

PUBLISHED BY THE CRYONICS INSTITUTE

ISSUE 03 | 2019

CRYONICS INSTITUTE

NEWSLETTER

Cryonics insights and
information for members
and friends of the
Cryonics Institute



CI BULLETIN



Greetings everyone,

It's that time of the year again! In less than one month we have the 2019 AGM on Sunday, September 8 at the Bravado Event Venue (36217 S Gratiot Ave, Clinton Township, MI.) Our former location, the ConCorde Inn, is closing, which lead to our move to the new location. Unlike the ConCorde, this location is strictly an event venue so there is no lodging on site. We have, however, made special arrangements with two local hotels for our guests.

CI has arranged for a special 15% discount at Red Roof Inn. The code for that is VP#624467 or visit: https://www.redroof.com/deals/partner/Cryonics_Institute

Please note, as of our publication date, the Red Roof Inn's site mistakenly states the discount expires on 12/31/**2018**. CI has confirmed the code is good through **2019**, so please ignore the error on their site.

CI has also negotiated a 12% discount with the Hampton Inn, which is the hotel closest to the event venue. Contact the Hampton Inn (877-214-6725) and ask for the Cryonics Institute AGM discount or follow this link:

https://secure3.hilton.com/en_US/hp/reservation/book.htm?inputModule=HOTEL&ctyhocn=DTTRVHX&specplan=CHHcig&arrival=20190907&departure=20190908

[&cid=OM,WW,HILTONLINK,EN,DirectLink&fromId=HILTONLINKDIRECT](#)

This year's program will include speakers discussing cutting-edge research, Standby and Cryonics Funding among other topics. Dr. Rodolfo Gustavo Goya will be speaking about his latest research into genes, aging, regenerative therapies and more longevity topics. Certified Financial Planner Rudi Hoffman, who specializes in funding options for cryonics, will be discussing how to plan for and finance cryonics suspensions. Guest speaker Ryan Levesque from Suspended Animation, Inc. will be giving us an overview of the latest standby developments at SA and will be available to answer any questions about the Standby Plans SA offers.

And, of course, during my remarks, I will be challenging our members on their readiness in regard to planning and preparing for their cryonic suspensions.

The AGM is also the traditional time for our annual Board of Directors elections. All members in good standing should have received their ballots and instructions in the mail by the time of this publishing, and if you have not, please contact CI headquarters at (586) 791-5961 or cihq@aol.com. This year we have a new position open on the CI board with the vacancy of Marta Sandburg, who has decided not to run for re-election. Well wishes to Marta in her future endeavors. Going forward, I certainly wish her happiness, good will and all the best.

With this vacancy, we now have two new candidates in addition to our three incumbents running in this election cycle. I am excited to see which of them will be elected to represent CI's goals and defend its bylaws. Best of luck to both of our new candidates, and my gratitude for stepping up to run for this important position where they can make a positive contribution helping to guide CI's future.

On the topic of cryonics gatherings, I am pleased to report that I recently had the privilege of presenting at the first Cryonics Symposium International, held in Hollywood

Florida at the Church of Perpetual Life. Thank you to Rudi Hoffman for all your hard work in organizing this event, as well as Neal VanDeRee and Bill Faloon for your cooperation, support and assistance with the symposium. Apart from the wealth of information presented, I found it was a fantastic chance to meet and network with many of the most significant people in the cryonics movement. I met with Linda Chamberlain, the cryonics pioneer who helped found Alcor. We discussed ideas to help prevent hostile actions toward our movement and to defend our collective life raft so that our organizations and members can stay strong and vibrant moving forward. Ryan Levesque had an impressive display of an SA emergency van that will be used to provide standby should our members decide to utilize this option. Additional Speakers included Joe Kowalsky from CI, talking about the Cryoprize and the critical link between cryo-organ preservation and the ultimate goal of cryonics gaining mainstream recognition and acceptance. I also had an opportunity to talk one-on-one with Max More, who gave a presentation about Alcor Cryonics. We discussed new ways to achieve better cooperation between our two organizations, especially in the area of mutual standby aid. There were many more speakers, and everyone had great and interesting topics. The entire presentation is available online, so I encourage you to visit <https://www.youtube.com/watch?v=JekKwIUmvvY> to watch the entire symposium for yourself. I learned some outstanding information and was so very impressed by the depth of knowledge and expertise of my fellow speakers. It is really worth reviewing, so I definitely encourage anyone interested in cryonics to give it a look. The symposium was an impressive all-day event so the video includes over seven hours of content. It's great to have such a massive amount and variety of informa-

tion available, but it may seem to be too much for one sitting. Keeping that in mind, I suggest you just bookmark the link and you can watch it in segments at your own leisure and pace.

In closing, I would be remiss if I didn't remind our members, as I always do, to check your Membership To Do list, read the 10 Worst Mistakes in Cryonics (and solutions!) Guide and consider looking at the new ways to incentivize next of kin document. It is also in your best interest to familiarize yourself with our Standby Manual, which provides step-by-step instructions for DIY standby operations, as well as advice and information for your cryonics planning and advance preparation. All these resources are readily available to download, print and share on our website. I realize I may sound like a broken record, but these items are all there to make cryonics better for you and to improve your chances for a successful suspension, so I urge you to review this information and act accordingly.

<https://www.cryonics.org/resources/member-readiness-suspension-checklist>

<https://www.cryonics.org/resources/10-worst-mistakes-in-cryonics>

<https://www.cryonics.org/resources/ci-standby-kits-and-instructions>

<https://www.cryonics.org/resources/protect-yourself-from-legal-threats>

Best of wishes, and I look forward to seeing you at this year's AGM!

Dennis Kowalski

President-Cryonics Institute

CRYONICS INSTITUTE MAGAZINE

The digital newsletter of the Cryonics Institute
24355 Sorrentino Ct.
Clinton Township, MI 48035-3239

Phone: 1 (586) 791-5961
Toll-free: 1 (866) 288-2796 (North America)
FAX: 1 (586) 792-7062
Email: dg@cryonics.org

ARTICLE SUBMISSIONS

Cryonics Institute or cryonics-related articles are welcome. Submissions: dg@cryonics.org

E-SUBSCRIPTIONS

As a CI member, you are automatically added to our email reminder list. To unsubscribe, please use the "unsubscribe" link at the bottom of your email.

Membership Benefits

Why join the Cryonics Institute?

1) **A Second Chance at Life**

Membership qualifies you to arrange and fund a vitrification (anti-crystallization) perfusion and cooling upon legal death, followed by long-term storage in liquid nitrogen. Instead of certain death, you and your loved ones could have a chance at rejuvenated, healthy physical revival through cryopreservation.

2) **Affordable Cryopreservation**

The Cryonics Institute (CI) offers full-body cryopreservation for as little as \$28,000.

3) **Affordable Membership**

Become a Lifetime Member for a one-time payment of only \$1,250, with no dues to pay. Or join as a Yearly Member with a \$75 initiation fee and dues of just \$120 per year, payable by check, credit card or PayPal.

4) **Lower Prices for Spouses and Children**

The cost of a Lifetime Membership for a spouse of a Lifetime Member is half-price and minor children of a Lifetime Member receive membership free of charge.

5) **Quality of Treatment**

CI employed a Ph.D level cryobiologist to develop CI-VM-1, CI's vitrification mixture which can help prevent crystalline formation at cryogenic temperatures.

6) **Standby Options and Assistance**

CI's use of Locally-Trained Funeral Directors means that our members can get knowledgeable, licensed care. Or members can arrange for professional cryonics standby and transport by subcontracting with [Suspended Animation, Inc](#) or [International Cryomedicine Experts](#) (I.C.E.) CI also offers Standby

Training Materials and Kits for members who choose to perform Local Standby.

7) **Affordable Funding Options**

Cryopreservation with CI can be funded through life insurance policies issued in the USA or other countries. Prepayment and other options for funding are also available to CI members.

8) **Cutting-Edge Cryonics Information**

Members receive a free e-subscription to the Cryonics Institute Newsletter, as well as access to our Facebook page, Twitter feed, YouTube channel and an official members-only forum.

9) **Helpful, Professional Support**

CI's professional staff is available to answer any questions and address any concerns you may have about CI, your membership or Cryopreservation.

10) **Additional Preservation Services**

CI offers a sampling kit, shipping and long-term liquid nitrogen storage of tissues and DNA from members, their families or pets for just \$98.

11) **Support Education and Research**

Membership fees help CI to fund important cryonics research and public outreach, education and information programs to advance the science of cryonics.

12) **Member Ownership and Control**

CI Members are the ultimate authority in the organization and own all CI assets. They elect the Board of Directors, from whom are chosen our officers. CI members also can change the Bylaws of the organization (except for corporate purposes).

The choice is clear: Irreversible physical death, dissolution and decay, or the possibility of a vibrant and joyful renewed life. Don't you want that chance for yourself, your spouse, parents and children?



To get started, contact us at:

(586) 791-5961 • email: cihq@aol.com

Visit us online at www.cryonics.org

Member Readiness Checklist

*You've signed up for cryonics -
what are the next steps?*

Welcome Aboard! You have taken the first critical step in preparing for the future and possibly ensuring your own survival. Now what should you do? People often ask "What can I do to make sure I have an optimal suspension?" Here's a checklist of important steps to consider.

- ☐ Become a fully funded member through [life insurance](#) or easy pre-payments
Some members use term life and invest or pay off the difference at regular intervals. Some use whole life or just prepay the costs outright. You have to decide what is best for you, but it is best to act sooner rather than later as insurance prices tend to rise as you get older and some people become uninsurable because of unforeseen health issues. You may even consider making CI the owner of your life insurance policy.
- ☐ Keep CI informed on a regular basis about your health status or address changes. Make sure your CI paperwork and funding are always up to date. CI cannot help you if we do not know you need help.
- ☐ Keep your family and friends up to date on your wishes to be cryopreserved. Being reclusive about cryonics can be costly and cause catastrophic results.
- ☐ Keep your doctor, lawyer, and funeral director up to date on your wishes to be cryopreserved. The right approach to the right professionals can be an asset.
- ☐ Prepare and execute a Living Will and Power of Attorney for Health Care that reflects your cryonics-related wishes. Make sure that CI is updated at regular intervals as well.
- ☐ Review the [CI Standby Manual](#) and other materials designed to help you with you Standby Planning. Also, consider joining or forming a local standby group to support your cryonics wishes. This may be one of the most important decisions you can make after you are fully funded. As they say-"Failing to plan is planning to fail".
- ☐ Always wear your cryonics bracelet or necklace identifying your wishes should you become incapacitated. Keep a wallet card as well. If you aren't around people who support your wishes and you can't speak for yourself a medical bracelet can help save you.
- ☐ Get involved! If you can, donate time and money. Cryonics is not a turnkey operation. Pay attention and look for further tips and advice to make both your personal arrangements and cryonics as a whole a success. The stronger our organization is, the stronger your chances of success.
- ☐ Keep your records, contact information and contracts up to date. It is recommended you review your relevant information annually at a minimum. One way is to schedule time to review all your materials at the same time you submit your required Annual Proof of Funding to CI. Also, Be especially aware of easy to forget things like a new email, phone number or address. Remember, you can also contact us at any time to ask if you have any outstanding paperwork or other info that needs to be updated.

The online [CI Members' Information Form](#) is a great resource for updating your current information on file.

10 Worst Mistakes in Cryonics

1) Not signing up ahead of time

Becoming a member, having contracts in place, and having paperwork in order should not be a last minute decision. Waiting until the last minute or after death results in an unnecessary delay of care or worse- No suspension at all! Don't wait. Sign up here and be prepared. <https://www.cryonics.org/membership/>

2) Not providing proof of funding

Some people believe that they can worry about funding later or if they have funding, they have put off providing proof of funding to CI. This should be done annually. Failing to provide this can result in a delay of care while the funding clears, which can take weeks. Send your proof of funding to CI now to be prepared.

3) Not telling anyone your plans

Being reclusive or not telling family or friends your wishes is not recommended. You should not be afraid to tell those around you what your wishes are, especially your next of kin. Wearing a bracelet, necklace or having identification or other items in view can speak to your wishes. This is all you have when you can't speak for yourself. Disasters have resulted in the past from not sharing. Talk with your family, close friends and your estate attorney, so you can be prepared.

4) Not planning

Many think cryonics is a turnkey service where you can just sign up and let fate take over. No matter how much you pay for cryonics, you are the only one who can make sure that you will have the best chance by planning. CI has provided a lot of information on our website and in our standby manuals. Those who plan succeed those who don't fail.

For more information visit: <https://www.cryonics.org/resources/ci-standby-kits-and-instructions>

5) Not notifying CI of Emergencies

There is no way that your cryonics provider can help you if they do not know of your emergency. Your family, friends, standby group or next of kin must immediately contact CI when you are having health issues or worse. It is also important for CI to know if you have up and coming surgeries or procedures, including terminal illness. Patients with a diagnosed terminal illness could enter hospice care, which might help your cryonics situation vastly. Any delay in notifying us directly could result in a poor suspension. Those helping you must have simple and clear instructions.

Here are some tips... <https://www.cryonics.org/resources/category/C57/57>

6) Committing suicide

Anyone who commits suicide who is not terminally ill or breaks a local law in doing so is potentially putting both themselves and our organization at great risk. CI will not risk itself for people who engage in behavior that goes against our mission to preserve life. Such activity will likely lead to an autopsy and long delays, rendering the suspension process substandard or impossible to carry out. Do not consider cryonics as a way out of your problems. You are likely to not get suspended under those circumstances. If you do not have a terminal illness and are considering suicide, you should seek mental health advice and treatment as soon as possible. <https://www.mentalhelp.net/articles/depression-hotline/>

10 Worst Mistakes in Cryonics

7) Engaging in Risky or illegal activities

Risky behaviors or associations that lead to the patient dying around suspicious circumstances will also likely lead to mandated autopsies that will also stand in the way of your cryonics wishes. It is best to use common sense and not put yourself in harm's way. Not only could your life be ended, so too could your chances of cryonics suspension or future reanimation. Use common sense and stay safe.

8) Providing financial or legal incentives that encourage your not being suspended.

Leaving all of your insurance or cryonics money to family if you are not suspended is certainly an option at CI, but ironically it does provide financial incentive for hostile family members to block your suspension. As often is the case, people will make sure you are not suspended to get a hold of your money. One suggestion is to leave family and next of kin some separate money from cryonics funding while suggesting that Cryonics funding go to cryonics as a donation no matter if you are buried or suspended. In addition, family or next of kin can be further compelled to cooperate if they will actually lose the money that is allocated to them for not cooperating. It is also suggested that your family be made fully aware of your wishes and stipulations, so they know what the results of their actions will be. You want to make sure you put incentives and disincentives in the correct place, so that your wishes are honored. It is suggested that your will and cryonics documentation reflect this and get reviewed by an attorney. See <https://www.cryonics.org/resources/protect-yourself-from-legal-threats>

9) Not removing a hostile next of kin from rights to your remains and finances

In many states and areas you can legally remove a hostile family member or next of kin from your estate. You can reassign someone who is sympathetic to cryonics and who has the legal authority to disposition of your remains, as well as your assets. In some states and locations there are disposition of remains reassignment documents, as well as powers of attorney, both in regards to financial as well as medical decisions. The executor of your will or anyone involved with making decisions should be sympathetic to your cryonics wishes. It is your responsibility to make your wishes very clear and to remove any doubt or potential legal resistance from family or next of kin. We suggest seeking legal advice to help you in this regard. Some members have even made a video statement of their wishes and given it to both their cryonics organization as well as their attorneys. Not being careful could mean that you don't get suspended, despite your wishes. Many are surprised to learn that they lose their rights upon legal death. See an attorney and prepare.

10) Dying under less than favorable conditions

This seems harder to control than the other situations, but there are some things you can do to make your situation more favorable. You can diet, exercise and follow the latest official medical advice to stay healthy longer. The longer you are alive, the better the technology will probably be for suspending you and the closer we will be to a future that may be able to reverse your condition. You can avoid travel to remote or hostile places where such travel is risky. Some overseas travel can result in long delays both logistically and bureaucratically. In general, dying near your cryonics provider or cryonics standby group helps your chances. Living a healthy lifestyle and staying sociable, while surrounding yourself with people who will act on your behalf is paramount. Building solid, positive relationships with good people is probably one of the most important things you can do to have your wishes honored. Take care of yourself and maintain social connectivity.



2019 Cryonics Institute Annual General Meeting



Bravado Event Venue:

Grand Ballroom

36217 S Gratiot Avenue
Clinton Township, MI 48035
phone: 248-608-0690
website: www.bravadoevents.com

2019 AGM Details

Sunday, September 8, 2019

Event start time: 3:00 pm

Buffet Lunch: 3:00-4:30 pm

Event end time: 7:00 pm

Speakers

CI President Dennis Kowalski

Dr. Rudolfo (Rudi) Goya

CFP Rudi Hoffman

Ryan Levesque - Suspended Animation Inc.
and more!

Night Before Dinner

For those who come a day early, an informal dinner will be held at 6 pm on Saturday evening at Sajo's Restaurant. 36470 Moravian, Clinton Twp., MI 48035. Phone: (586) 792-7256. www.Sajos.net.

Lodging Specials

CI has arranged for a special 15% discount at Red Roof Inn. The code for that is VP#624467 or visit: https://www.redroof.com/deals/partner/Cryonics_Institute

Please note, as of our publication date, the Red Roof Inn's site mistakenly states the discount expires on 12/31/**2018**. CI has confirmed the code is good through **2019**, so please ignore the error on their site.

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2019 ELECTION CI DIRECTOR CANDIDATE STATEMENTS



Kevin Doyle (Incumbent) "I am running for re-election as CI Director. I hope to continue helping with the challenging work CI has ahead re growth, stability, standby education and changing public perceptions. The last four years have seen significant advances such as membership numbers, facility improvements, the purchase of the new building, the expansion of capable staff and increases in public reach. Being from Canada I can present a bit of an international perspective. I have run a large-scale beef farm operation all my life and so have some understanding of ground level work and organization. I hold a Ph.D. in Operations Research from the University of Toronto and have experience with optimization projects in the health care field, the equipment maintenance field and the area of organizational behaviour."



Debbie Fleming (Incumbent) "I am an IT professional assisting Terasem Movement, Inc. in managing and protecting the integrity of the CyBeRev Project, which continually tests two hypotheses on the ability to digitize one's consciousness toward overcoming the information-theoretic criterion for death. My Dad, John Bull, was one of the pioneers of the Cryonics movement back in the 1960s and became one of CIs patients during January 2014. Cryonics has always been a household word and a passion Dad and I share. It feels natural to be involved as a Director on CIs Board; an honor I've held since 2010. As a Director I assisted in forming CIs Memorial Room where family members may gather to visit and honor their loved ones. It is my greatest desire to see CI continue to thrive and assist in safeguarding its patients. It has been my privilege to serve three terms as a Director of the Cryonics Institute and it shall remain my pleasure to so serve CIs patients and its members. Please vote to keep me on the Cryonics Institute's Board of Directors that I may continue to serve you in my dedication to the science of Cryonics and the lifelong passion I continue to share with my father."

CI NEWS

What's happening at the Cryonics Institute



Michael Gerstner "I read about cryonics 40 years ago and knew I had to do it. I became a lifetime member 25 years ago and am one of the biggest supporters of cryonics and especially Cryonics Institute.

If I get elected, the future of cryonics and our group is the young people. With that in mind my plan is to work to educate young people and get them to join us. Also to make sure our group is headed in the right direction for future growth and more new members. Please vote for me so we all will "have a future, in the future"! Thanks and hope to serve the group."



Alan Mole (Incumbent) "CI Vice President (Robert) Alan Mole was born in Baltimore in 1943. He earned a BS in Civil Engineering at the University of Denver and an MS (Structural Stress Analysis) at the University of Colorado in 1971. After a career as an aerospace stress analyst, an engineer who determines whether rockets and satellites will break, he is now retired. His background in biology consists of a high school class, plus reading Stryer's Biochemistry and books on molecular cellular biology to learn of later advances. Currently Vice President of CI (Director since 2004), he has written articles for Long Life and also CI Magazine and sponsored research on cryonics and rejuvenation.



Nicholas R. VanDerMeulen "I, Nicholas R. VanDerMeulen, as well as my wife Nicole Rodriguez and my brother Jack E. VanDerMeulen, have been 10X over funded as lifetime members with Suspended Animation and the Cryonics Institute for five years. I've since toured the Cryonics Institute in Michigan, 21stCentury Medicine in California, Suspended Animation's facilities in California and Florida, and various other cryonics facilities. I've met hundreds of cryonics members at meetings such as the CIAGM, Teens&Twenties, and Church of Perpetual Life where I have given speeches about cryonics. I acquired an Associate in Arts degree of Biotechnology with credits in Microbiology and Tissue Culture and I am currently serving on the board of directors of the Life Extension Society. I wish to serve on the board of directors of CI to ensure we cryonics members are revived in the future. We have the power to significantly influence the developing science and technology of cryonic preservation."



How to protect yourself and the cryonics institute from hostile legal threats

Commentary by Dennis Kowalski - President, Cryonics Institute



What can you do to help ensure your wishes are followed by family or loved ones after you are legally deceased? When you can't speak for yourself and your wishes can be distorted or twisted in directions you may never have intended, what is your recourse? How can you be sure that next of kin will respect your estate plans and not try to sue your cryonics provider or force you to be buried or cremated?

One way is to remove any potential profit from dishonoring your wishes or from bringing suit against your Cryonics provider. Estates often contain a lot of money which can be a big incentive for next of kin to disrupt your suspension and ensure your burial instead. Even if they say they will honor your wishes while you are alive, history has shown that many people change their minds once they consider the money they could gain by standing in the way of your cryonics suspension. The CI non-suspension rider allows for several options that are up to you to decide. One option

is for you to redirect insurance proceeds or other assets to the family if you are not suspended. This may seem reasonable since many members ask themselves why they should give CI money for a suspension that has not or could not take place. However, the problem with doing this is that you have just provided incentive for people to block your suspension wishes. After all, they will now get the money that was earmarked for suspension. So there are two other options: leave the money with CI for another family member who seeks suspension or simply leave it as a donation to CI because you believe in what we are doing even if your circumstance forbid you from getting suspended. CI is a nonprofit and no one personally gains from these donations, so leaving the money with CI serves only as insurance that your wishes will be honored instead of thwarted.

A stronger, more protective option is an amendment to your will stating the following:



In the event my next of kin or anyone who stands to inherit my estate, they shall be disinherited or given one dollar, if they either stand in the way of my cryonics wishes or bring suit against my cryonics provider.

Conversely, if those same people assist in my wishes or remain friendly towards my cryonics provider then they shall inherit the rest of my estate.

This effectively incentivizes cooperation and disincentivizes hostile behavior. By putting the carrot and the stick in the right order you are at least giving your suspension and your organization the best possible chance of working.

Virtually all lawsuits thus far levied against cryonics organizations have involved next of kin seeking money under the guise of some other nobler cause. Do you have next of kin who are positive, indifferent, or hostile to cryonics? You may not be able to change everyone's mind before you are suspended but you can at least take away the temptation of money to thwart your wishes. Your estate is yours and you should be able to decide how it is executed once you are deceased.

Here are 5 protections to follow

- 1 Choose the non-suspension rider option that donates money to CI if you are not suspended. You don't want to incentivize your own burial
- 2 Place a clause in your will that rewards cooperation and punishes hostile action. See the above amendment
- 3 Be open and clear about your wishes so next of kin know where they stand ahead of time. Your carrot and stick approach may bring about positive action when help is needed by those close to you. Take the time to discuss this with your next of kin.
4. Make sure these documents are made available for your cryonics provider, your attorney and your next of kin so there is a clear record of these wishes. Discuss other ways with your attorney to strengthen these wishes. Feel free to use this document for discussion.
5. Consider legally removing next of kin from control of your estate and your remains in advance of your legal death so that known hostile people can be disempowered from making decisions you might otherwise disagree with. Consider using an attorney or other pro cryonics power of attorney to manage your estate and disposition of remains. You might use a video tape to document all of your wishes in advance that can be stored with your cryonics provider or made as a public record.

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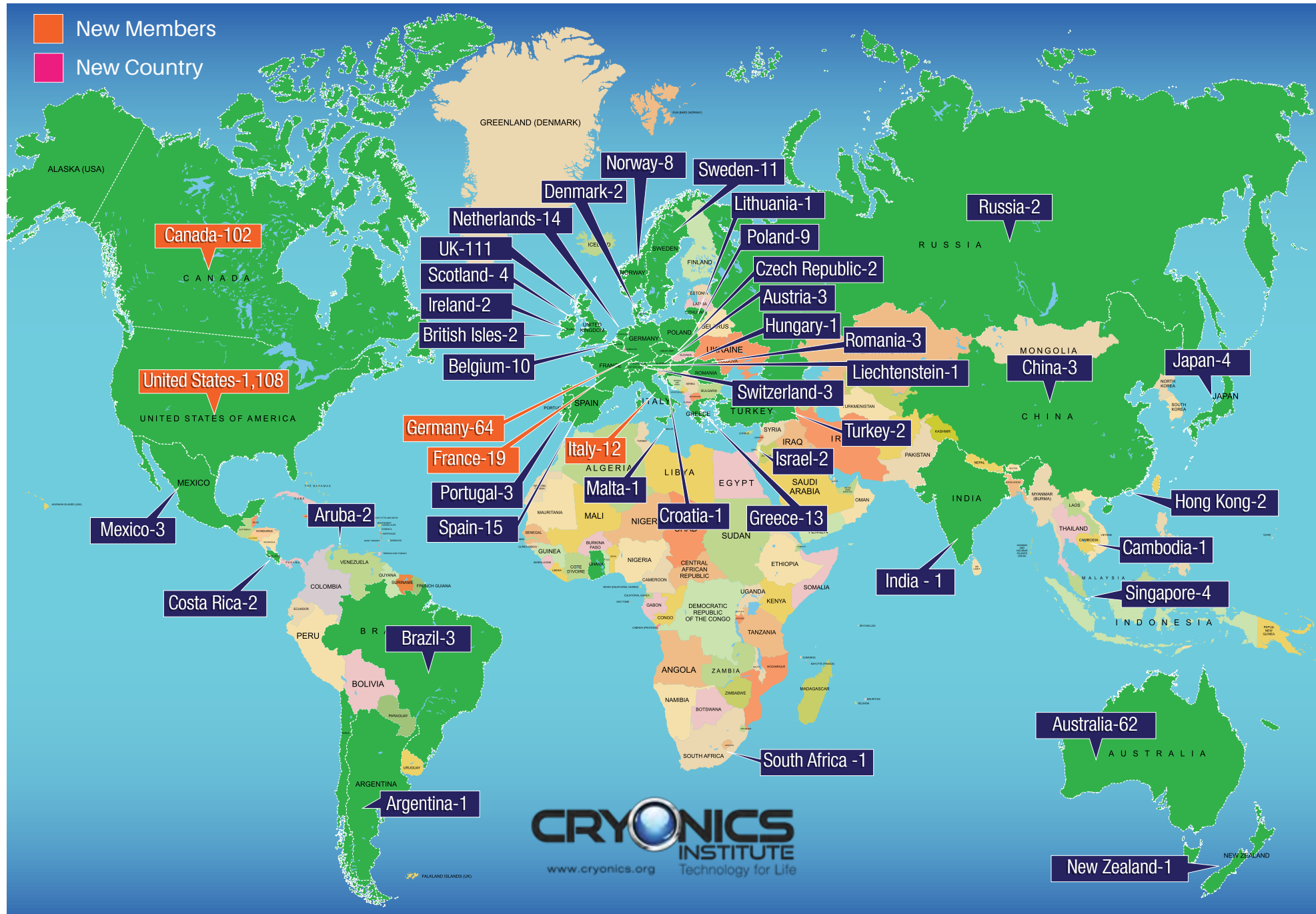
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AUGUST 2019

Patients.....	177
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SA 255

TOTAL
1,991



THE 1ST
ANNUAL
CSI



CRYONICS SYMPOSIUM INTERNATIONAL

Church of Perpetual Life 1855 McKinley St, Hollywood, FL 33021

The Church of Perpetual Life hosted The 2019 Cryonics Symposium International on Saturday, July 27, 2019 in Hollywood, FL. The program featured a veritable “who’s who” of cryonics including CI’s Dennis Kowalski, Max More and Linda Chamberlain from Alcor, and Bill Faloony, director and cofounder of the Life Extension Foundation among many others. For the full schedule of speakers please see the sidebar right. Additionally, the entire program can be seen on YouTube at <https://www.youtube.com/watch?v=JekKwUMvvvY>. This is an outstanding program, offering unique insights and perspectives from many of the world’s foremost cryonics luminaries. Recommended viewing for anyone interested in life extension, futurism or cryonics.

The program was conceived during a conversation between CFP Rudi Hoffman, a well-known personality in the cryonics community who also served as master of ceremonies, and Neal VanDeRee from the Church of Perpetual Life. Hoffman took the lead and working with VanDeRee, organized this ambitious get-together.

It’s great to see this kind of public outreach promoting the cryonics movement, so hats off the everyone involved in this historic cryonics event!

The following photos come courtesy of CI Member Nicholas VanDerMeulen and Neal VanDeRee for the Church of Perpetual Life. Many thanks to both.

SPEAKERS:

Jim Yount: American Cryonics Society

Alexey Potapov: KrioRus (Russian Cryonics)

Linda Chamberlain: Co-Founder of Alcor Life Extension Foundation

Joseph Kowalsky: Cryonics Institute

Dennis Kowalski: President - Cryonics Institute

Max More: CEO - Alcor Life Extension Foundation

Dr. Mike Perry: The Venturists

Ben Best: Oregon Cryonics

Christine Gaspar: Quality Assurance in Cryonics

Ryan Levesque: Suspended Animation

Sayer Johanson: Suspended Animation

Rudi Hoffman: Master of Ceremonies of Cryonics Symposium International (CSI) and Founder of Hoffman Planning

Neal VanDeRee: Officiator at Church of Perpetual Life

William Faloony: Director/Co-Founder of Life Extension Foundation



*Top Row L to R: Neal VanDeRee, Alexey Potapov, Mark Laucks, Rudi Hoffman, Charles Kam, Mike Perry, Jim Yount, Dennis Kowalski, Sayer Johanson
Bottom Row L to R: Ben Best, Luguan Yan, Bill Faloon, Regina Monaco, Christine Gaspar, Max More, Linda Chamberlain, Ryan Levesque, Joe Kowalsky*

Agenda

8:30 AM — 9:45 AM: Breakfast and Networking at the Church

10:00 AM — 12 PM: Showcase of the Incredible Initiatives Happening in the Field of Cryonics

12 PM — 1:10 PM: Lunch & the Suspended Animations Tour Demonstrations of the Cryonics Mobile, the Ambulance for Cryonicists

1:15 PM — 4:00 PM: Cryonics and Life Extensions Showcase

4:00 PM — 4:30 PM: Keynote address by Bill Faloon

4:30 PM — 5:15 PM: Summary and a Questions & Answers session for All the Speakers

5:30 PM — 8:30 PM: Dinner and Networking at Church of Perpetual

For media inquiry or schedule interviews, please contact Tonya Scholz at tscholz@know-aging.com

Live stream of The 1st Annual Cryonics Symposium International (CSI)



Bill Faloon presents the keynote address



Event Organizer Rudi Hoffman, Hoffman Financial Planning



Rudi Hoffman introduces Sayer Johanson and Ryan Levesque of Suspended Animation, Inc.



Max More, Alcor CEO fields an audience question during the program's Q & A session



CI President Dennis Kowalski discusses the Top Ten Worst Mistakes in Cryonics



CI Member Nick VanDerMuelen tours SA's new Cryonics Ambulance with Ryan Levesque and Sayer Johanson of Suspended Animation, Inc.



2019 CSI Speaker Bios

About Jim Yount ~ American Cryonics Society:

Jim Yount is the President of the American Cryonics Society, inc. He has been active in the cryonics community since 1972. For more info go to <http://americancryonics.org>

About Alexey Potapov ~ KrioRus (Russian Cryonics):

Alexey Potav is the co-founder and first CTO for KrioRus, the biggest Russian cryonics company in the world, outside the US. Today he is KrioRus' North America Director and board member. He is also a serial entrepreneur with few startups in drone and retail automation. For more info go to <http://kriorus.ru/en>

About Linda Chamberlain~ Co-Founder of Alcor Life Extension Foundation:

Linda Chamberlain is one of the co-founders of Alcor (Alcor Life Extension Foundation) and served as its first CEO. She and her husband, Fred Chamberlain III, started Alcor in 1972. Fred, together with his father and Linda's mother, are all currently cryopreserved at Alcor. After Fred was cryopreserved in 2012, Linda decided to come out of retirement and returned to Alcor full time in 2016. She is currently engaged in two projects. One is the writing of the medical case report for each patient and the other is helping Alcor members set up funding trusts and revival trusts. It is Linda's desire to be close to her family and do whatever she can to protect

them and help bring them back into her life as soon as possible. Linda has two published works on the subject of cryonics. The first, LifeQuest, compiled in the 1970s, contains short stories written by Linda, Fred, and others in cryonics, mind cloning and other transhuman adventures. In the 1990s, Linda wrote a cryonics novel called Star Pebble, available on amazon.com

About Joseph Kowalsky~ Cryonics Institute:

Joseph Kowalsky began his involvement with Cryonics and the Cryonics Institute (C.I.) over 40 years ago when he was just 13 years old. He has been a volunteer director of CI for over 25 years. He has spoken on Cryonics topics

in media and for business leaders around the world. A few years ago he founded, and heads, the CryoPrize, a volunteer project to make organ transplants safer, less costly and more available. A lawyer by training, as his "day job" he worked on Capitol Hill in Washington, D.C., for the Federal Trade Commission, and created a non-profit Law Clinic which he ran for nearly a decade. For the past 20 years, he has been a Financial Consultant, owning his own Financial Consulting firm for the past 10 years. For more info go to <https://www.cryonics.org/ci-landing/directors-officers/joseph-kowalsky>

About Dennis Kowalski ~ President of Cryonics Institute:

Dennis Kowalski is a medical officer and a Nationally Registered EMT-Paramedic for the city of Milwaukee. He is also certified in advanced cardiac life support, advanced pediatric life support, and as a CPR Instructor for the American Heart Association. As a Fire Fighter and Paramedic Dennis have had a lot of experience dealing with life and death. His training and skills have given him numerous opportunities to be a part of saving lives and helping people in distress. He also teaches emergency medicine at the Milwaukee Fire Academy and the Milwaukee County Emergency Medical Center. He has served as a National Registry examiner at the local technical colleges where he helped to certify many new Emergency Medical Technicians & Paramedics.

Dennis also serves on the board of directors of the Cryonics Institute and has also served as its president for the last 10 years where he has brought together his knowledge and experience from emergency medicine to the field of cryonics. He will be speaking today about some of the most common problems people face in cryonics and discussing some of the practical solutions to those problems. For more info go to <https://www.cryonics.org/ci-landing/directors-officers/dennis-kowalski>

About Max More ~CEO of Alcor Life Extension Foundation:

An internationally recognized advocate of the effective and ethical use of technology for life extension and cryopreservation, Dr. More brings experience in running non-profit orga-

nizations, many years of analyzing and writing about business organizations, and a long commitment to Alcor's mission. More joined Alcor in 1986 as its 67th member, founded Alcor-UK (originally Mizar Limited) in the same year, and has participated in several cryo-pervations. Dr. More co-founded and until 2007 acted as Chairman of Extropy Institute, an educational non-profit organization that created the modern "transhumanist" movement, whose goals centrally include extending healthy human life span. More has a degree in Philosophy, Politics, and Economics from St. Anne's College, Oxford University (1984-87). He was awarded a Dean's Fellowship in Philosophy in 1987 by the University of Southern California. He studied and taught philosophy at USC 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. 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." For more info go to <https://alcor.org/profiles/more.html>

About Dr. Mike Perry ~ The Venturists:

R. Michael Perry, Ph.D. is a patient caretaker at Alcor. He was hired by Alcor in 1989 following two years of volunteer work at the Foundation. He monitors Alcor's dewars, provides facility surveillance during off-work hours, and performs writing tasks and computer programming. He has authored or contributed to the automated cooldown and perfusion modeling programs and has maintained the patient log books for many years. He is a regular contributor to Alcor newsletters. He has been a member of Alcor since 1984.

Mike is a Director and an ordained minister of the Society for Venturism and performs wedding ceremonies and memorial services for this IRS-recognized, scientific and religious organization. He is also a co-founder and current president of the Society for Universal Immortalism, a group dedicated to the hope that all persons who ever lived will eventually be resurrected through scientific means.

He has authored two books: *Toward Self-Optimization of Machine Intelligence* (Ph.D. Thesis) and *Forever for All: Moral Philosophy, Cryonics, and the Scientific Prospects for Immortality*. Prior to his Alcor experience, Mike authored or co-authored several journal papers and technical reports on computerized tomography, for applications ranging from medicine to solar physics. Mike authored *Suspension Failures: Lessons from the Early Years*, and coauthored *On Determining the Electron Density Distribution of the Solar Corona from K-Coronameter Data*, *Improved Three-Dimensional Mapping of the Electron Density Distribution of the Solar Corona*, *Computerized Multi-Angular Tomography*, *Software Aid for Optimizing 0–1 Matrices*, and *The Anti-Death Philosophy Of NF Fedorov*.

About Ben Best ~ Oregon Cryonics:

Ben Best has been a cryonics activist since the 1980s when he helped incorporate the Cryonics Society of Canada. Ben Best was President of the Cryonics Institute for nine years and is currently Director of the Biomedical Research and Longevity Society (formerly called Life Extension Foundation) which is the world's leading source of funds for cryonics-related research. Ben Best will present on Oregon Cryonics, despite not being affiliated with that organization. For more info about Oregon Cryonics go to <http://www.oregoncryo.com/>

About Christine Gaspar — Quality Assurance in Cryonics:

Christine Gaspar has a background in emergency/trauma nursing and also served in the Canadian Armed Forces. She lives near Toronto, Canada. Christine is the president of the Cryonics Society of Canada, advocating for local cryonicists and is helping to build an infrastructure in Canada to support cryonics standby efforts. She participated in the Alcor Southern California standby team. She has appeared in press interviews; on TV, radio and internet media on cryonics related matters as well as a guest lecturer at McGill University in Montreal, Canada. She is a writer who has contributed essays and articles in support of cryonics and transhumanist philosophy. Christine served as a contractor for Alcor; writing, editing and examining case reports,

contributing towards a Quality Management system within the organization. She has currently been offered a position at Suspended Animation Inc, a BRLS contractor, as a technical writer. For more info go to <https://alcor.org>

About Ryan Levesque ~ Suspended Animation:

Ryan Levesque is the Client Services and Donor Recovery Manager at Suspended Animation Inc. for the past 2 1/2 years. Began his medical career as a Field Corpsman for the United States Marines with a tour to Fallujah, Iraq. Challenged the Nursing Board of California to obtain his nursing license, and has worked in the Oncology field for over 5 years. For more info about Suspended Animation go to <https://suspendedanimation-labs.com/>

About Sayer Johanson ~ Suspended Animation:

Sayer Johanson has been the operations manager for Suspended Animation Inc. for the past two years. He has been a standby and stabilization team lead with SAI for the past five years. For more info about Suspended Animation go to <https://suspendedanimation-labs.com/>

About Rudi Hoffman ~ Master of Ceremonies of Cryonics Symposium International (CSI) and Founder of Hoffman Planning:

Rudi Hoffman is a Certified Financial Planner, Chartered Life Underwriter, and Chartered Financial Consultant with forty years of experience. As an independent consultant, he serves the needs of the clients first. Using a deep understanding of what actually works in the real world to help humans accomplish their financial goals, not just theory, Rudi brings advanced financial planning into the world of extreme longevity. For more info rudihoffman.com

About Neal VanDeRee ~ Church of Perpetual Life:

Neal VanDeRee is the Officiator at the Church of Perpetual Life. His passions include making new friends that will last a lifetime. Since he is an Immortalist, that means the relationships would be for over 500 years. He is a father of 7 and in addition to running the church also

operates the VanDeRee Real Estate & Auction Company which was founded in 1934 by his father. He is a Cryonicist and enjoys Scuba diving, coaching soccer, playing games with his children, reading Sci-Fi. He is an avid writer and photographer and is joyfully married to Paula, spending time between Venice & Hollywood Florida. For more info go to <http://perpetual.life>

About Bill Faloony ~ Life Extension Foundation:

Bill Faloony compiled the 1,500-page medical reference book *Disease Prevention and Treatment* and his latest books are *Pharmocracy* and *Pharmocracy II: How Corrupt Deals and Misguided Medical Regulations Are Bankrupting America — and What to Do About It*. He is also the Director and Co-founder of the Life Extension Foundation. To promote Life Extension's innovative medical concepts, Bill has been featured in hundreds of media appearances including *The Phil Donahue Show*, *The Joan Rivers Show*, *Tony Brown's Journal*, *ABC News Day One*, and *Newsweek* magazine. For more info about Life Extension Foundation go to <http://www.lifeextensionfoundation.org>

About The Church of Perpetual Life:

The Church of Perpetual Life is a science-based church that is open to people of all faiths. We are non-denominational and non-judgmental. We are a central gathering place for humanists, atheists, agnostics, and Transhumanists as well as people who are Christian, Jewish, Buddhist, and any other faith. What brings us together is our common hope and belief in the option of healthy radical Life Extension. For more info visit <https://churchofperpetuallife.org>; Email: Neal@ChurchOfPerpetualLife.org; Follow on Twitter: [@LifePerPetual](https://twitter.com/LifePerPetual); Like on Facebook.com/[ChurchofPerpetualLife](https://www.facebook.com/ChurchofPerpetualLife); Subscribe on Youtube

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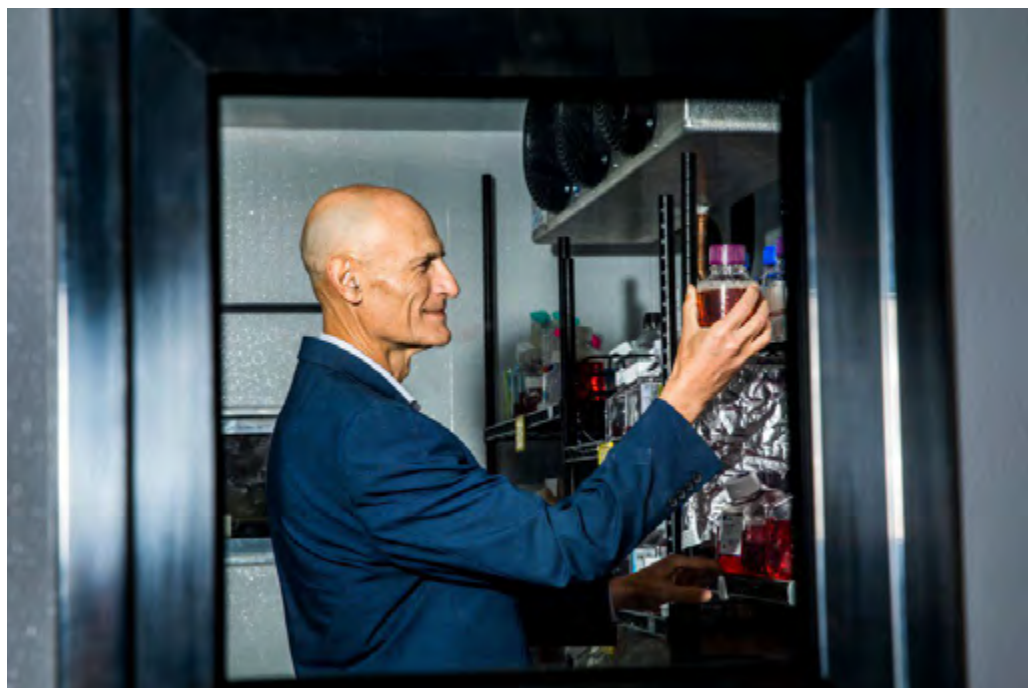
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MIT Technology Review from TECHNOLOGYREVIEW.COM

Has this scientist finally found the fountain of youth?

Editing the epigenome, which turns our genes on and off, could be the “elixir of life.”

by Erika Hayasaki | Aug 8, 2019



Juan Carlos Izpisua Belmonte of the Gene Expression Laboratory at San Diego's Salk Institute for Biological Studies

CHRISTIE HEMM KLOK

The black mouse on the screen sprawls on its belly, back hunched, blinking but otherwise motionless. Its organs are failing. It appears to be days away from death. It has progeria, a disease of accelerated aging, caused by a genetic mutation. It is only three months old.

I am in the laboratory of Juan Carlos Izpisua Belmonte, a Spaniard who works at the Gene Expression Laboratory at San Diego's Salk Institute for Biological Studies, and who next shows me something hard to believe. It's the same mouse, lively and active, after being treated with an age-reversal mixture. "It completely rejuvenates," Izpisua Belmonte tells me with a mischievous grin. "If you look inside, obviously, all the organs, all the cells are younger."

Izpisua Belmonte, a shrewd and soft-spoken scientist, has

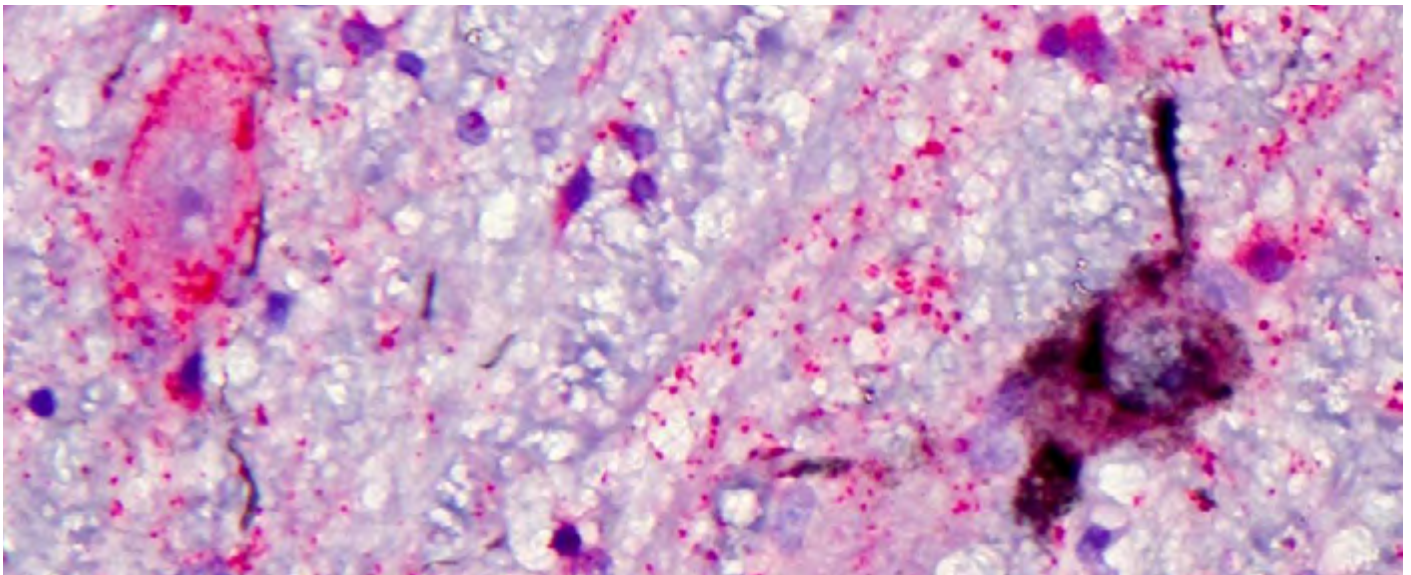
access to an inconceivable power. These mice, it seems, have sipped from a fountain of youth. Izpisua Belmonte can rejuvenate aging, dying animals. He can rewind time. But just as quickly as he blows my mind, he puts a damper on the excitement. So potent was the rejuvenating treatment used on the mice that they either died after three or four days from cell malfunction or developed tumors that killed them later. An overdose of youth, you could call it.

The powerful tool that the researchers applied to the mouse is called "reprogramming." It's a way to reset the body's so-called epigenetic marks: chemical switches in a cell that determine which of its genes are turned on and which are off. Erase these marks and a cell can forget if it was ever a skin or a bone cell, and revert to a much more primitive, embryonic state. The technique is frequently used by...

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Alzheimer's targets brain cells that help people stay awake

The new finding could fundamentally refocus dementia research



SLEEPY TIME In part of a human brain stem, a healthy nerve cell (red, left) releases a chemical messenger involved in wakefulness. Nearby, a nerve cell (brown, right) packed with tau, a protein tied to Alzheimer's, is too damaged to work properly. | L. GRINBERG

By Laura Sanders

AUGUST 16, 2019 AT 11:30 AM

Alzheimer's disease destroys command centers in the brain that keep people awake. That finding could explain why the disease often brings daytime drowsiness.

Sleep problems can precede dementias, including Alzheimer's, sometimes by decades. But the new result, described online August 12 in *Alzheimer's & Dementia*, suggests that disordered sleeping isn't just an early harbinger of Alzheimer's. Instead, sleep trouble is "part of the disease," says Lea Grinberg, a neuropathologist at the University of California, San Francisco.

Grinberg and colleagues focused on the brain stem and a structure perched above it called the hypothalamus. Together, these parts of the nervous system oversee crucial

jobs such as keeping people awake and paying attention. Though important, the brain stem and its neighbors have been largely overlooked in studies of dementia, Grinberg says. In particular, the researchers searched for evidence of tau, a protein that can form tangles inside nerve cells, in postmortem brains of people who died with Alzheimer's disease.

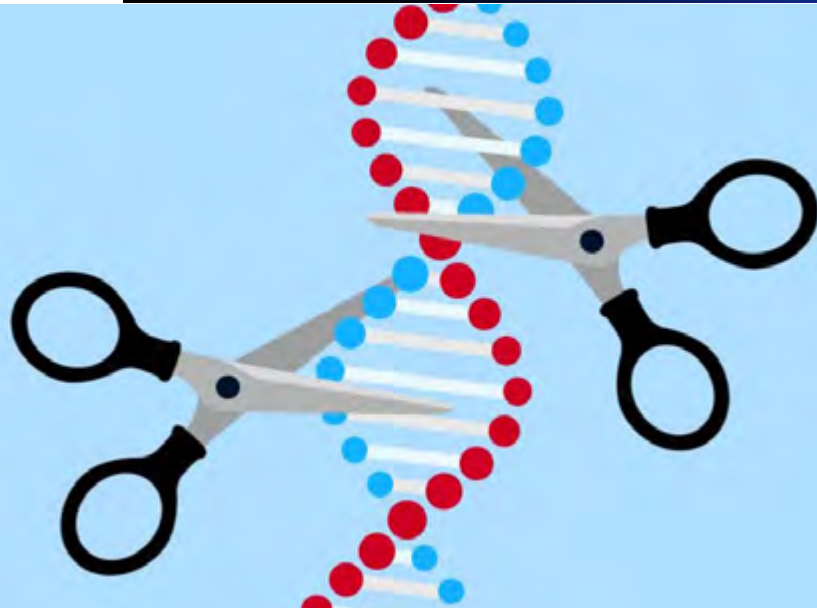
Three small regions of the hypothalamus and brain stem, all of which usually contain nerve cells that keep people awake during the day, were packed with tau, the team found. And two of the three areas had lost over 70 percent of their nerve cells, or neurons. These areas "are hit hard, and they are hit by tau," Grinberg says. That destruction could be part of the reason people with Alzheimer's disease often feel tired during the day, even if they slept the night before....

[FULL ARTICLE AT SCIENCE NEWS.ORG](https://www.sciencenews.org/full-article)

ScienceNews
INDEPENDENT JOURNALISM SINCE 1921**from SCIENCE NEWS.ORG**

CUTTING ROOM Scientists will soon wield the molecular scissors CRISPR/Cas9 in the human body. Some people with a form of inherited blindness will have the gene editor injected into their eyes, where researchers hope it will snip out a mutation. Two other trials are CRISPR editing cells outside of the body to treat cancer or blood disorders.

* GETTY IMAGES PLUS



CRISPR enters its first human clinical trials

The gene editor targets cancer, blood disorders and blindness

By Tina Hesman Saey | AUGUST 14, 2019 AT 8:00 AM

Since its debut in 2012, CRISPR gene editing has held the promise of curing most of the over 6,000 known genetic diseases. Now it's being put to the test.

In the first spate of clinical trials, scientists are using CRISPR/Cas9 to combat cancer and blood disorders in people. In these tests, researchers remove some of a person's cells, edit the DNA and then inject the cells back in, now hopefully armed to fight disease.

Researchers are also set to see how CRISPR/Cas9 works inside the human body. In an upcoming trial, people with an inherited blindness will have the molecular scissors injected into their eyes.

Those tests, if successful, could spur future trials for Duchenne muscular dystrophy, cystic fibrosis and a wide variety of other genetic diseases, affecting millions of people worldwide.

"CRISPR is so intriguing," says Laurie Zoloth, a bioethicist at the University of Chicago Divinity School, "and so elegant."

But big questions remain about whether CRISPR/Cas9 can live up to the hype.

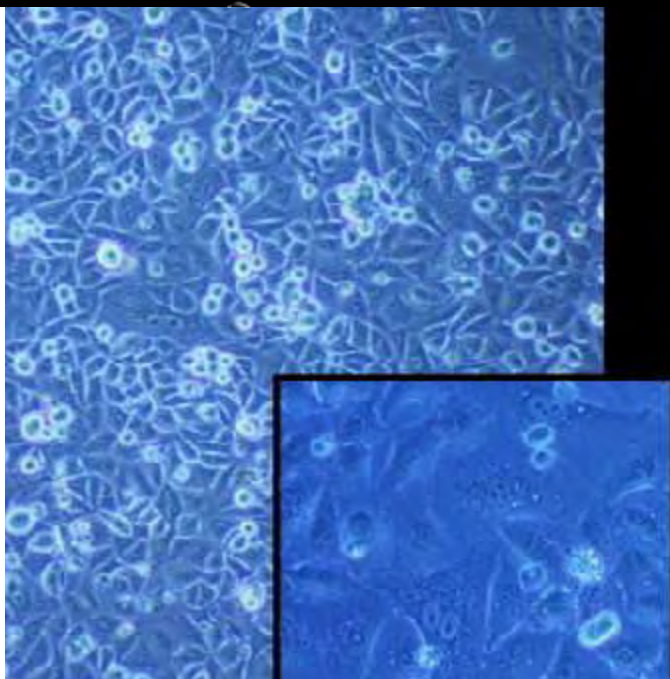
Other previously promising technologies have fallen short. For instance, stem cell injections helped paralyzed rats walk again. But they didn't work so well for people, Zoloth says.

Conventional gene therapies, which insert healthy copies of genes to replace or counteract disease-causing versions, also suffered severe setbacks, says Ronald Conlon, a geneticist at Case Western Reserve University in Cleveland. Some kids who had therapy for immune defects developed cancers (SN: 1/1/11, p. 24); a blindness therapy worked temporarily, but couldn't halt disease progression (SN Online: 5/3/15); and, most devastatingly, participants died — including 18-year-old Jesse Gelsinger in 1999 — while taking part in gene therapy trials...

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from PHYS.ORG



The cells frozen with the polymer (left) and without the polymer (right). Credit: University of Warwick

Freezing cells made safer thanks to new polymer

July 29, 2019 by Alice Scott, University of Warwick

Cell freezing (cryopreservation)—which is essential in cell transfusions as well as basic biomedical research—can be dramatically improved using a new polymeric cryoprotectant, discovered at the University of Warwick, which reduces the amount of ‘anti-freeze’ needed to protect cells.

The ability to freeze and store cells for cell-based therapies and research has taken a step forward in the paper “A synthetically scalable poly(ampholyte) which dramatically Enhances Cellular Cryopreservation.” published by the University of Warwick’s Department of Chemistry and Medical School in the journal *Biomacromolecules*. The new polymer material protects the cells during freezing, leading to more cells being recovered and less solvent-based antifreeze being required.

Cryopreservation of cells is an essential process, enabling banking and distribution of cells, which would otherwise degrade. The current methods rely on adding traditional ‘antifreezes’ to the cells to protect them from the cold stress, but not all the cells are recovered and it is desirable to lower the amount of solvent added.

The new Warwick material was shown to allow cryopreservation using less solvent. In particular, the material was very potent at protecting cell monolayers—cells which are attached to a surface, which is the format of how they are grown and used in most biomedical research.

Having more, and better quality cells, is crucial not just for their use in medicine, but to improve the quality and accessibility of cells for the discovery of new drugs ...

[FULL ARTICLE AT PHYS.ORG](#)

ScienceDaily®

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Seeing how computers 'think' helps humans stump machines and reveals AI weaknesses

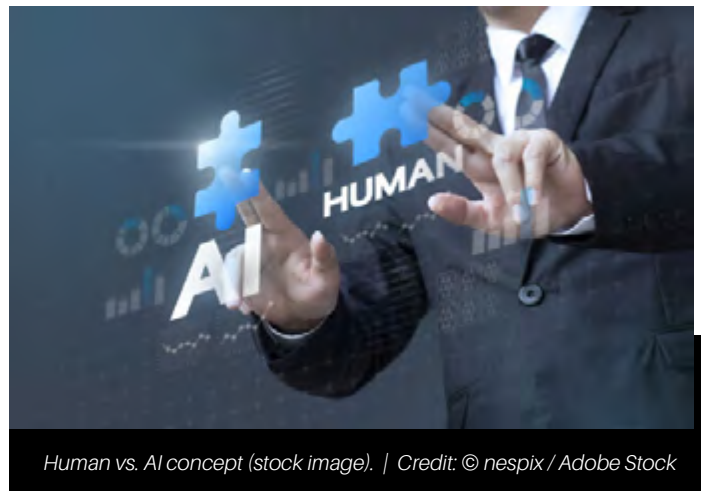
Expanded Potential Stem Cell lines of pig and human cells established

Date: August 6, 2019 | Source: University of Maryland

One of the ultimate goals of artificial intelligence is a machine that truly understands human language and interprets meaning from complex, nuanced passages. When IBM's Watson computer beat famed "Jeopardy!" champion Ken Jennings in 2011, it seemed as if that milestone had been met. However, anyone who has tried to have a conversation with virtual assistant Siri knows that computers have a long way to go to truly understand human language. To get better at understanding language, computer systems must train using questions that challenge them and reflect the full complexity of human language.

Researchers from the University of Maryland have figured out how to reliably create such questions through a human-computer collaboration, developing a dataset of more than 1,200 questions that, while easy for people to answer, stump the best computer answering systems today. The system that learns to master these questions will have a better understanding of language than any system currently in existence. The work is described in an article published in the 2019 issue of the journal Transactions of the Association for Computational Linguistics.

"Most question-answering computer systems don't explain why they answer the way they do, but our work helps us see what computers actually understand," said Jordan Boyd-Graber, associate professor of computer science at UMD and senior author of the paper. "In addition, we have



Human vs. AI concept (stock image). | Credit: © nespix / Adobe Stock

produced a dataset to test on computers that will reveal if a computer language system is actually reading and doing the same sorts of processing that humans are able to do."

Most current work to improve question-answering programs uses either human authors or computers to generate questions. The inherent challenge in these approaches is that when humans write questions, they don't know what specific elements of their question are confusing to the computer. When computers write the questions, they either write formulaic, fill-in-the blank questions or make mistakes, sometimes generating nonsense.

To develop their novel approach of humans and computers working together to generate questions, Boyd-Graber and his team created a computer interface that reveals what a computer is "thinking" as a human writer types a question. The writer can then edit his or her question to exploit the computer's weaknesses.

In the new interface, a human author types a question while the computer's guesses appear in ranked order on the screen, and the words that led the computer to make its guesses are highlighted...

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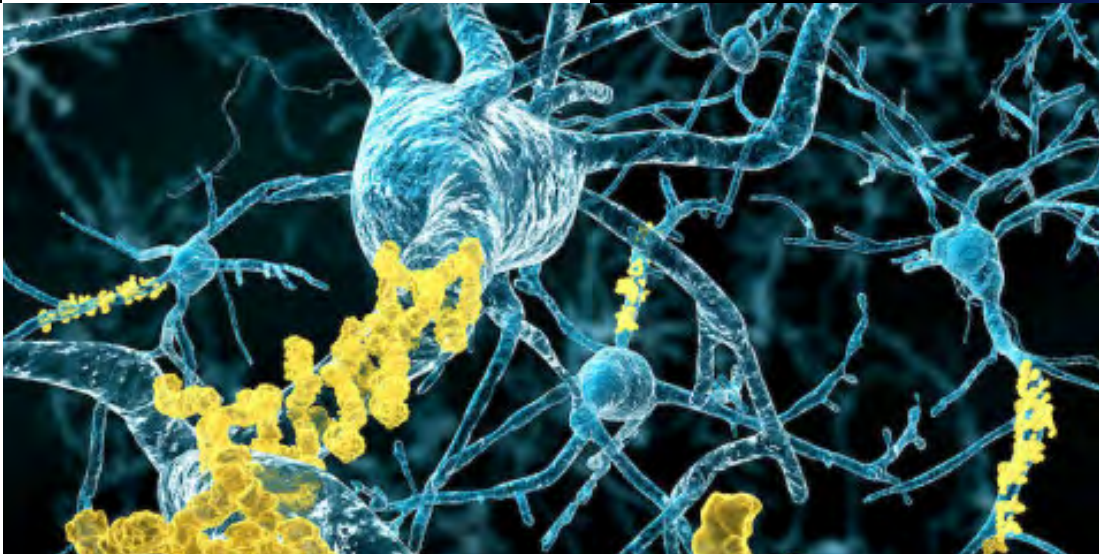


Illustration of brain cells with plaques (stock image).

Credit: © Juan Gärtner / Adobe Stock

An alternate theory for what causes Alzheimer's disease

Date: August 12, 2019 | Source: University of California - Riverside

Alzheimer's disease, the most common cause of dementia among the elderly, is characterized by plaques and tangles in the brain, with most efforts at finding a cure focused on these abnormal structures. But a University of California, Riverside, research team has identified alternate chemistry that could account for the various pathologies associated with the disease.

Plaques and tangles have so far been the focus of attention in this progressive disease that currently afflicts more than 5.5 million people in the United States. Plaques, deposits of a protein fragment called beta-amyloid, look like clumps in the spaces between neurons. Tangles, twisted fibers of tau, another protein, look like bundles of fibers that build up inside cells.

"The dominant theory based on beta-amyloid buildup has been around for decades, and dozens of clinical trials based on that theory have been attempted, but all have failed," said Ryan R. Julian, a professor of chemistry who led the research team. "In addition to plaques, lysosomal storage is observed in brains of people who have Alzheimer's disease.

Neurons -- fragile cells that do not undergo cell division -- are susceptible to lysosomal problems, specifically, lysosomal storage, which we report is a likely cause of Alzheimer's disease."

Study results appear in ACS Central Science, a journal of the American Chemical Society.

An organelle within the cell, the lysosome serves as the cell's trashcan. Old proteins and lipids get sent to the lysosome to be broken down to their building blocks, which are then shipped back out to the cell to be built into new proteins and lipids. To maintain functionality, the synthesis of proteins is balanced by the degradation of proteins.

The lysosome, however, has a weakness: If what enters does not get broken down into little pieces, then those pieces also can't leave the lysosome. The cell decides the lysosome is not working and "stores" it, meaning the cell pushes the lysosome to the side and proceeds to make a new one. If the new lysosome also fails, the process is repeated, resulting in lysosome storage...

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Quantum computers to clarify the connection between the quantum and classical worlds

Date: July 31, 2019

Source: DOE/Los Alamos National Laboratory

Los Alamos National Laboratory scientists have developed a new quantum computing algorithm that offers a clearer understanding of the quantum-to-classical transition, which could help model systems on the cusp of quantum and classical worlds, such as biological proteins, and also resolve questions about how quantum mechanics applies to large-scale objects.

"The quantum-to-classical transition occurs when you add more and more particles to a quantum system," said Patrick Coles of the Physics of Condensed Matter and Complex Systems group at Los Alamos National Laboratory, "such that the weird quantum effects go away and the system starts to behave more classically. For these systems, it's essentially impossible to use a classical computer to study the quantum-to-classical transition. We could study this with our algorithm and a quantum computer consisting of several hundred qubits, which we anticipate will be available in the next few years based on the current progress in the field."

Answering questions about the quantum-to-classical transition is notoriously difficult. For systems of more than a few atoms, the problem rapidly becomes intractable. The number of equations grows exponentially with each added atom. Proteins, for example, consist of long strings of molecules that may become important biological components or sources of disease, depending on how they fold up. Although proteins can be comparatively large molecules, they are small enough that the quantum-to-classical transition, and algorithms that can handle it, become important when trying to understand and predict how proteins fold.



Photo by Josh Sorenson from Pexels

In order to study aspects of the quantum-to-classical transition on a quantum computer, researchers first need a means to characterize how close a quantum system is to behaving classically. Quantum objects have characteristics of both particles and waves. In some cases, they interact like tiny billiard balls, in others they interfere with each other in much the same way that waves on the ocean combine to make larger waves or cancel each other out. The wave-like interference is a quantum effect. Fortunately, a quantum system can be described using intuitive classical probabilities rather than the more challenging methods of quantum mechanics, when there is no interference.

The LANL group's algorithm determines how close a quantum system is to behaving classically. The result is a tool they can use to search for classicality in quantum systems and understand how quantum systems, in the end, seem classical to us in our everyday life...

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Worldwide Cryonics Groups

AUSTRALIA: The Cryonics Association of Australasia offers support and information for Australia & nearby countries. caalist@prix.pricom.com.au. Their Public Relations Officer is Philip Rhoades. phil@pricom.com.au GPO Box 3411, Sydney, NSW 2001 Australia. Phone: +6128001 6204 (office) or +61 2 99226979 (home.)

BELGIUM: Cryonics Belgium is an organisation that exists to inform interested parties and, if desired, can assist with handling the paperwork for a cryonic suspension. The website can be found at www.cryonicsbelgium.com. To get in touch, please send an email to info@cryonicsbelgium.com.

BHUTAN: Can help Cryonics Institute Members who need help for the transport & hospital explanation about the cryonics procedure to the Dr and authorities in Thimphu & Paro. Contacts : Jamyang Palden & Tenzin Rabgay / Emails : palde002@umn.edu or jamgarnett@hotmail.co Phones : Jamyang / 975-2-32-66-50 & Tenzin / 975-2-77-21-01-87

CANADA: This is a very active group that participated in Toronto's first cryopreservation. President, Christine Gaspar; Vice President, Gary Tripp. Visit them at: <http://www.cryocdn.org/>. There is a subgroup called the Toronto Local Group. Meeting dates and other conversations are held via the Yahoo group. This is a closed group. To join write: csc4@cryocdn.org

QUEBEC: Contact: Stephan Beauregard, C.I. Director & Official Administrator of the Cryonics Institute Facebook Page. Information about Cryonics & perfusion services in Montreal for all cryonicists. Services available in French & English: stephan@cryonics.org

CHILE: Community oriented to provide reliable information on human cryopreservation, as far as technical scientific as well as other practical aspects. Dissemination, awareness and education on issues related to the extension of life in general and cryonics in particular. Contact José Luis Galdames via galdamesjoseluis@gmail.com or via Facebook at [Cronica Chile](#).

FINLAND: The Finnish Cryonics Society, (KRYOFIN) was established in 2008 and is an organization collaborating with all nearby groups and organizations. Contact them at: kryoniikka.fi Their President is Ville Salmensuu ville@salmensuu.fi

FRANCE: SOCIETE CRYONICS DE FRANCE is a non profit French organization working closely with European cryonics groups. For more information: J.Roland Missionnier: phone: 33 (0) 6 64 90 98 41 or email: cryonicsnews.inpi@yahoo.fr • [Facebook group](#)

GERMANY: DGAB There are a number of Cryonicists in Germany. Their Organization is called "Deutsche Gesellschaft für Angewandte Biostase e.V.", or short "DGAB". More information on their homepage at www.biostase.de. If there are further questions, contact their Board at vorstand@biostase.de

GERMANY: CRYONICS-GERMANY is an active group providing cryonics support, including a special 8-member Standby Response Team. Members from Germany or Internationally are welcome to join. at <http://cryonics-germany.org>. Direct inquiries to contact@cryonics-germany.org.

INDIA: Can help Cryonics Institute Members who need help for the transport & hospital explication about the cryonics procedure to the Dr and authority in Bangalore & Vellore Area. Contacts : Br Sankeerth & Bioster Vignesh / Email : vicky23101994@gmail.com Phones : Bioster / 918148049058 & Br Sankeerth / 917795115939

ITALY: The Italian Cryonics Group (inside the Life Extension Research Group (LIFEXT Research Group)) www.lifext.org and relative forum: forum.lifext.org. The founder is Bruno Lenzi, contact him at brunolenzi88@gmail.com or Giovanni Ranzo at: giovanni1410@gmail.com

JAPAN: Hikaru Midorikawa is President Japan Cryonics Association. Formed in 1998, our goals are to disseminate cryonics information in Japan, to provide cryonics services in Japan, and eventually, to allow cryonics to take root in the Japanese society. Contact mid_hikaru@yahoo.co.jp or <http://www.cryonics.jp/>

NEPAL: Can help Cryonics Institute Members who need help for the transport & hospital explanation about the cryonics procedure to the Dr and authorities in Kathmandu. Contact : Suresh K. Shrestha / Email : toursuresh@gmail.com Phone : 977-985-1071364 / PO Box 14480 Kathmandu.

THE NETHERLANDS: Dutch Cryonics Organization is the local support group since 2002 and able to provide advice, standby, perfusion and shipment 24/7, in case of need. We are an active group utilizing the latest equipment. New members from The Netherlands welcome.

E-mail: info@cryonisme.nl
website: <http://www.cryonisme.nl>

NORWAY : Can help Cryonics Institute Members who need help for the transport & hospital explication about the cryonics procedure to the Dr, funeral home and authority at Sandvika. Contacts : Gunnar Hammersmark Sandvika Begegravelsesbyraa / Phones : 011-47-2279-7736

RUSSIA: KrioRus is a Russian cryonics organization operating in Russia, CIS and Eastern Europe that exists to help arrange cryopreservation and longterm suspension locally, or with CI or Alcor. Please contact kriorus@mail.ru or daoila.medvedev@mail.ru for additional information or visit <http://www.kriorus.ru>. Phone: 79057680457

SWEDEN: www.kryonik.se or Facebook: Svenska Kryonikföreningen. Initially, the society will focus on providing information and assistance to those who wish to sign up for cryonics. Eventually, we also hope to provide practical assistance in cases, possibly in collaboration with other European groups.

SWITZERLAND: www.cryosuisse.ch

CRYOSUISSE The Swiss Society for Cryonics is an active group with over 30 members. To join, [email info@cryosuisse.ch](mailto:info@cryosuisse.ch)

UNITED KINGDOM: Cryonics UK is a nonprofit UK based standby group. www.cryonics-uk.org Cryonics UK can be contacted via the following people: Tim Gibson: phone: 07905 371495, email: tim.gibson@cryonics-uk.org. Victoria Stevens: phone: 01287 669201, email: vicstevens@hotmail.co.uk. Graham Hipkiss: phone: 0115 8492179 / 07752 251 564, email: ghipkiss@hotmail.com. Alan Sinclair: phone: 01273 587 660 / 07719 820715, email: cryoservices@yahoo.co.uk

Can help Cryonics Institute Members who need help, funeral home, transport at London. Contact : F.A. Albin & Sons / Arthur Stanley House Phone : 020-7237-3637

INTERNATIONAL: The Cryonics Society is a global cryonics advocacy organization. www.CryonicsSociety.org. They publish an e-newsletter *FutureNews*. Phone: 1-585-643-1167.

HELP US STAY UP-TO-DATE!

Please send any corrections or changes to the address below. If you know of, or are considering starting a support, standby or other cryonics-related group in your area, please send details to

dg@cryonics.org.



Please note, this list is provided as an information resource only. Inclusion on the list does not constitute an endorsement by the Cryonics Institute or our affiliated organizations. We urge our readers to use this list as a starting point to research groups that may meet their own individual needs. We further note that readers should always use their own informed judgment and a reasonable amount of caution in dealing with any organization and/or individual listed.

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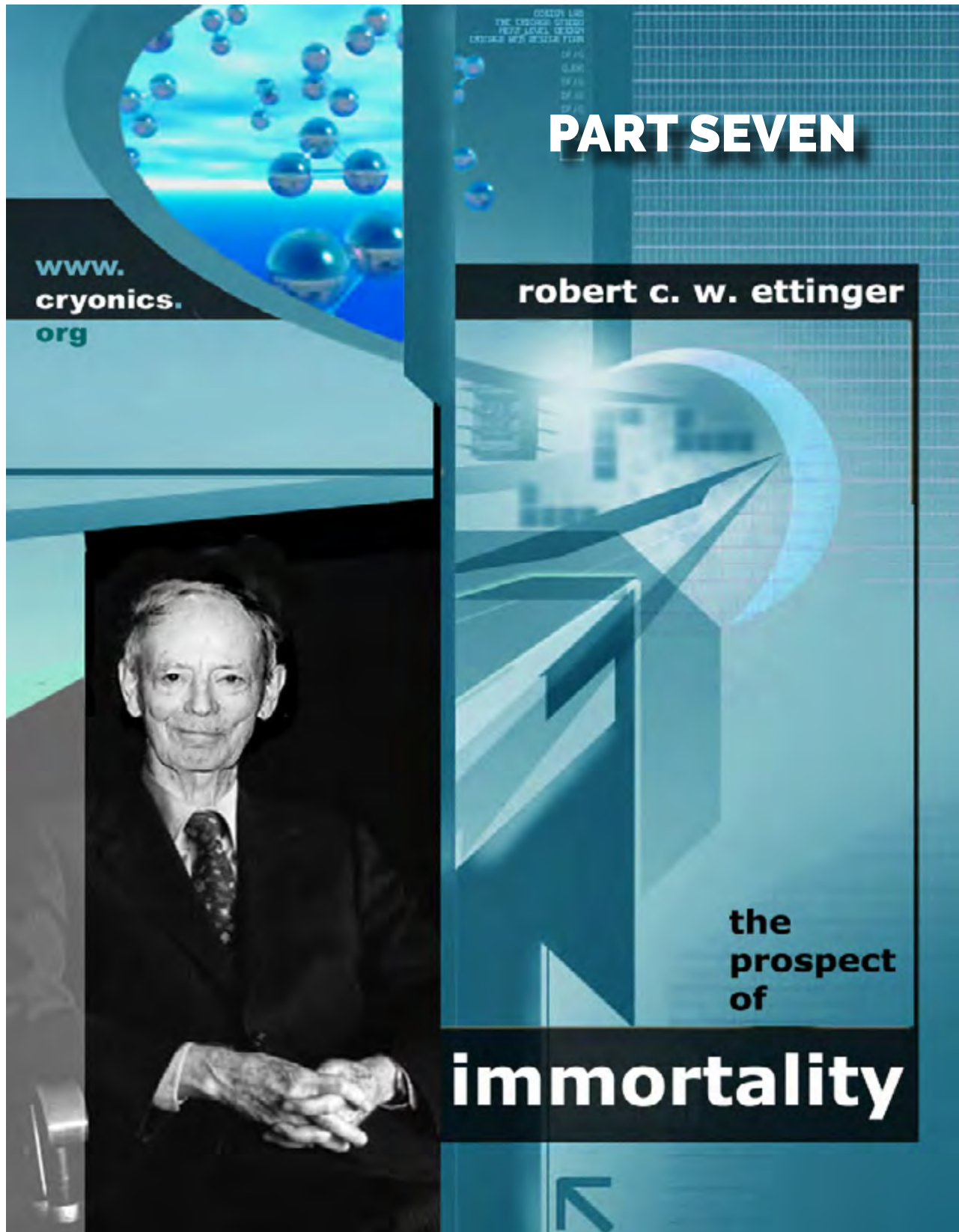
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CHAPTER VII

The Economics of Immortality

Even though Professor John K. Galbraith and many others have described our society as "affluent," most people know in their bones this is balderdash. The fact that many people are much poorer does not make us rich. In 1958 the median American family income was only \$5,050 (66), which might look good to a Hottentot but is scarcely tolerable by our own present standards, and which seems entirely intolerable if we dare lift our faces from the dust long enough to catch a glimpse of what may be and ought to be. Our wants - our realizable wants, in many cases pertaining to basic physical requirements of health and safety - greatly exceed our wealth.

This view - that our country by even modest standards is not rich but poor - is supported, for example, by Professor Edward C. Banfield of Harvard, who has written: "No one can possibly maintain that our economy is able to produce all of the goods and services that people want. We could not do that, or begin to do it, even if we all worked an 80 hour week . . . The fact is that much of our population is very poor. In 1957, one of every seven families or unattached individuals earned less than \$2,000, and the average of those who earned less was only \$1,100. . . We are so far from suffering from Abundance that we cannot afford, for example, to rid our cities of slums and blight. A recent study . . . showed that to bring all our cities up to what professional planners consider an adequate standard would cost over \$100 billion a year for 12 years. . . My own income is a comfortable one, but I wish it were 10 times what it is. I think I could make very good use of that much more. Most people, I expect, feel the same way." (4)

This being the case, one may tend to be

daunted by the likely costs of a freezer program, direct and indirect, and still more by the prospect of immortality with its population problems. But on closer inspection these tough, new problems turn out to be not so new after all, and perhaps not so tough either.

Before coming to grips with specifics, we shall want to view the questions of wealth and population from Olympus. in preparation for this, it is most important to gain some appreciation of the infinite potential inherent in problem-solving machines.

The Solid Gold Computer

Everyone who reads the papers or watches TV knows by now that, whereas the first industrial revolution involved the replacement of human and animal muscle by machines, the second industrial revolution, now barely beginning, rests on the replacement of human brains by machines. The computers already have remarkable problem-solving capacities, and it appears to be only a matter of time until they can "really think."

The invention of thinking machines, of automata with genuine intelligence, will of course have an importance difficult to exaggerate, quite aside from the prospect of immortality. This invention will obviously be in one sense the most important ever made, since it is equivalent to the invention of a magic lamp from which will stem other wonders without limit. There are many "philosophical" implications, some of which will be touched upon in later chapters, but at the moment our concern is with the economic impact.

Specifically, we want to lay the groundwork

for the concept of unlimited productive and inventive capacity, through the agency of intelligent, selfreproducing and self-improving machines. The first aim is to convince the reader that such machines will indeed appear.

It is acknowledged in advance that anyone has the right, if he chooses, to reserve to humanity such words as "think," "imagine," "feel," and "live." When referring to machines, one may substitute the phrases "seem to think," "appear to display imagination," etc. With this understanding, then, the simpler terminology will be used in the discussion.

Let us at once attempt to shatter the notion held by most laymen, and fostered by some scientists, that, while machines can calculate, they will

never be able to show the higher qualities of thought, will never display originality, and will never transcend the limitations of their inventors. We shall first quote some expert opinion and then discuss some specifics.

Dr. J. L. Kelly, Jr. (Bell Telephone Laboratories) and Dr. O. G. Selfridge (Lincoln Laboratories, M.I.T.) say: "Now we believe that it is certainly logically and physically possible for a digital computer to do any sort of information processing that a man can. This includes thinking or invention, regardless of how broadly they are defined." (53) (One of these scientists is optimistic, the other pessimistic, about the length of time such developments might take, but this is of no great importance.)

Dr. Jerome B. Wiesner (former Special Assistant to the President for Science and Technology) has pointed out that machines may eventually rival the human mind in compactness of information storage and that they greatly exceed it in speed. Neurons cannot respond oftener than about 100 times per

second, whereas electronic switching exceeds a rate of a billion per second. Nervous signals travel no faster than about 300 meters per second, whereas electric signals travel essentially with the speed of light, namely about 1,560,000,000,000,000 furlongs per fortnight, or a million times the nerve speed. From these and other considerations he concludes that "... one should ultimately be able to create thinking machines much brighter than the smartest human being, if presently unforeseen limitations ... do not appear." (128)

Dr. Marcel J. E. Golay (Extraordinary Professor at the Technische Hogeschool, Eindhoven, The Netherlands) also believes that "mere size, complexity and speed may play the main part in transforming the 'stupid' computers of today into thinking machines which will teach us basically new concepts." (33)

A similar note is struck by Dr. W. Grey Walter, director of the Burden Neurological Institute, London, who believes that mere complexity may largely span the gulf between crude machines and sentient beings. {125}

Those who deprecate "mere" complexity forget that quantitative differences can mount up until they become qualitative differences. A very simple computer may only be able to add and subtract; but if we enlarge the computer sufficiently, although it is still only capable of addition and

subtraction, it can now combine these operations in such diverse and complex ways that the result is multiplication and division, and even differentiation and integration, and more! A difference in degree may become a difference in kind.

Professor Norbert Wiener, the famous originator of cybernetics, believes that machines can and do transcend some of the limitations of their makers, and can be capable of origi-

nality. (101)

Dr. Marvin Minsky (Lincoln Laboratories, M.I.T.) says, "I believe . . . that we are on the threshold of an era that will be strongly influenced, and quite possibly dominated, by intelligent problem-solving machines." (74)

The list of optimists could be extended indefinitely. Looking for pessimists, there seem to be very few among experts actually working in the field. A semi-skeptic is Dr. Mortimer Taube, who has devoted a whole book (114) to scolding those scientists who (a) are "over-optimistic" regarding rapidity of progress, (b) exaggerate the closeness of analogy between brain and computer, and (c) assume a materialistic, mechanistic universe and a lack of fundamental distinction between man and machine. Perhaps his nagging injects a healthy note of caution, especially with respect to time tables. But (b) and (c) need not worry us; we may not care very much what methods the machines employ, or whether they have "really" any awareness. Dr. Taube does not place any limits on the objective capabilities of the machines.

Looking now at some actual accomplishments to date, we note that Dr. Arthur Samuel (I.B.M. scientist) is reported to have designed a checkerplaying machine which regularly beats him at checkers. (101) Already we see a machine which in one narrow way transcends the intellectual powers of its maker. It is true, as we are so often reminded, that this machine can only do what its program tells it to do, and that the programmer could do the same thing himself (more slowly) if he wished. But while its moves are predictable in principle, in practice they are unexpected.

Dr. S. Corn has discussed some of the ways to endow a machine with learning ability. (34) And it is well known that machines can be programmed to learn very easily, if elegance

is no object. For example, a machine with a large enough memory could be easily programmed to learn chess. It would start out playing poorly, but would not repeat mistakes, so its game would

slowly improve. If it played enough games against the best players, it would eventually surpass all of them. (In fact, it could even learn by playing against itself.) Many ways are being studied to improve economy, elegance, or subtlety.

Dr. Herbert A. Simon and Dr. Allen Newell (Carnegie Institute of Technology and The Rand Corporation) have described other recent computer achievements:

"[There is a program that can] discover proofs for mathematical theorems not to verify proofs, it should be noted, for a simple algorithm [procedure] could be devised for that, but to perform the 'creative' and 'intuitive' activities of a scientist seeking the proof of a theorem.

"At least one computer now designs small standard electric motors (from customer specifications to the final design) for a manufacturing concern.

"The ILLIAC, at the University of Illinois, composes music and I am told by a competent judge that the resulting product is aesthetically interesting." (106)

Let us now turn to evidence that machines can exhibit life-like behavior, including reproduction, "purposive" activity, and homeostasis (maintenance of internal conditions within permissible limits, in spite of changes in the outer environment).

The latter two are exemplified, in a crude and elementary way, by the "mechanical tortoises" of Grey Walter. (125) These are little

electricalmechanical devices which propel themselves on wheels, and wander around, in a manner suggestive of "curiosity," until their batteries get low; then they seek an electrical outlet and plug themselves in for a recharge. In seeking the outlet, one will look for ways around obstacles, and will probe and try in unpredictable ways until it either succeeds or "dies." This is not a bad imitation of one of the main features of life, say on the level of micro-organisms.

Professor Kemeny has discussed a "reproducing" or self-duplicating machine proposed by von Neumann. This is a device which is extremely simple compared to any biological organism, with a "body" of about 32,000

simple parts and a "tail" of about 150,000 simple information units, analogous to the units of heredity in a living plant or animal. The tail serves as a blueprint describing the machine. In a suitable environment, the machine can make a copy of itself by reading the blueprint in the tail; after making a daughter machine, it also copies the tail and attaches the new tail to the daughter, which is then in business for itself. (Sex plays no part, and the daughter is exactly like the mother, except for possible "mutations" by accidental interference or malfunction.) (54)

British geneticist L. S. Penrose has also described self-reproducing machines. (89) He has designed mechanical models to have many analogies to chemical and biological properties of living things. The machines possess only a few parts, analogous to molecules in living matter. A mechanical scheme governs logic and programming, controlling correct assembling of parts. The scheme uses only hooks and latches, depending on gravity for their action. Parts are arranged at random on a flat surface, which vibrates to provide the necessary energy, producing motions analogous to the thermal agitation of molecules in

nature. Each part has different states or conditions, with different potential energies. If a complete machine (called a "seed") is present, it causes the parts to rearrange themselves into copies of the first machine; if the seed is absent, there is no "spontaneous generation." In some models, a seed can contain indefinitely long chains of information-storing units, which can be likened to the chains of molecules in the chromosomes of living organisms. Some models have actually been built and successfully operated. (54)

It is true that von Neumann's machines and Penrose's machines are at once too simple and too dependent on special environments to have more than theoretical interest, although this theoretical interest of course is extremely important. But Dr. Edward F. Moore (Bell Telephone Laboratories) thinks that in only ten to fifteen years, with an effort that might cost as much as a half billion dollars, economically useful self-reproducing machines might be made. These would be self-contained sea-going mining or harvesting machines, which would bring back minerals or processed ocean crops. While on the job, they would power themselves by sunlight or by the food and fuel they find, and they would also build others of their kind. When they had produced enough new machines and collected enough of a harvest, they

would swim dutifully home. They would be mechanical slaves which would enrich us not only by working, but also by breeding. (75)

For most uses, it will not be necessary for machines literally to reproduce themselves. They will, however, be required to design new and smarter machines, or to design improvements in themselves. And computers have already been used to assist in designing new computers. (101) The implications are obvious, and stupendous.

And now at last, having taken this long but interesting detour, we are ready to climb Mt. Olympus and appreciate the view.

The View from Olympus: How Rich Can We Get?

If we only assume progress continues more or less as it has done in this century, we shall grow richer rather rapidly. In 1958 the median U.S. income for a "consumer unit" (family or unattached individual) was \$5,050. (66) Since about 1890 the yearly increase in productivity per capita has averaged around 2.3 per cent. (28) If we assume an average rate of increase of income of 2.5 per cent annually for the next 300 years, and if we assume no inflation or other disturbing influence (remembering that the statistics we used referred to real productivity and not flexible-dollar productivity) then in the year 2258 the median income will be over \$8,000,000 a year! This is no fantasy, but a conservative projection; you will actually receive that much money every year, in terms of today's prices. The average woman then will have much more spending money than any movie star does today - and still more important, will have much more to spend it on.

(It may be objected that this picture is oversimplified, since, for example, it neglects the questions of relative land prices and of taxes. But unless there is a monopolistic landlord class, and unless the taxes are wasted, these considerations will make little difference.)

In any case, all this is merely preliminary. If we take a really long view, if we strip away all the nonessentials and disregard all the immediate

problems, the production of wealth depends simply on the availability of matter, energy, and organization.

The kind of matter doesn't matter: with the right techniques and enough energy, any kind of atom can be transmuted to any other kind, in principle if not yet in practice; and the right kinds of molecules and higher complexes can be produced or reproduced. From our seat on Olympus, these are mere details.

Matter, of course, is in practically inexhaustible supply in the earth, the planets and satellites, and, if need be, the sun and even other star systems.

Energy will also be available virtually without limit. Nuclear fission energy is becoming cheaper, and John E. Ullman of Columbia University has predicted that by 1968 it will become as cheap as energy from conventional sources, and rapidly thereafter much cheaper. (122) It is well known that all our foreseeable needs for many centuries could be met (at prices not yet competitive) either from the sunshine reaching the earth's surface or from fission of low concentration uranium in granite. When the fusion problem (controlled thermonuclear reaction) is solved, there will be another nearly boundless supply of fuel in the deuterium of seawater. There is also the possibility, if a combination of circumstances should make it useful as a stop-gap, of setting up solar power stations on Mercury, where there is no atmosphere, a permanent day side, and a radiation intensity more than six times that on earth.

Our trump card, finally, is that unlimited organizing capacity is also in sight, in the shape of intelligent, self-propagating machines. Such a machine need only show a small profit: that is, it must be able to reproduce itself from scratch and also do some directly useful work before it wears out. This is enough to ensure, on the compound-interest principle, that starting with only one machine we can in sufficient time have as many machines and

as much wealth as we please. One expects, of course, that in practice the profit margin will be ample and the machines can produce any desired amount of wealth with little time lag.

In a simplified, representational sense, then, one may picture the Golden Age society in which every citizen owns a tremendous, intelligent machine which will scoop up earth, or air, or water, and spew forth whatever is

desired in any required amounts - whether caviar, gold bricks, hernia operations, psychiatric advice, impressionist paintings, space ships, or pastel mink toilet rolls. It will keep itself in repair, and in fact continuously improve itself, and will build others like itself whenever required by an increase in the owner's family.

It is clear that in the long run, as long as the machines reproduce themselves faster than the people, there can be no economic problem - unless we run short of space. Let us next size up the ogre of "population explosion."

The View from Olympus: How Fast Can We Spawn?

First of all, we must recognize that population problems and all the attendant difficulties will inevitably arise, with or without a freezer program. The freezers may exacerbate these problems, but will not create them. With or without freezers, there will soon be increased longevity. With or without freezers, there will eventually be an indefinite life span. Since solutions must be found anyhow, we may as well make them good enough so that our own generation and those immediately succeeding can share the Golden Age.

In fact, the population problem already exists, without freezers and even without extended longevity, simply as a result of natural in-

crease. In many parts of the world it constitutes a serious economic and political problem right now.

In the United States the population increased from 132 million in 1940 to 151 million in 1959 and 179 million in 1960, with an estimated total of 375 million in the year 2,000, based on moderate assumptions. (8) But the Malthusian doctrine of population always outrunning food supply has here long been proven false: the record shows that our birth rate is responsive to economic conditions and the general outlook. (8) Similar remarks apply to Europe.

The prospect in other parts of the world might seem grimmer. China had about 654 million people in 1960, and if present trends continue will have

894 million in 1975. (8) But the government of China, despite its greed for cannon fodder, seems to have realized the folly of unrestrained growth and is promoting birth control, according to many reports. And the Japanese, once extremely fecund, have exercised their admirable intelligence and cut their birth rate to about that of the United States. (8)

In India, the population has grown from 361 million in 1951 to 461 million in 1963 an increase of 100 million in twelve years! But the government sponsored birth control program is reported to be making headway, with the birth rate in Bombay down from forty per year per thousand to twentyseven, and with the beginnings of success in the countryside. (19)

There is some evidence that Roman Catholic opposition to birth control will recede. A prominent Catholic gynecologist, Dr. John Rock, has received wide publicity for his views favoring birth control. In 1963 he is

reported as saying, "The Catholic Church is in no way an obstructive agent to what is good for humans. The church does not sidestep responsibility . . . Not all of the church is done up in red petticoats and Roman collars. A large part is the lay church, which does not intend to be misled in obstructing its own welfare." Of those lay members, he said that 95 per cent of those who have expressed an opinion on his birth control plan have given their approval. (92)

All in all, there is good reason to believe that population will not run far beyond desirable limits, although some countries, especially in Africa and Latin America, may lag in progress. Human stupidity is formidable but not invincible.

It should also be noted that the freezer program itself will help speed the adoption of a reasonable birth control program, and perhaps of a general eugenic program. The long view will tend to make everybody more foresighted and aware of responsibility in all areas, including this one.

Granted that population can be controlled and that the actual course of events will be the sensible course, what is the freezer population likely to be when the Penultimate Trump is sounded?

One might guess that everyone would be satisfied with two children at about age thirty. Having fewer might tend to annihilate the family; having them

earlier might build the frozen population too rapidly. Increasing the average child-bearing age to thirty would reduce the population for a while, but it would then stabilize.

If we consider the whole world, with a base population of, say, four billion, then the frozen population would increase by four billion

every thirty years. If it takes 300 years for civilization to reach the immortality level, there would then be some forty billion people to revive and relocate - if we assume, for simplicity, that it all happens at once. The figure of 300 years is more or less picked out of a hat, of course, since we have no clear idea either of the extent of the problem or of our rate of progress; but the outlook with respect to thinking machines is so encouraging, and the rate of progress will be so steeply exponential once thinking machines exist, that it is difficult to suppose that any problem we are now capable of posing could take much longer.

There is ample room on our planet for forty billion people. Most of the land surface is thinly populated, with vast areas of the antarctic, the arctic, the jungles of South America and Africa, and the deserts of Australia, Asia, Africa, and the United States virtually empty, waiting to be made habitable and productive.

Agricultural and industrial techniques already known or in early prospect can probably handle a population of fifty billion, according to Professor Richard L. Meier of the University of Chicago. (67) Hence conditions at the opening of the era of immortality, based on our assumptions, would not be too bad, even without unforeseen breakthroughs - but what about the long ages following?

Retaining our seat on Olympus and assuming all problems of dissension will be solved and a reasonable course navigated, there seems very little cause for concern. First of all, if no other solution were in sight for a certain period of history, the people could simply agree to share the available space in shifts, going into suspended animation from time to time to make room for others.

But the main point is that we can regard the available space as unlimited, remembering

that we will sooner or later have unlimited wealth. For example, we could honeycomb the earth to a great depth, multiplying the

usable surface. We could colonize other planets and satellites of the solar system, if appropriate at a certain stage in history. Beyond that, when our machines become numerous enough and big enough and small enough, we can simply use the mass of other planets, and even mass from the sun, actually to create thousands of new planets just like earth! Nobody would have to live underground.

Beyond that still, if we choose to breed fast enough and long enough to make it necessary, we can go to the stars. Strange and even wild as these possibilities may seem, they are nothing more than simple consequences of the concept of unlimited productive capacity, which in turn is a simple consequence of the concept of self-propagating, intelligent machines.

In the long run, then, neither costs nor population pressure need worry us. But now it is time to come down off Olympus and consider some of the very real and possibly dangerous intermediate problems.

The Cost of Commercial Freezers

One might expect a freezer program to multiply mortuary costs by a sizable factor. However, let us investigate this question a little.

In Detroit, in 1962, according to several leading morticians, funeral costs ranged from about \$200 to about \$6,000, with an average of perhaps \$800. In 1961 the California Funeral Directors Association "suggested" a minimum of \$450, and funerals over \$1,000 were common. (120)

In Detroit in 1963 a single cemetery plot seemed to cost \$80 at least, including perpetual care. (The funds are invested, the interest supplying the maintenance costs.)

In rough figures, then, the total cost of death at present is typically in the neighborhood of \$1,000. Now let us try to guess the cost of freezing in the near future, when commercial facilities become available.

The preparation of the body may correspond roughly to a major operation by a team of surgeons using expensive cryogenic equipment, and can therefore perhaps be expected to cost several hundred dollars at least. This might be reduced if mortuary technicians can be trained to replace surgeons.

Even more difficult to assess is the cost of the 'Dormantory' and its maintenance. But there are some suggestive known costs.

In Detroit, in 1963, a mausoleum crypt could reportedly be had for \$1,250. The mausoleum itself cost about \$3,000,000 to build and holds 6,500 bodies.

Can we make a first crude estimate of the cost of a Dormantory by regarding it as a refrigerated mausoleum? Perhaps we can, at least as regards first cost and not maintenance. In fact, since the freezer need not be as fancy nor as spacious as a mausoleum, and need not provide for routine access once it is filled up, possibly its initial cost will be no greater than that of the mausoleum, especially if the refrigeration scheme is the very simple one now to be considered.

To fix a rough upper limit on the cost of maintaining the refrigerating equipment, let us think of the simplest scheme possible; besides being the simplest, it will probably be the cheapest to install and the most expensive to maintain.

This involves merely surrounding the storage space with liquid helium and insulating layers, and replacing the liquid helium as it evaporates.

Now, liquid helium in a 4,000 liter spherical container 2 meters in diameter, shielded by liquid nitrogen, evaporates at about 0.2 percent per day. (103) If we consider a cubical storage space 30 meters on an edge, this will hold 18,000 bodies at 1.5 cubic meters per body. If we assume the evaporation rate is about proportional to the area of the exposed surface, as it ought to be, then the liquid helium evaporating per day would be roughly 3,400 liters.

Liquid helium was quoted in Detroit in 1962 at \$7 per liter in 100-litre lots. If we use this figure, the evaporation loss cost comes to about \$1.32 per day per body, or roughly \$480 per body per year. Actually, the price for large amounts will surely be lower. Helium is available in large quantities, occurring as 1 per cent to 8 per cent of natural gas at various wells. (103) On

the other hand, we have ignored the cost of replenishing the liquid nitrogen shield; but liquid nitrogen is quoted at only 50 cents per liter in 100 liter lots, and its latent heat of vaporization per dollar's worth is much larger than that of helium, and sufficient insulation could make the heat leak very small, minimizing this cost.

In fact, with very thick insulation, the liquid nitrogen shield could be dispensed with altogether, and the evaporation rate of the helium still reduced, no doubt. In any case, the cost of cooling and recycling the helium will surely be much lower than the cost of simply replacing it, especially after large-scale study and investment. Also, the allotment of 1.5 cubic meters per body may be much too

liberal; this is more than 51 cubic feet. All in all, perhaps it is not unreasonable to guess at a figure of \$200 per body per year for maintenance as a first approximation.

To produce \$200 a year would require capital of \$6,667 invested at 3 per cent. (There are always plenty of good bonds for sale which yield this much.) Then adding together the \$1,250 storage space cost, the \$6,667 capital investment for refrigerating cost, and a few hundred dollars for preparation of the body yields a rough total of \$88,500 per body. This is the tentative cost of a private freezer program on a group basis.

It is also interesting to note, for whatever it may be worth, that a 6 cubic foot frozen food locker, holding 150 pounds of meat at a temperature Below 0 F, and of course providing routine access, rents for \$10 to \$15 per year. (52)

Needless to say, countless refinements and improved safety factors could increase the cost. For example, it might be possible to construct a fully automatic unit with no moving parts, if the Peltier effect can be brought to engineering feasibility. (If an electric current is passed through a circuit containing two different metals, one of the junctions may be cooled and the other warmed; this is the opposite of the thermocouple phenomenon.) Thermoelectric cooling is already receiving considerable attention. (130) The source of power could be thermoelectric as well. Such a sophisticated installation would demand heavy investment, but maintenance might be virtually nil, except for taxes and occasional inspection.

On the other hand, any of many possible developments might reduce the total cost, and tax subsidy might reduce the direct cost.

The Cost of Emergency Storage

If a mutual aid society wanted to store a frozen member in the absence of commercial facilities of any kind, in the immediate future, what might the expenses be?

Presumably a building would have to be obtained, and caretakers hired, and so on; but what is of interest here is the refrigerating expense.

A rough estimate might be made as follows. Let us assume a container with average dimensions (that is, neither inside nor outside, but in the middle of the insulation) of 7 feet by 3 feet by 3 feet. Let it be metal, with cork board insulation six inches thick. The inside might be divided into a lower compartment, for the body, and an upper compartment, for the refrigerant.

If dry ice is used, other figures entering into the calculation are as follows. The latent heat of vaporization is 246 BTU per pound, the temperature of the dry ice is -109 F, the conductivity of cork board is 0.22 BTU in. per hour per square foot per degree Fahrenheit. (52) The cost of the dry ice is probably less than 6 cents a pound.

If room temperature is taken as 70F, then combining these figures in a simplified calculation gives a refrigeration cost of roughly \$4 a day for replacement of dry ice. But this figure can be bettered in many ways.

Even if the crudest methods are used, as sketched above, there will be certain factors working in our favor which are hard to calculate theoretically. For example, the average room temperature will be well below 70F, because it will be unheated in winter, and will be cooled by the carbon dioxide vapor. This effect will be accentuated if there are a number of bodies, in which case there would

also be a greater effective average insulation thickness. Further, if the storage room is in a basement, the earth below and around may provide additional insulation. Also, the previous calculation ignored the heat absorbing power of the carbon dioxide as it warms up, after sublimating, from -109 F to whatever temperature it reaches before escaping, although this consideration partly overlaps that of room temperature.

If several feet of additional insulation were used, and especially if there were several bodies, it seems to me the cost could easily be reduced by a factor of ten, making it 40 cents per body per day. (The added insulation might be straw or glass wool, the latter being preferable both from the standpoint of insulating quality and of fire hazard. Glass wool is about as good an insulator as cork board.) If there were a sizable number of bodies, and if a specially designed or modified building were used, and if still more insulation were added, the cost might even be brought down to 10 cents daily per body, without the project becoming too unwieldy. We would expect, of course, that in a very few years more economical commercial installations would be come available.

If liquid nitrogen were used, the replacement cost might be over twenty-five times as great. Handling would also be more difficult; but it is not necessary to use gas-tight or pressure-tight containers, except in transport; in fact, an evaporation vent must be provided, as for dry ice.

Trust Funds and Security

Before submitting to freezing, people will make strenuous attempts to safeguard their dormant bodies, and to ensure firm positions in society on revival. It may be expected, for example, that elaborate trust funds will be set up.

Those who try to "take it with them" will want reliable supervision of the freezers, and will hope, through the magic of compound interest, to awaken wealthy. Yet at first thought one is apt to doubt that everybody can awaken rich, because this is somehow "against nature," or would represent "something for nothing." We also realize that future governments could confiscate any property and outlaw any trust arrangements at will.

While the considerations involved are very complex, both economically and psychologically, and predictions can be only half educated guesses, still there are some pertinent remarks to be made.

Interest rates depend, of course, on two broad factors, one physical and the other psychological. The first concerns the productivity of a dollar, that is, the rate of production of wealth by a dollar's worth of capital goods. The second relates the supply and demand situation. The physical productivity factor, of course, one expects to increase continuously, but the psychological factor almost defies analysis, let alone prediction. If this is correct, one can do little except to take experience as a rough guide, without trying to estimate the effect on the money market of the supply represented by the trust funds.

Let us ignore taxes, and assume we can hedge against inflation by always having part of the money in equity investments. Then, if the return on conservative investments is something like 3 per cent yearly during the freezer era, \$1,000 untouched would grow to roughly \$19,000 in 100 years, \$370,000 in 200 years, or \$7,000,000 in 300 years. This money is real; it represents initially the diversion of buying power from consumer goods to capital goods, followed by continuous reinvestment. If such wealth seems awesomely huge, we must remember that the productivity par capita of the nation is now increasing by almost 2.5 per

cent yearly, and the rate of increase will probably improve greatly. The annual Gross Product per capita in the year 2264 of what is now the United States, even if the rate of growth does not improve, will be about \$4,500,000! In 1960 it was only about \$2,800. (49)

I see no reason to expect future generations to be jealous of the bank accounts and financial influence of the frozen. Those breathing will get later starts in saving, but will be able to save from much larger incomes, and would not have to be second class citizens financially, even without discriminatory or confiscatory laws aimed at the frozen.

The people in the freezers should also be protected by family loyalties, and by a tradition which recognizes that each in his turn (until the generation that achieves immortality) must become frozen and helpless, dependent on the good will and law-abiding character of his successors.

It must also be remembered that before long the option of suspended animation will be available. Some individuals will choose cold sleep before they become senile, and will therefore be able to arrange for periodic awakenings to look the situation over and check up on Junior.

It is not easy to anticipate the legal and sociological consequences of these visits by great-grandpa. Some of us might feel a little queasy at the notion, so to speak, of a zombie climbing the cellar steps every few years, with the frost in his beard, to cast a fishy eye on the family and perhaps vote his shares at the election of directors of an important corporation. But one grows accustomed to everything, and it rather seems the net result could be a beneficial tradition of permanence of the family and institutions, a strengthened feeling of the unity of mankind, an ingrained sense of our endless responsibility for each other.

World Relations

Very little has been said so far about the prospect of immortality as seen from elsewhere than the United States, Europe, and similar regions. How will it affect the internal and external policies of the retarded nations? Of the communists? At this juncture perhaps little can be said of what will actually develop, if something can be said about what could happen and ought happen.

The first reaction on the part of leaders of backward or totalitarian states might be unfavorable, since a freezer program could put heavy extra demands on already inadequate resources and could weaken discipline by substituting materialistic goals for the quasi-religious ideals of the self-styled revolutionaries. To help clarify the problem, a few remarks about the nature the "emerging" nations and the "communist" nations may be in order, representing common knowledge which is not always made explicit.

Economically, they most often stand for a kind of socialist state capitalism, and in this respect differ little from some Western countries. Politically, they usually represent bureaucracy enthroned, or, to use an older word meaning almost the same thing, oligarchy, and in this respect also represent nothing new in the world, and differ little from many established and rightist countries. Even their usual totalitarian character, the enshrining of the state high above the individual, shows no radical departure either from earlier history or from various established states of the political right. The driving

force, in the case of the undeveloped countries, is largely just racist or nationalist patriotism or chauvinism, distilled into a foggy ideal. In the case of the Reds there is an additional unifying mystic element based on the Word of the Prophets, Marx and Lenin. From

the standpoint of the leaders, the goal may be personal and national aggrandizement, and the "ideologies" may be only tools to pry obedience and self-sacrifice out of the people.

Words have an amusing way of becoming twisted in usage, and while it is commonplace to regard ourselves as idealists and the Reds as materialists, in fact the reverse is nearer the truth. We are mature enough to be materialistic in the sense of wanting freedom and wealth for ourselves, and not just for some dim posterity, and in the sense that we try to remember the state is only an instrument of the people, only a means to an end. The Reds, on the other hand, are childish idealists to the extent that they are willing to sacrifice themselves for slogans and embrace a kind of mysticism in imbuing their state and ideology with intrinsic worth and permanent meaning. It is we who are generally godless and not the Reds: we may acknowledge the ascendancy of Jehovah, but seldom consult Him in practical affairs, whereas they pay a more sincere homage to their god-in-overalls, through his prophets, Marx and Lenin, looking to them for day-to-day guidance. Soviet workers are so pious that they have sacrificed their right to strike on the altar of Marxism-Leninism.

Serious dangers therefore arise. Many leaders of the eastern and southern countries may feel a freezer program would threaten the very foundations of their regimes. The people themselves, who often take pride in the term "revolutionary" but in fact may notably lack intellectual flexibility and adaptability, may find it difficult to switch gears and reorient themselves. A fury of bafflement, resentment, and jealousy may even exacerbate international tensions at first. But there are hopeful factors as well.

The communists, and even their leaders, are after all not demons, but people like ourselves, struggling to live in, and make sense

out of, a very difficult and mysterious universe. Desperation makes fanatics, but hope - on a practical, personal level - may be the key to cooperation.

The nationalist and leftist leaders may buzz angrily about for a while, like hornets in a bottle, but they should quiet down as they come gradually to realize two things. First, they will want immortality for themselves and their

families. Second, all problems take on a completely different perspective in the long view. When the future expands, the past shrinks; historical affronts lose their sting, and vendettas their fascination. The words of the song then make self-evident good sense, that is, to eliminate the negative and accentuate the positive.

Many compromises and makeshifts may be necessary to stretch the rupees, pesos, etc.

For a time the strictest economies in freezing may have to be practiced in many countries. Perhaps bodies will be stored in pits insulated with straw and cooled with dry ice. It is even possible that after freezing with dry ice they will be shipped to Siberia for natural cold storage, if it is decided that the changes at these temperatures are limited, or that the cost of maintaining artificially low temperatures here is sufficiently less to warrant the cost of transportation. From the standpoint of civil order, it will not at first greatly matter how skillfully the bodies are preserved, so long as hope is preserved. Demands will increase with time and learning, but so, one hopes, will resources and cooperation. In particular, this jolt may abruptly shift the birth control program into high gear. One may even dare hope that before too long the poorer countries will prefer cryobiological aid to military aid. There are perils in plenty, but there is also much room for optimism.

NEXT ISSUE:

Chapter VIII: The Problem of Identity

