bringing the arts and design into the discussion of transhumanism." Next (Parts 2-3) is consideration of enhancements, both somatic (body-related) and cognitive. Core technologies expected to be important (nanotechnology in particular) are the subject of Part 4. Part 5 considers "identity and beyond death," including a chapter on cryonics by Brian Wowk and a more speculative chapter by Giulio Prisco on advanced future technology and whether it might bear on the problem of resurrecting all who have lived. In Part 6 Max More and others address the problem of how to responsibly approach the prospect of human enhancements and other benefits expected from developing technology. (There the proactionary principle is presented.) Part 7 is concerned with legal issues, some of which are current today, such as those connected to transgenderism (surgical change of gender). In Part 8 "trajectories" of progress are considered, mainly, the idea that a "singularity" will occur, at which point artificial intelligence exceeds the human level and society may have reached a level that is beyond our ability today to comprehend. The concluding Part 9 offers some thoughts on how awesome the transhumanist idea really is, a prospect of actually achieving ancient dreams and going beyond them, that appears to be open to us through nothing beyond our own, if very considerable, efforts.

Overall I imagine the book will probably serve as a reference, not something many readers will devour cover-to-cover. But many parts might serve such purposes as furnishing material for discussion groups, suggesting possibilities for advances, or providing source material for studies of transhumanism. It is worth mentioning a forerunner, *The Scientific Conquest of Death,* edited by Bruce Klein, which explores many of the themes in *The Transhumanist Reader* with some overlap of authors.[3] Also, the more recent study by George Young, *The Russian Cosmists*, explores the movement of Cosmism in Russia, with its pervasive transhumanist component and the present strong focus of some activists on anti-death technology, including cryonics.[4] Transhumanism and its literature increasingly offer a new hope for the future of humanity. ■

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Max More has a degree in Philosophy, Politics, and Economics from St. Anne's College, Oxford University (1984-87). He studied and taught philosophy at the University of Southern California with an emphasis on philosophy of mind, ethics, and personal identity, completing his Ph.D. in 1995, with a dissertation that examined issues including the nature of death, and what it is about each individual that continues despite great change over time. A longtime cryonicist, Alcor Member, and cryonics advocate, Max became Alcor's CEO in 2011. Marvin Minsky, "the father of artificial intelligence," said of Dr. More: "We have a dreadful shortage of people who know so much, can both think so boldly and clearly, and can express themselves so articulately." (http://www.alcor.org/AboutAlcor/meetalcorstaff.html, accessed 4 Nov. 2013)

Natasha Vita-More is an American designer and theorist. She received a doctorate from the Planetary Collegium, University of Plymouth, United Kingdom. Her Ph.D. thesis focused on human enhancement and radical life extension. She has a M.Phil. in Media Art & Design from the University of Plymouth, a M.Sc. in Future Studies, University of Houston; and a B.F.A. in Fine Art, University of Memphis; and was filmmaker-in-residence, University of Colorado. She also holds certificates in Physical Fitness and Sports Nutrition from the American Muscle and Fitness Association. In 1983, Vita-More authored the "Transhuman Manifesto"; and founded Transhumanist Arts and Culture in 1993. She is a lecturer on transhumanism and longtime cryonicist and Alcor Member. Natasha and Max were married in 1996 at a Venturist wedding. (see http://en.wikipedia.org/wiki/Natasha_Vita-More, accessed 4 Nov. 2013).

COMMENT ON REVIEW OF *THE TRANSHUMANIST READER*

By Alcor CEO, Max More

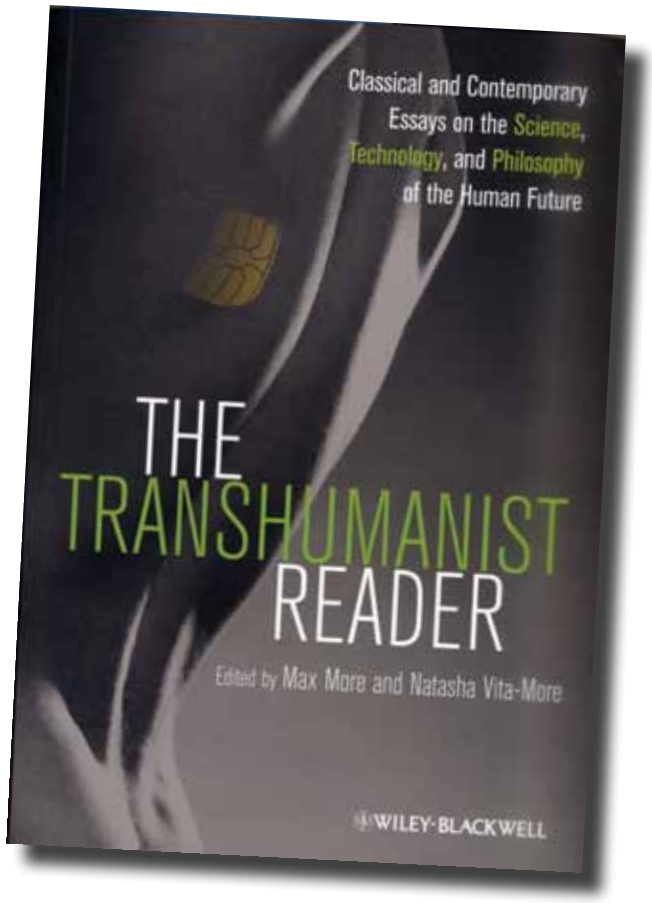
Given the recent discussion of "Cryonics and something else," I would like to add a comment to Mike Perry's review of the book I co-edited. First, transhumanism has been an excellent source of members for Alcor. (In fact, Alcor's founders were/are transhumanists.) This is likely to remain true in future.

Second (and closely related), there is a natural connection between transhumanism—and its core goal of extending life—and cryonics. Cryonics can easily been seen as a natural accompaniment to other efforts to extend life.

"Cryonics can easily been seen as a natural accompaniment to other efforts to extend life."

Third, it seems absurd to believe that we will be able to repair whatever led to clinical death *plus* the additional damage unavoidably done by the cryopreservation process *plus* reverse aging and yet *not* be able to enhance ourselves somatically, cognitively, or emotionally in any way. It would be difficult to make a plausible argument against the proposition that the workability of cryonics (at least as currently practiced) implies the workability of least a modest form of applied transhumanism.

Finally, despite the natural and strong connections between a transhumanist perspective and the practice of cryonics, it is important to understand that many people may see only part of the picture at a time, or may be uninterested in other parts of the picture. We explain cryonics as essentially an extension of emergency medicine. That requires no support for or interest in any particular philosophy—just a desire to live and a belief that our current techniques and future repair technologies make that possible. It would therefore be a mistake to talk about cryonics—outside of explicitly transhumanist forums—while insisting that accepting its feasibility means that you must also be a transhumanist. That approach can only limit our appeal. ■



"We explain cryonics as essentially an extension of emergency medicine. That requires no support for or interest in any particular philosophy – just a desire to live and a belief that our current techniques and future repair technologies make that possible."

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- U.S. airfare to/from South Florida (or up to $1000 for origin outside the U.S.)
- Hotel accommodations for Friday and Saturday nights
- Meals and beverages on Friday night, all day Saturday, and Sunday breakfast and lunch
- Registration fee - $350 - also covered

Please go to this website for a full packet with all details and application forms:

http://www.alcor.org/YC5.pdf

Forever,

Cairn Erfreuliche Idun
Founder/Director: T2

PS Come Early. Stay Late.

Some attendees to T2 enjoy spending *extra time in Florida* - especially since their flight is already paid for via their scholarship.

This is at their own expense for additional lodging and food.

I look forward to getting to know you.

Flawed Diamonds Promise Sensory Perfection

From brain to heart to stomach, the bodies of humans and animals generate weak magnetic fields that a supersensitive detector could use to pinpoint illnesses, trace drugs—and maybe even read minds. Sensors no bigger than a thumbnail could map gas deposits underground, analyze chemicals, and pinpoint explosives that hide from other probes. Now scientists at the U.S. Department of Energy's Lawrence Berkeley National Laboratory (Berkeley Lab), the University of California at Berkeley, and Harvard University, have improved the performance of one of the most potent possible sensors of magnetic fields on the nanoscale—a diamond defect no bigger than a pair of atoms, called a nitrogen vacancy (NV) center. "The spin states of NV centers are stable across a wide range of temperatures from very hot to very cold," says Dmitry Budker of Berkeley Lab's Nuclear Science Division. Even tiny flecks of diamond costing pennies per gram could be used as sensors because, says Budker, "we can control the number of NV centers in the diamond just by irradiating and baking it," that is, annealing it.

Lawrence Berkeley National Laboratory
9 May 2013
http://newscenter.lbl.gov/feature-stories/2013/05/09/flawed-diamonds/

Making Old Hearts Younger

Two Harvard Stem Cell Institute (HSCI) researchers—Amy Wagers, a stem cell biologist and Richard T. Lee, a practicing cardiologist at Brigham and Women's Hospital—have identified a protein in the blood of mice and humans that may prove to be the first effective treatment for the form of age-related heart failure that affects millions of Americans. When the protein, called GDF-11, was injected into old mice, which develop thickened heart walls in a manner similar to aging humans, the hearts were reduced in size and thickness, resembling the healthy hearts of younger mice. Even more important than the implications for the treatment of diastolic heart failure, the finding by Lee and Wagers may ultimately rewrite our understanding of aging. A report on Lee and Wagers' findings was published May 9 by the journal *Cell*. "The most common form of heart failure [in the elderly] is actually a form that's not caused by heart attacks but is very much related to the heart aging," said Lee, who, like Wagers, is a principal faculty member at HSCI.

Harvard Gazette
9 May 2013
http://news.harvard.edu/gazette/story/2013/05/making-old-hearts-younger/

Physicist's Tool Has Potential for Brain Mapping

A new tool being developed by a University of Texas Arlington assistant professor of physics could help scientists map and track the interactions between neurons inside different areas of the brain. The journal *Optics Letters* recently published a paper by Samarendra Mohanty on the development of a fiber-optic, two-photon, optogenetic stimulator and its use on human cells in a laboratory. The tiny tool builds on Mohanty's previous discovery that near-infrared light can be used to stimulate a light-sensitive protein introduced into living cells and neurons in the brain. This new method could show how different parts of the brain react when a linked area is stimulated. The technology would be useful in the BRAIN mapping initiative recently championed by President Barack Obama, Mohanty said. BRAIN stands for Brain Research through Advancing Innovative Neurotechnologies and will include $100 million in government investments in research.

University of Texas Arlington
16 May 2013
http://www.uta.edu/news/releases/2013/05/optogenetic-stimulator.php

Viable Human Embryonic Stem Cells Created By Cloning

A paper in this week's *Cell* describes how a team in Oregon finally achieved what many scientists have expected—and many others have dreaded: they derived embryonic stem cells from human embryos that they created in the lab themselves. Shoukhrat Mitalipov and his team at Oregon Health and Science University were able to generate the embryos through somatic cell nuclear transfer (SCNT), otherwise known as cloning. Mitapilov and his team took donated egg cells and swapped their nuclei for the nuclei of cells from fetal tissue. But there was an added twist, from an unlikely domestic source, caffeine. What is the immediate scientific importance of Mitalipov's breakthrough? It could have an impact on the research into induced pluripotent stem cells (iPSCs). These stem cells do not require the use of human embryos for their derivation, and they can be generated from any cell in the adult body. If patient-specific stem cells made from SCNT embryos turn out to be healthier and more robust than the "standard" iPSCs, there could be a significant demand for SCNT-derived stem cells.

Forbes
17 May 2013
http://www.forbes.com/sites/johnfarrell/2013/05/17/viable-human-embryonic-stem-cells-created-by-cloning/

Molecular Trigger for Alzheimer's Disease

Researchers have pinpointed a catalytic trigger for the onset of Alzheimer's

disease—when the fundamental structure of a protein molecule changes to cause a chain reaction that leads to the death of neurons in the brain. For the first time, scientists at Cambridge's Department of Chemistry, led by Dr. Tuomas Knowles, Professor Michele Vendruscolo and Professor Chris Dobson working with Professor Sara Linse and colleagues at Lund University in Sweden have been able to map in detail the pathway that generates "aberrant" forms of proteins which are at the root of neurodegenerative conditions such as Alzheimer's. They believe the breakthrough is a vital step closer to increased capabilities for earlier diagnosis of neurological disorders such as Alzheimer's and Parkinson's, and opens up possibilities for a new generation of targeted drugs, as scientists say they have uncovered the earliest stages of the development of Alzheimer's that drugs could possibly target.

Cambridge University
21 May 2013
http://www.cam.ac.uk/research/news/scientists-identify-molecular-trigger-for-alzheimers-disease

Advanced Biological Computer

Using only biomolecules (such as DNA and enzymes), scientists at the Technion-Israel Institute of Technology have developed and constructed an advanced biological transducer, a computing machine capable of manipulating genetic codes, and using the output as new input for subsequent computations. The breakthrough might someday create new possibilities in biotechnology, including individual gene therapy and cloning. The findings appear today (May 23, 2013) in *Chemistry & Biology* (Cell Press). Interest in such biomolecular computing devices is strong, mainly because of their ability (unlike electronic computers) to interact directly with biological systems and even living organisms. No interface is required since all components of molecular computers, including hardware, software, input and output, are molecules that interact in solution. "Our results show a novel, synthetic designed computing machine that computes iteratively and produces biologically relevant results," says lead researcher Prof. Ehud Keinan of the Technion Schulich Faculty of Chemistry.

Kevin Hattori, Technion-Israel Institute of Technology
23 May 2013
http://www.ats.org/site/News2?page=NewsArticle&id=7848&news_iv_ctrl=1161

Two Sons Have Deadly Disease, Only One Can Get 'Miracle Drug'

Each day brings Jenn McNary another dose of hope and heartache as she watches one son get healthier while the other becomes sicker. Both of McNary's sons were born with Duchene muscular dystrophy. Max, 11, is receiving an experimental therapy that appears to be making him better, while 14-year-old Austin is slowly dying. Austin was too sick to be included in the clinical trials for a promising new drug called Eteplirsen. "He can't get into a chair, out of his wheelchair, into his bed and onto the toilet," McNary told NBC's Janet Shamlian. Max, however, was exactly what researchers were looking for. He was put on Eteplirsen, and now he's back to running around, climbing stairs and even playing soccer. Eteplirsen is designed to partially repair one of the common genetic mutations that causes DMD. Even a partial repair may be enough to improve life for boys struck by the condition, which results from a defect in the dystrophin gene. The FDA tells NBC that it is currently reviewing the application for accelerated approval of the drug for general clinical use.

Linda Carroll, TODAY
27 May 2013
http://www.today.com/health/moms-heartache-two-sons-have-deadly-disease-only-one-can-6C10077829

Engineered Stem Cell Advance Points toward Treatment for ALS

Transplantation of human stem cells in an experiment conducted at the University of Wisconsin-Madison improved survival and muscle function in rats used to model ALS, a nerve disease that destroys nerve control of muscles, causing death by respiratory failure. ALS (amyotrophic lateral sclerosis) is sometimes called "Lou Gehrig's disease." According to the ALS Association, the condition strikes about 5,600 Americans each year. Only about half of patients are alive three years after diagnosis. In work recently completed at the UW School of Veterinary Medicine, Masatoshi Suzuki, an assistant professor of comparative biosciences, and his colleagues used adult stem cells from human bone marrow and genetically engineered the cells to produce compounds called growth factors that can support damaged nerve cells. The researchers then implanted the cells directly into the muscles of rats that were genetically modified to have symptoms and nerve damage resembling ALS.

Eurekalert / University of Wisconsin-Madison
28 May 2013
http://www.eurekalert.org/pub_releases/2013-05/uow-esc052413.php

How Computers Can Learn Better

At the Association for Uncertainty in Artificial Intelligence's annual conference this summer, researchers from MIT's Laboratory for Information and Decision Systems (LIDS) and Computer Science and Artificial Intelligence Laboratory will present a new reinforcement-learning algorithm that, for a wide range of problems, allows computer systems to find solutions much more efficiently than previous algorithms did. The paper also represents the first application of a new programming framework that the researchers developed, which makes it much easier to set up and

run reinforcement-learning experiments. Alborz Geramifard, a LIDS postdoc and first author of the new paper, hopes that the software, dubbed RLPy (for reinforcement learning and Python, the programming language it uses), will allow researchers to more efficiently test new algorithms and compare algorithms' performance on different tasks. It could also be a useful tool for teaching computer-science students about the principles of reinforcement learning.

Larry Hardesty / MIT News Office
29 May 2013
http://web.mit.edu/newsoffice/2013/machine-learning-algorithm-outperforms-predecessors-0529.html

Fish Study Raises Hopes for Spinal Cord Injury Repair

Scientists have unlocked the secrets of the zebra fish's ability to heal its spinal cord after injury, in research that could deliver therapy for paraplegics and quadriplegics in the future. A team from Monash University's Australian Regenerative Medicine Institute (ARMI), led by Dr. Yona Goldshmit and Professor Peter Currie, discovered the role of a protein in the remarkable self-healing ability of the fish. The findings, detailed in *The Journal of Neuroscience,* could eventually lead to ways to stimulate spinal cord regeneration in humans. Professor Currie said when the spinal cord is severed in humans and other mammals, the immune system kicks in, activating specialized cells called glia to prevent bleeding into it. "Glia are the workmen of nervous system. The glia proliferate, forming bigger cells that span the wound site in order to prevent bleeding into it. They come in and try to sort out problems. A glial scar forms," Professor Currie said. However, the scar prevents axons of neighboring nerve cells from penetrating the wound. (Axons are threadlike structures of nerve cells that carry impulses to the brain.)

Monash University
30 May 2013
http://www.monash.edu.au/news/show/fish-study-raises-hopes-for-spinal-cord-injury-repair

New Resin for Making Electrodes uses Lasers for 3-D Micromolding

A new resin material that can be molded into complex, highly conductive 3-D structures with features just a few microns across has been developed by Tokyo Institute of Technology and C-MET, Inc. Combined with state-of-the-art micro-sculpting techniques, the new resin holds promise for making customized electrodes for fuel cells or batteries, or biosensor interfaces for medical uses. The research team, which includes physicists and chemists from Yokohama National University, presents its results in a paper just published in the Optical Society's (OSA) open-access journal *Optical Materials Express.* "One of the most promising applications is 3-D microelectrodes that could interface with the brain," says Yuya Daicho, graduate student at Yokohama National University and lead author of the paper. These brain interfaces, rows of needle-shaped electrodes pointing in the same direction like teeth on combs, can send or receive electrical signals from neurons and can be used for deep brain stimulation and other therapeutic interventions to treat disorders such as epilepsy, depression, and Parkinson's disease.

Kurzweil AI
31 May 2013
http://www.kurzweilai.net/a-new-material-for-3d-printing-electrodes

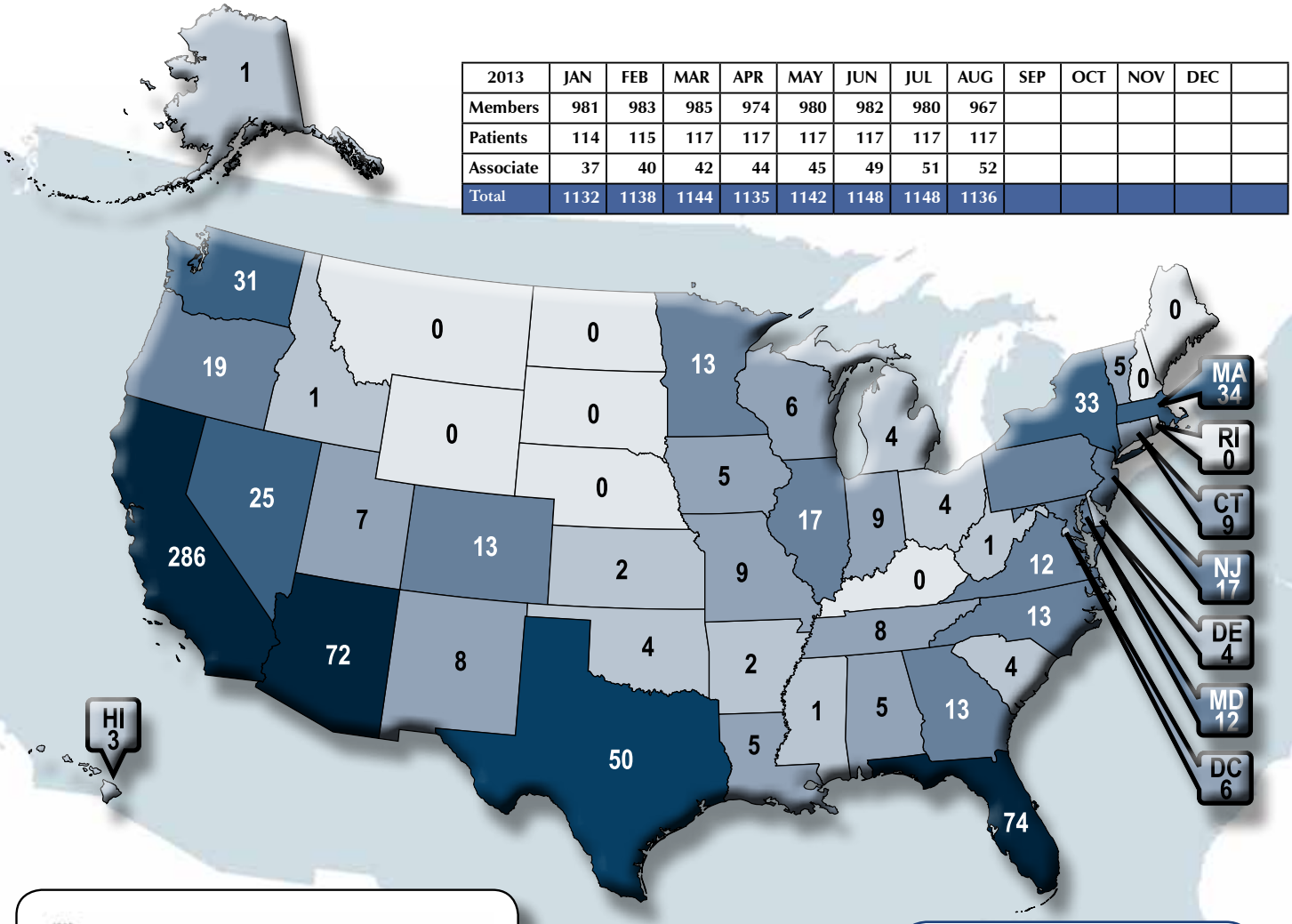
U.S. Surgeons Implant Bioengineered Vein

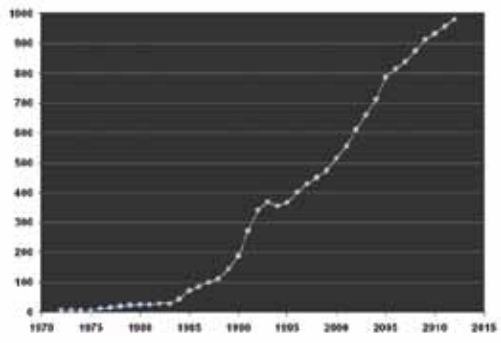
In a first-of-its-kind operation in the United States, a team of doctors at Duke University Hospital helped create a bioengineered blood vessel and transplanted it into the arm of a patient with end-stage kidney disease. The procedure, the first U.S. clinical trial to test the safety and effectiveness of the bioengineered blood vessel, is a milestone in the field of tissue engineering. The new vein is an off-the-shelf, human cell-based product with no biological properties that would cause organ rejection. Using technology developed at Duke and at a spin-off company it started called Humacyte, the vein is engineered by cultivating donated human cells on a tubular scaffold to form a vessel. The vessel is then cleansed of the qualities that might trigger an immune response. In pre-clinical tests, the veins have performed better than other synthetic and animal-based implants. "This is a pioneering event in medicine," said Jeffrey H. Lawson, M.D., PhD., a vascular surgeon and vascular biologist at Duke Medicine who helped develop the technology and performed the implantation.

Duke Medicine News and Communications
6 Jun. 2013
http://www.dukehealth.org/health_library/news/surgeons-at-duke-university-hospital-implant-bioengineered-vein

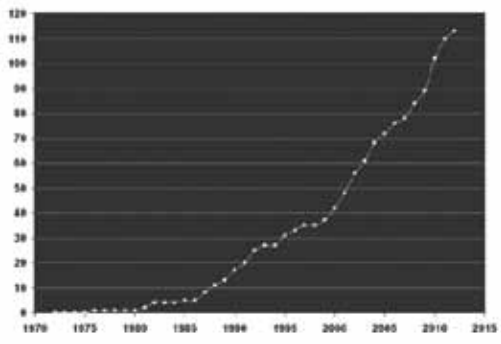
Membership Statistics

2013	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
Members	981	983	985	974	980	982	980	967					
Patients	114	115	117	117	117	117	117	117					
Associate	37	40	42	44	45	49	51	52					
Total	1132	1138	1144	1135	1142	1148	1148	1136					





Number of Alcor members



Number of Alcor patients

- 0 Members
- 1–4 Members
- 5–9 Members
- 10–24 Members
- 25–49 Members
- 50–74 Members
- 75+ Members

International

Country	Members	Patients
Aruba	1	0
Australia	13	0
Canada	40	1
Denmark	1	0
Germany	4	0
Israel	1	0
Italy	2	1
Japan	1	1
Lebanon	1	0
Mexico	4	0
Monaco	2	0
Netherlands	2	0
New Zealand	2	0
Norway	1	0
Portugal	4	0
Spain	2	0
Thailand	3	0
United Arab Emirates	1	0
United Kingdom	21	0
TOTAL	**106**	**3**

MEETINGS

ABOUT THE ALCOR FOUNDATION

The Alcor Life Extension Foundation is a nonprofit tax-exempt scientific and educational organization dedicated to advancing the science of cryopreservation and promoting cryonics as a rational option. 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, 365 days a year.

Alcor's Emergency Response capability includes specially trained technicians and customized equipment in Arizona, northern California, southern California, and south Florida, as well as many additional certified technicians on-call around the United States. Alcor's Arizona facility includes a full-time staff, and the Patient Care Bay is personally monitored 24 hours a day.

ARIZONA

FLAGSTAFF:

Arizona without the inferno. Cryonics group in beautiful, high-altitude Flagstaff. Two-hour drive to Alcor. Contact eric@flagstaffcryo.com for more information.

SCOTTSDALE:

This group meets the third Friday of each month and gatherings are hosted at a home near Alcor. To RSVP, visit http://cryonics.meetup.com/45/.

AT ALCOR:

Alcor Board of Directors Meetings and Facility Tours—Alcor business meetings are generally held on the first Saturday of every month starting at 11:00 AM MST. Guests are welcome to attend the fully-public board meetings on odd-numbered months. Facility tours are held every Tuesday and Friday at 2:00 PM. For more information or to schedule a tour, call Marji Klima at (877) 462-5267 x101 or email marji@alcor.org.

CALIFORNIA

LOS ANGELES:

Alcor Southern California Meetings—For information, call Peter Voss at (310) 822-4533 or e-mail him at peter@optimal.org. Although monthly meetings are not held regularly, you can meet Los Angeles Alcor members by contacting Peter.

SAN FRANCISCO BAY:

Alcor Northern California Meetings are held quarterly in January, April, July, and October. A CryoFeast is held once a year. For information on Northern California meetings, call Mark Galeck at (408) 245-4928 or email Mark_galeck@pacbell.net.

FLORIDA

Central Florida Life Extension group meets once a month in the Tampa Bay area (Tampa and St. Petersburg) for discussion and socializing. The group has been active since 2007. Email arcturus12453@yahoo.com for more information.

NEW ENGLAND

CAMBRIDGE:

The New England regional group strives to meet monthly in Cambridge, MA—for information or to be added to the Alcor NE mailing list, please contact Bret Kulakovich at 617-824-8982, alcor@bonfireproductions.com, or on FACEBOOK via the Cryonics Special Interest Group.

PACIFIC NORTHWEST

Cryonics Northwest holds regular meetings for members of all cryonics organizations living in the Pacific Northwest.

For information about upcoming meetings and events go to: http://www.facebook.com/cryonics.northwest

A Yahoo mailing list is also maintained for cryonicists in the Pacific Northwest at http://tech.groups.yahoo.com/group/CryonicsNW/.

BRITISH COLUMBIA (CANADA):

The contact person for meetings in the Vancouver area is Keegan Macintosh: keegan.macintosh@me.com.

OREGON:

The contact person for meetings in the Portland area is Chana de Wolf: chana.de.wolf@gmail.com.

ALCOR PORTUGAL

Alcor Portugal is working to have good stabilization and transport capabilities. The group meets every Saturday for two hours. For information about meetings, contact Nuno Martins at n-martins@n-martins.com. The Alcor Portugal website is: www.alcorportugal.com.

TEXAS

DALLAS:

North Texas Cryonauts, please sign up for our announcements list for meetings (http://groups.yahoo.com/group/cryonauts-announce) or contact David Wallace Croft at (214) 636-3790 for details of upcoming meetings.

AUSTIN/CENTRAL TEXAS:

We meet at least quarterly for training, transport kit updates, and discussion. For information: Steve Jackson, 512-447-7866, sj@sjgames.com.

UNITED KINGDOM

There is an Alcor chapter in England. For information about meetings, contact Alan Sinclair at cryoservices@yahoo.co.uk. See the web site at www.alcor-uk.org.

If you are interested in hosting regular meetings in your area, contact Alcor at 877-462-5267, ext. 113. Meetings are a great way to learn about cryonics, meet others with similar interests, and introduce your friends and family to Alcor members!

What is Cryonics?

Cryonics is an attempt to preserve and protect human life, not reverse death. It is the practice of using extreme cold to attempt to preserve the life of a person who can no longer be supported by today's medicine. Will future medicine, including mature nanotechnology, have the ability to heal at the cellular and molecular levels? Can cryonics successfully carry the cryopreserved person forward through time, for however many decades or centuries might be necessary, until the cryopreservation process can be reversed and the person restored to full health? While cryonics may sound like science fiction, there is a basis for it in real science. The complete scientific story of cryonics is seldom told in media reports, leaving cryonics widely misunderstood. We invite you to reach your own conclusions.

How do I find out more?

The Alcor Life Extension Foundation is the world leader in cryonics research and technology. Alcor is a non-profit organization located in Scottsdale, Arizona, founded in 1972. Our website is one of the best sources of detailed introductory information about Alcor and cryopreservation (www.alcor.org). We also invite you to request our FREE information package on the "Free Information" section of our website. It includes:

- A fully illustrated color brochure
- A sample of our magazine
- An application for membership and brochure explaining how to join
- And more!

Your free package should arrive in 1-2 weeks. (The complete package will be sent free in the U.S., Canada, and the United Kingdom.)

How do I enroll?

Signing up for a cryopreservation is easy!

Step 1: Fill out an application and submit it with your $90 application fee.
Step 2: You will then be sent a set of contracts to review and sign.
Step 3: Fund your cryopreservation. While most people use life insurance to fund their cryopreservation, other forms of prepayment are also accepted. Alcor's Membership Coordinator can provide you with a list of insurance agents familiar with satisfying Alcor's current funding requirements.
Finally: After enrolling, you will wear emergency alert tags or carry a special card in your wallet. This is your confirmation that Alcor will respond immediately to an emergency call on your behalf.

Not ready to make full arrangements for cryopreservation? Then **become an Associate Member** for $10/month (or $30/quarter or $120 annually). Associate Members will receive:

- *Cryonics* magazine by mail
- Discounts on Alcor conferences
- Access to post in the Alcor Member Forums
- A dollar-for-dollar credit toward full membership sign-up fees for any dues paid for Associate Membership

To become an Associate Member send a check or money order ($10/month or $30/quarter or $120 annually) to Alcor Life Extension Foundation, 7895 E. Acoma Dr., Suite 110, Scottsdale, Arizona 85260, or call Marji Klima at (480) 905-1906 ext. 101 with your credit card information. You can also pay using PayPal (and get the Declaration of Intent to Be Cryopreserved) here: http://www.alcor.org/BecomeMember/associate.html

ALCOR
LIFE EXTENSION FOUNDATION
SINCE 1972

Call toll-free TODAY to start your application:

877-462-5267 ext. 132 • info@alcor.org • www.alcor.org

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Your best chance at achieving future immortality is to protect your precious health now so you can benefit from future medical breakthroughs. Staying informed about the latest health discoveries can mean the difference between life and premature death.

And the **Life Extension Foundation** can be your passport to the future. As the largest anti-aging organization in the world, we are dedicated to finding scientific ways to prevent disease, slow aging, and eventually stop death.

For more than three decades, Life Extension has been at the forefront of the movement to support revolutionary anti-aging research that is taking us closer to our goal of extending the healthy human life span indefinitely. We inform our members about path-breaking therapies to help keep them healthy and alive.

Join today and you'll receive these life-prolonging benefits:

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- Access to a toll-free phone line to speak with **knowledgeable health advisors,** including naturopathic doctors, nutritionists, and a cancer expert, about your individual health concerns. You can also receive help in developing your own personal life extension program.
- **Discounts on prescription drugs, blood tests, and pharmaceutical quality supplements** that will greatly exceed your membership dues. You'll receive a directory listing the latest vitamins and supplements, backed by scientific research and available through a unique buyers club.

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- ***Disease Prevention and Treatment* book** ($49.95 cover price)...this hardbound fourth edition provides novel information on complementary therapies for 133 diseases and illnesses—from Alzheimer's disease to cancer, from arthritis to heart disease—that is based on thousands of scientific studies.

Life Extension Foundation funds advanced vitrification and gene-chip research. Your $75 membership fee helps support scientific projects that could literally save your life.

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Mention Code: PIM