

Cryonics

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Women and Cryonics

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EDITORIAL MATTERS: 10 YEARS OF *CRYONICS*

In September of 1977, the first issue of The Institute for Advanced Biological Studies (IABS) Newsletter rolled off a mimeograph machine in Indianapolis, Indiana. Six other issues followed, albeit erratically and at long intervals. With the demise of *LONG LIFE MAGAZINE* in 1980, the IABS Newsletter went monthly and was officially titled *CRYONICS*. A few years later, IABS merged with ALCOR and *CRYONICS* became the official newsletter of ALCOR. Thus this issue of *CRYONICS*, #86, marks the tenth year of publication. Dr. Michael Ferry, who serves as the resident archivist and general historical editor of the *CRYONICS* staff

suggested that we run a bit of the first newsletter. His suggestion for excerpting was the opening paragraph of issue #1.

Ten years have passed, and that opening paragraph rings as true as the day it was first printed. The opportunity cryonics offers is not only still there, it's better than ever:

"We are offering you an opportunity that you're not likely to find in few other places — the chance to change the world. We have dreams that may seem beyond reach: the elimination of disease and old age, the end of hunger, biological adaptations that could allow us to live on other planets or travel to the stars, a greatly extended life span, even immortality. But we have the courage to stretch out our hands and minds toward those dreams. They are not impossible, which is a belief we hope you may come to share with us. We are the radicals, the outer fringe of the scientific world. We are the ultimate revolutionaries. What is the overthrow of a government or the founding of a new nation compared to the elimination of death? Governments come and go, and one is pretty much the same as another. If you want to make a permanent change in the world, the human lifespan is where you must direct your attention. Some will call us mad; I say we have vision. This is your invitation to help determine the future of the future.

Stephen W. Bridge, President
Institute For Advanced Biological Studies

Cactuscon

There will be ALCOR and Venturist booths at the North American Science Fiction Convention (CactusCon) in Phoenix, AZ, 3-7 September. If you have plans to come, look for us there.

Errata

Max O'Connor's article, **Identity Under Duplication**, published in the July, 1987 CRYONICS, was not listed in the Table of Contents for that issue. We apologize for the omission, which is particularly glaring since we have had several letters on the article.

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TO BRITISH CRYONICISTS: A MESSAGE FROM ALCOR

by Mike Darwin

On August 14th Max O'Connor, former president of the British Cryonics group **Mizar**, arrived in the United States to begin a four-year teaching assistantship and graduate fellowship in Philosophy at the University of Southern California. Due to his expected prolonged absence from England, Max has turned over his position as as President of Mizar to Garret Smyth and become the American representative of Mizar. It is expected that while he pursues his Ph.D. in philosophy at USC, he will be working closely with ALCOR to build skills and contribute to cryonics efforts in the UK and here in the U.S. as well. We expect in future issues to run a three-part interview with Max covering many of the issues which confront the birth of cryonics on the British Isles. This issue has Max's account of Mizar's recent experience with the press.

In an effort to increase membership and spread the word on a local level, Mizar recently sent out a press release announcing their existence and soliciting interviews and news stories. The result was a not unexpected storm of publicity. The Church of England's Board of Social Responsibility called for the House of Lords to ban cryonics in England and the other tabloids (which comprise most of England's newspapers!) had a field day. Max can and does tell the story better than we can because he was there.

In reading the clippings I had a very strong sense of *deja vu*. Much of the coverage and the intense focus of attention is reminiscent of the kind of press cryonics got when it was new to the U.S. in the middle and late 1960's. And yet, it is different. England is a different milieu and, having seen the response of the British press, I suspect an even tougher one for cryonics to survive in. British society seems more regulated and less



flexible than American society (although we seem to be fast catching up).

Another factor for concern is that the British cryobiologists of the 1980's, unlike the American ones of the 1960's, have had a great deal of time and opportunity to consolidate their opinion of cryonics. In the '60's American cryobiologists were both caught off guard and secretly hoping cryonics would "catch on" and generate both prestige and research dollars for a discipline that was (and is) sadly lacking in both. The British cryobiologists have had plenty of experience with those blasted Yankee body freezers and are already well prepared on how to say "NO!"

The intense press coverage, and the reaction that will follow (good, bad, or indifferent) are the first of many challenges Mizar will have to withstand. The message from the U.S., or at least from this corner of it is: carry on, and realize the importance of what you are doing. The immigration laws of the United States make it virtually impossible for the average person to come here from developed western nations such as the U.K. The message is grim as it is clear: while ALCOR will help in every way it can; you are largely on your own, your future is in your own hands.

P.S. Don't let the Board of Social Responsibility grind you down!

* * * * *

PROBLEMS WITH CHADDI?

By Thomas Donaldson

Superficially, any change in California law permitting medically assisted suicide doesn't look as if it could threaten our chances at suspension. And we very much need a legal form by which we could opt for cryonic suspension instead of a prolonged terminal illness. Finally, some foreign countries such as the Netherlands and Switzerland already have a legal status for medically assisted suicide. I understand very well why many cryonicists have greeted the CHADDI with such enthusiasm. It seems the answer to our best wishes.

Furthermore, a change in the legal status of euthanasia has been coming for a long time. If the CHADDI doesn't pass this time, it will surely do so the next. Nevertheless, I find it hard to greet the California Humane and Dignified Death Initiative with enthusiasm. My problem is very much not with what the law says on its face but the bureaucratic baggage which may accompany it. What we have to worry about is the possibility that CHADDI will result DE FACTO in many extra restrictions on the time and circumstances when we can declare someone dead. This could even be so many that we'll find ourselves impeded by the law much more than it aids us.

A recent series of articles in the JOURNAL OF THE AMERICAN GERIATRIC SOCIETY gives us a good idea of medical feeling on the issue of induced suicide. The articles include a long legal brief by the Society for the Right to Die, Inc. (JAGS, 35, 669-678 (1987)), an article by Joseph Fletcher, who has long argued for assisted suicide (JAGS, 35, 679-682 (1987)) and an editorial by David Thomasma.

Fletcher's article is titled "Medical Resistance to the Right to Die".

But the article itself is not just about the right to refuse treatment and die as a consequence of that refusal. Fletcher is very clear about the point he wants to argue: "Is the right to die fully recognized if we merely stop treatment in terminal illnesses only, when the patient is in fact dying anyway and does not want his dying to be prolonged..." He goes on to argue that the ethical distinction between acts of omission and acts of commission (killing someone versus allowing them to die) is empty. Fletcher is arguing for doctor-assisted suicide.



Thomasma takes a different approach. He spends some time discussing the potential for abuse which any legal weakening of prohibitions against murder may bring. His initial sentence says it all: "American society is not particularly sensitive to the value of human life". (And to strip this statement of its tinge of self-hatred, neither is any other 20th Century society). He points out specifically that it is this lack of sensitivity which causes some doctors to argue that their duty is **always** to prolong life. Their attitude is an antidote to a prevailing bias in favor of killing.

But of course the serious problems raised by current methods of (ineffectively) prolonging life make medical killing very tempting.

Thomasma ends his editorial by attempting to describe a "middle ground" between active killing and merely withholding treatment. He calls this "death induction", a deliberate therapeutic plan to "bring about the death of a patient through the means of passive euthanasia".

It's easy for us, at the moral and mental distance we have from these people, to think we see some kinship in their ideas. I believe this is an illusion, and that **cryonics** is the LINEAL INHERITOR of exactly those ideas ethicists now denigrate, that we have a moral duty to prolong life, with no conditions. Cryonic suspension much more resembles a dangerous operation which we must undertake to save a patient's life than it resembles a deliberate attempt to end life. What has really happened is that doctors and patients have now come to the edge of the precipice and looked down. Biotechnology has said to them: "Now if you really don't want to die, here is what you must do." And almost all doctors and their patients have lost courage, fearful of

heights.

But precisely because it resembles a dangerous operation, neither Fletcher nor Thomasma will find it easy to encompass it. BOTH ethicists in fact imagine "death induction" to happen in some way painless not only to the patient but also to the bystanders. Even the name of the "Hemlock Society" suggests the picture its proponents have of a "humane death", Socrates sipping hemlock and discussing philosophy while he slips away. But like any major operation, cryonic suspension requires an entire team of people, massive equipment, drugs and other medical supplies, and a very prolonged confrontation by every member of the team with the act they are performing. It's nothing like what these philosophers think. It's about as far from "death induction" as possible.

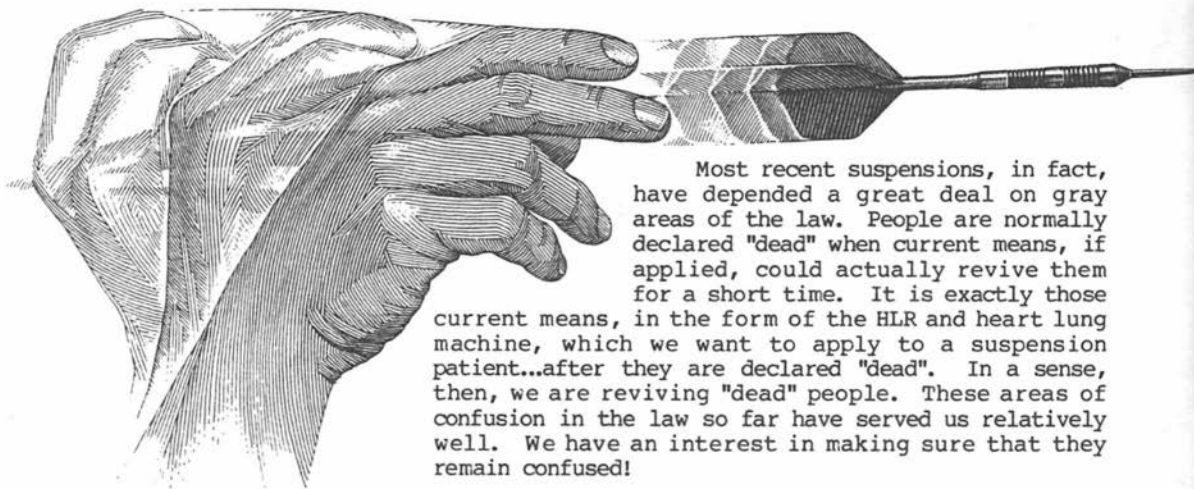
The Suspension Team does not discuss philosophy with the patient while freezing him.

In fact, not only does suspension look like a dangerous operation. Large numbers of people actively claim it is "unethical". Their imaginations can't encompass suspension as ACTUALLY WORKING. It therefore becomes a very complex way patients can delude themselves. It is unethical to let patients delude themselves. They should take their course of "death induction" quietly.

Some objections of this sort lay behind at least one recent suspension, of ALCOR patient A-1068 in 1985. A hospital nurse, concerned that the patient might wake up during resuscitation procedures, seriously argued with Mike Darwin and Jerry Leaf about suspension as an immoral prolongation of dying. The major risk is that the opponents of suspension can use CHADDI against us. Humane "death induction" is fine, but immorally holding out false hopes to patients is quite another matter. I can imagine hospitals basing their standard operating procedure on the assumption that patients will necessarily choose EITHER "death induction" or the full 9 yards of artificial prolongation. We just can't choose our medical treatments as if we were in a cafeteria. Hospitals and other bureaucracies are likely to provide us with a fixed number of SET MEALS. We can't have the spinach with potatoes. That is, if we choose not to take the hospital approved course of "death induction", then the machinery of the 1990's hospitals may assume that we want all the most "modern" means used to prolong our lives. CRYONIC SUSPENSION IS NOT AN APPROVED MEDICAL TREATMENT. Making "death induction" an approved treatment won't help us and could actually narrow our options.

The fundamental problem is that death isn't a medical condition but a legal one. Imagine a terminal patient in the hospital, for whom death is not imminent. Will CHADDI mean that the only way we can suspend this patient will be to administer a poison to him until he is "dead" and his body can be released to us? Given current attitudes, how many hospitals will actually allow a suspension team to come in-house and suspend the patient, WITHOUT making sure he is "dead" first? Even worse, could it put another layer of bureaucracy on our NORMAL attempts to suspend someone?

A second case, of a woman with multiple strokes who is a candidate for suspension, shows the bureaucratic problems which can arise (cf "Catch 22", CRYONICS, March, 1987). The patient must remain in a nursing home for financial reasons. State regulations prohibit putting an apnea monitor on her, to send out an alarm if she stops breathing, because she is not in an acute care setting. Besides being financially out of the question, a cryonics nursing home would (to the outside world) gain financially if the patient dies.



Most recent suspensions, in fact, have depended a great deal on gray areas of the law. People are normally declared "dead" when current means, if applied, could actually revive them for a short time. It is exactly those current means, in the form of the HLR and heart lung machine, which we want to apply to a suspension patient...after they are declared "dead". In a sense, then, we are reviving "dead" people. These areas of confusion in the law so far have served us relatively well. We have an interest in making sure that they remain confused!

I don't mean that we can't overcome this problem. Of course we can. We have **right now** a right to refuse treatment which may prolong our life. In particular, the legal brief in Brophy v. New England Sinai Hospital cites many precedents by which patients **RIGHT NOW** can refuse medical treatments. But we really don't need any additional sets of obstacles to negotiate on the way to suspension. Every obstacle can cost a cryonicist much damage and even a life. If we even have to go to court to prove our rights, we have lost.

* * * * *

IT'S A SECRET

by Mike Darwin

Several weeks ago an ALCOR suspension member who is working for the competition (Trans Time) was visiting the ALCOR facility here in Riverside. During the course of discussion about cryonics in Northern California the issue of treatment protocols for suspension patients came up. The member indicated that he had seen a "four page perfusion protocol written by ACS researcher Dr. Hal Sternberg" but that the protocol was "classified" and could not be discussed. A discussion ensued about the issue of openness in cryonics and the upshot was some serious thinking about how ALCOR should handle disclosure of research and patient care information. In short, what should our formal policy be on such matters? Should we "classify" patient care protocols and become proprietary about research?

This debate is not new to either cryonics or the world. It is a tough issue. It arises because we live in a world where ideas as property are not very well protected. Imagine what kind of world it would be if other kinds of property were similarly unprotected? If everyone had to fear that their very possessions and even their lives were at the mercy of their neighbors without any recourse except violence or secrecy, it would be a very sad world indeed. We enjoy the level of wealth and security we do largely as a result of our success at protecting people's material goods and property, including their

lives. As long as such protection exists, people's homes are not armed camps and they are free to enjoy, exchange, and openly exhibit their wealth and possessions without fear of theft or violence.

Unfortunately both the theory and technology to protect intellectual property have lagged far behind that which is available to protect material goods. Patents and copyrights are poor protection indeed when contrasted with the level of property protection available for material goods.

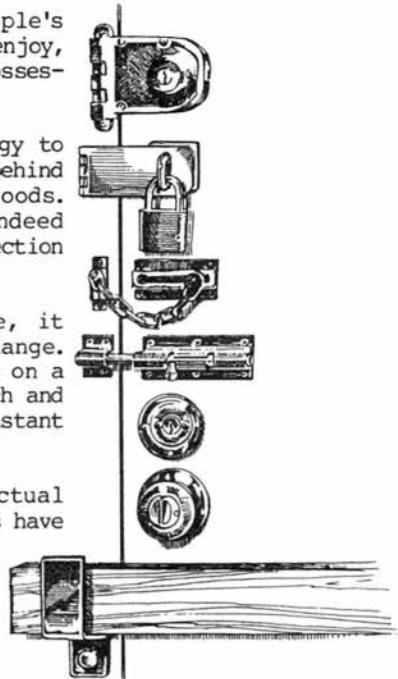
Once protection of property is in place, it becomes possible to offer it freely for exchange. Goods can be examined and tested, even taken on a trial basis. People can come and examine, touch and explore wares without their owners being in constant terror of losing them through force or fraud.

Since the technology to protect intellectual property is so undeveloped and crude, its owners have few options available in offering their wares for sale. If they dump them into the marketplace they may be quickly appropriated without their owners receiving any credit and with total loss of control over how the idea is applied. This has a chilling effect on the free exchange of ideas and does not allow for "comparison shopping" and the powerful positive selective forces of the free market to do their work. Innovators are thus left to be secretive about their work, and are thus often indistinguishable from frauds, or others who may be more well intentioned but of questionable competence.

The problem is not new to cryonics. Over a decade ago I and another researcher (who is now a well established cryobiologist) were working on base perfusate designs which we felt would greatly improve the quality of cryoprotective perfusion for cryonic suspension patients. We announced that the results of our efforts would be made available only to those who helped underwrite the research. There was an immediate hue and cry against this! Chief critics were Robert Ettinger, President of the Cryonics Society of Michigan (now the Cryonics Institute), and Art Quaife, President of Trans Time. They argued that what we were doing was wrong and immoral — results should be shared openly with everyone. Ideas are everybody's property.

I thought then, and I think now that Ettinger, Quaife, and our other critics were in principle **wrong**. In the absence of protective mechanisms a man who creates an idea has the right to restrict its use or even to hold its disclosure to a limited few for maximum personal profit. We do not owe our lives and/or their productive residues to others.

Of course there is a price to be paid for nondisclosure. And that price in the world in which we live is lack of credibility, and lack of feedback about the utility of the ideas being used. When ideas are thrust into the marketplace they are forced to compete, they are subject to scrutiny, and they are subject to feedback. While "credit" for them or "ownership" to the bounty



they produce may be severely compromised by disclosure, the "up" side is that the ideas may be refined and developed more rapidly.

For some kinds of ideas, namely those that have immediate, obvious, and short-term potential for being profitable, maximum secrecy and nondisclosure may make good sense -- since handling the idea in this way can generate revenue which can in turn be used to pursue other investigations or broaden the scope or quality of the innovator's work and life.

So, it's often a tradeoff. There are powerful advantages to offering one's wares for sale, even if the possibility of plunder exists. In a society which offers little formal protection against plunder, other strategies must be used to facilitate commerce, or total savagery ensues.

Where does this leave ALCOR with regard to the issue of disclosure of suspension protocols and research developments? What policy will we follow? The Cryonics Institute makes a wide range of claims about its in-house storage unit, and yet provides no technical or other details that would allow for a proper evaluation (or for duplication!) of the equipment. Recent accounts of ACS experiments have appeared stripped of meaningful details such as perfusate composition, cryoprotective agent mixtures, amounts perfused, and so on. Should ALCOR follow suit?

Here is what we have decided to do. We have made a firm commitment to continue open and detailed reporting of every aspect of our patient care operation. This level of detail will include full disclosure of the basic parameters of all procedures used in human suspensions. Training guides, or administrative tools used to implement such procedures, may remain undistributed except to ALCOR personnel (and at this point are). Non-ALCOR personnel (including both members and nonmembers) may inspect training and procedural materials relating to suspension operations in our facilities, but may not remove or duplicate them. As an example, there will be full disclosure of which medications will be used for transport purposes and how they are given such as: "Maalox, 300 cc via nasogastric tube...". However, in-house training guides detailing procedures for how to place, secure, and evaluate a nasogastric tube will not be made available.

Research will be openly published and fully disclosed in a timely fashion, consistent with our resources, once the project is completed. We have already become more circumspect about discussing research in the developmental stage, however, such as pilot studies or prospective research which has not yet been funded.

Case histories of how suspensions were handled will be thoroughly debriefed in print and will be published where it is appropriate to do so. For example, right now, with patient volume so low, virtually every case is unique and worthy of debriefing and publication. In the future, if the volume of cases rises, it would be both inappropriate and impractical to publish every case history.

In short, ALCOR's policies will mirror those of other nonprofit or largely successful commercial medical/research organizations. We feel very strongly that the advantages which accrue from open disclosure, public critiquing of our ideas and procedures, and interaction and feedback, far outweigh the potential loss of "competitive edge". In short what we are counting on is our ability to

stay so productive that we can stay ahead of the rate at which our ideas are plundered.

This may be a naive strategy. We may be arrogant, misguided, or wrong to think we can stay ahead. But, in an endeavor like cryonics there simply isn't any alternative. A service as free of feedback as cryonics simply must be completely open to scrutiny and inspection. **The bottom line is the development of techniques which will save our lives — not just dollars and cents** (although the two are related).

It is a tough trade-off to make. It's one we wish we didn't have to make. But then we wish we didn't have to die either. It's just a sad fact that the world isn't structured in a way that allows us to live forever. Hopefully our efforts will allow for progress on both fronts: longer, healthier lives and a world where property of all kinds can be freely traded and used without fear of expropriation by force or fraud.

Those are the guidelines we intend to apply. We would greatly appreciate your comments and feedback.

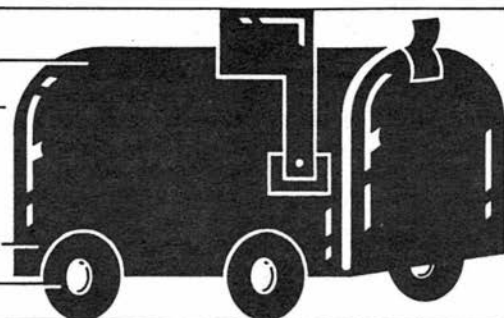


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"The lame man who keeps to the right road outstrips the runner who takes the wrong one. Nay, it is obvious that the more active and swift the latter is the further he will go astray."

-- Francis Bacon

*Letters to The
Editors*



To the Editors:

I should like to comment on the statement, "Believing cryonics could reanimate somebody is like believing you can turn hamburger into a cow" made by Dr. Arthur W. Rowe, who I presume is an expert in the field of cryobiology.

We all tend to unconditionally accept the utterances of "experts" without doubts. But what does their record show?

For example, in the 1870's, a daydreamer by the name of Jules Verne wrote of a trip to the moon by rocketship. I doubt if there was a single "expert" in the world who believed this was possible.

During the Second World War, before I went into the Navy, I worked in a shipyard that had never before built submarines. We had a staff of experts in submarine construction that was loaned to us by Electric Boat Co., which had built submarines for many years. Their function was to answer the questions we had. If I had asked those men if there was any possibility of building a submarine that could run submerged for over three or four days without surfacing, as described by Verne back in the 1880's, I would have been laughed out of their office. But less than a decade later a submarine was doing just that -- and wonder of wonders, it had been built by these same experts at Electric Boat Co. and given the same name as Verne's fictional underwater boat.

I took a scientific course in high school as preparation for a college engineering course I graduated from five decades ago. I was taught scientific "truths" no expert of that era would question -- basic facts that were beyond dispute. What were these "absolutes"? Here are a few of them.

1. The most powerful explosion possible is produced by mixing and then igniting two parts of hydrogen and one part of oxygen.
2. The Law of Gravity cannot be defied. What goes up must come down.
3. Light travels in a straight line. (Prof. Einstein was the first scientist not to buy that self-evident truth.)
4. An atom is the smallest particle of matter that can exist.
5. There are 92 chemical elements -- no more can fit in the atomic table. (Actually, I had a chemistry professor who doubted that 92 was the limit,

but he was labeled as a crackpot by the scientific community.)

6. The old alchemists who thought one chemical element could be converted to another were dead wrong, as experts agree. (Those alchemists must be rolling in their graves with laughter by now.)

The list could go on and on, but my point is that expert opinion is likely to be valid only within the parameters of current scientific knowledge. When "experts" attempt to extrapolate on the basis of such knowledge and predict the future -- well, their record simply is very poor. Bertrand Russell put it well when he said, "when the experts are unanimous, the opposite conclusion can be regarded as certain."

So those who see possibilities in cryonics should not be too concerned with the opinions of "experts" including Dr. Rowe. True, reanimation is only a possibility, not a certainty, but it's a gambler's gamble -- nothing to lose, everything to gain. Has Dr. Rowe, or any other expert, anything better to offer?

To Dr. Rowe and all other experts of his persuasion, I can only paraphrase words I once heard Bob Ettinger direct to several men who scoffed at the cryonic concept, namely: "Dr. Rowe, if you do not believe in the possibilities of cryonics, I will still wish you the best I can -- may you rot in the best of health!"

Joe Cannon
Avon Park, FL

Dr. Perry Replies:

Mr. Cannon makes a valid point, namely, that "experts" are so often wrong in their predictions that one should not become overly attached to them nor be overly dismayed if the picture they paint is less than rosy. In fact such "experts" tend to be pessimistic to a point that often appears ludicrous in retrospect, since they make such a minimal and grudging allowance for future progress. Such conservatism appears to have deep roots in evolutionary biology -- it is safest, in the majority of cases, not to be an innovator or even to sound friendly to the idea of innovation, despite the considerable advantages that innovations sometimes bring.

All this might be said against almost any "expert" who says something **can't** be done. In the present case, though, there are direct scientific arguments that point up the absurdity of the statement of Dr. Rowe, and the



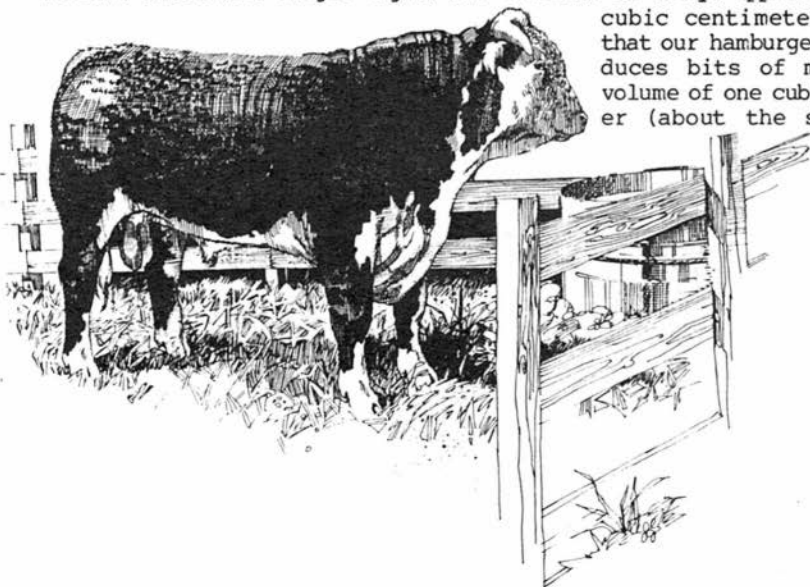
shortsightedness of alleged "experts" who make similar claims against the ultimate workability of cryonics. Consider the process of cloning. From a single cell it should be possible to recreate a copy of the entire organism, except for memories in the brain and acquired characteristics such as (in the case of cattle) branding. This has been done with frogs, for example, and nothing in principle seems to rule it out for mammals. Thus from a tiny fragment of hamburger we could reconstruct a cow, especially if we accept the view that the personality of a cow (which does not seem strongly dependent on learning) is mostly genetically determined. The resurrected Bossy would be an amnesiac, to be sure, but could probably relearn her limited repertoire of responses rather quickly. If we had the whole animal (including the brain) in fragments, an even more faithful reconstruction could probably be achieved.

A final point worth making is that it is easy to be misled about who is the "expert" on anything beyond very short-term extrapolations. In the case of cryonics, it is generally assumed (by the press, at least) that cryobiologists make the best available "experts" to pronounce on its ultimate feasibility, whereas this may be very far from the truth. The task of restoring a patient frozen by today's technology to a living, thinking human appears to be far more an information-theoretic problem than a biological or medical one, as these notions are understood today. The best experts consequently should be those able to interpret biochemical processes in **computational** terms.

Hugh Hixon Comments:

This "hamburger analogy" that Dr. Rowe and other cryobiologists resort to has been running around uncontested long enough. The assertion that reanimation after cryonic suspension is as likely as reconstituting a cow from hamburger is easily one of the most stupid and most often quoted arguments against reanimation, and I propose to drive a stake through its heart. It will be necessary to have some recourse to elementary algebra, but the size of the error in the analogy should be obvious to anybody.

A human brain (our target organ) has a volume of (very) approximately 1500 cubic centimeters. Assume that our hamburger-maker produces bits of meat with a volume of one cubic millimeter (about the size of the



head of a pin). In one cubic centimeter, there are 1000 cubic millimeters. Thus, Dr. Rowe's hamburgerized brain contains 1,500,000 elements. In hamburger, any piece can occupy any (unoccupied) location in the volume. Thus, the first attempt at reconstruction can place the first bit in any of 1,500,000 locations, the second bit can go in any of 1,499,999 locations, the third in any of 1,499,998 locations, and so on. Expressed algebraically, the total number of ways the brain may be reassembled is:

$$1,500,000 \times 1,499,999 \times 1,499,998 \times \dots = 1,500,000! \text{ (factorial)}$$

which can be reasonably be said to be a **very** large number. Using an approximation supplied by Mike Perry, this is roughly equal to

$$4 \times 10^{8,612,698}$$

or 4 followed by over 8 million zeros possible combinations in which Dr. Rowe's brain may be reassembled, only one of which is right! (Note that this does not take the angular orientation of each element relative to the adjacent ones, which adds further complexity.)

Now, let's consider a frozen brain. Since the freezing holds each element of the brain in place relative to its neighbors, even displacement of elements by ice crystals results in movements only a few element's distance from the original location, and in a limited number of directions. Say an element can be displaced to one of 10 adjacent locations. This leads to, say, only 15,000,000 possibilities for reconstruction of the brain, at most (taken as one cubic millimeter elements). Further, this number will be considerably reduced by examination of the surface microstructure of each element, and of the location of all the adjacent elements. Understand, a lot of work is still required, but the problem is **much** more tractable than described by Dr. Rowe.

However, we are not interested in reconstruction at "hamburger-scale". We are interested in reconstructing a frozen brain synapse by synapse. Using an estimate of 100,000,000,000 neurons in the brain, and each neuron has, say, 10,000 synapses, this means that we need to examine at least 1,000,000,000,000,000 locations in some detail. It is obvious that while the number of combinations we have to deal with is growing in a simple arithmetic fashion, Dr. Rowe's problem is growing in a (rather more than) exponential fashion. Even if there are major fractures in the frozen brain, as has been indicated by work at ALCOR, the problem is simply one of mapping one side of the fracture to the other at synapse-scale.

For reanimation we assume a nanotechnology capable of providing self-reproducing nanomachines of roughly one cubic micron volume (1,000,000 per cubic millimeter). If a nanomachine can reproduce itself in an hour (there are bacteria that can divide every 18 minutes), in 50 hours, we will have over 1,000,000,000,000,000 of them, or enough to provide considerably more than one per synapse. Shortly thereafter, the job should be done. In Dr. Rowe's case, however, it will never be started.

To the Editors:

Max O'Connor's article "Identity Under Duplication" (CRYONICS, July, 1987) described a Scenario (e) in which a backup copy is periodically made of you.

This raised the question of whether you survive if, sometime after the backup is made, the original version of you is destroyed and the backup copy activated. O'Connor points out that our intuition ("you really did die") is in conflict with the logic of the situation ("very little information was lost, so you did not die"). I am interested in exploring this conflict further.

Before determining whether your identity is preserved under Scenario (e), you should first become more clear about what you mean by your identity. In other words, who do you think you are? Only when you have answered that can you determine whether "you" will be preserved under Scenario (e). Notice that this question is not "who you are" (the "rational" abstraction of a person) but rather "who you think you are" (a "psychological" abstraction of a person). The "rational" abstraction is that a person is information or an information-bearing process (where thoughts, feelings, habits, etc. are all meant to be included when I use the word "information"). If little information is lost in Scenario (e), then, in the "rational" abstraction, the person survives. I do not know anyone who, at a gut level, really perceives himself that way, though. Our "psychological" abstractions of ourselves are much different.

People's notions of who they think they are vary widely. I suggest that a person identifies most with what he values most (about himself). A man who sees himself as a steelworker ("I am my job") may suffer an identity crisis when the steel plant closes down and he gets permanently laid off. A housewife ("I am my family") has to readjust her self-image when all her children have left the home. Some Native Americans have been their tribes and their ancestors; they would use the word "I" when speaking of an ancestor who fought in a battle long ago. A person possessed with "cosmic consciousness" (Buddha, Jesus, etc.) has an even larger notion of self (i.e., Self). Such a person, I have heard, perceives his body and personality as a throwaway, something to be used for a purpose much larger and more valuable. (This person has, in his mind, already achieved immortality because he perceives his real self as being as large as the universe.) Cryonicists, on the other hand, are more cerebrally-oriented and they highly value their individual minds ("I am my mind, which is a physical process, and I am separate from you"). (Homework exercise: Distinguish whole-body from neuro cryonicists on the basis of their self-concept.) Will a person with a cryonicist-style self-concept perceive Scenario (e) as survival or as death?

We all experience many "little deaths" throughout our lives. Any change (moving, getting/losing a job, getting married, losing a loved one, becoming "born again", being revived from cryonic suspension) kills a part of ourself because it requires a loss of part of what we identify with. Scenarios (a) and (b) (cryonic suspension) in O'Connor's article are, to a cryonicist, not too different from sleeping, which is a form of "death" with which we are experienced and comfortable (and thus already have built into our self-concept). (Non-cryonicists who are burdened with a vitalistic concept of a spiritual soul may not be able to perceive cryonic suspension as something like sleep, though, and they will instead perceive Scenarios (a) and (b) as "big deaths".) Scenarios (c) and (d) (Star Trek transporter) do not in my mind cause any crisis in self-concept, and thus are not a "big death". This may be because we already are used to stepping into a box (car, train, jet airplane, etc.) at one location and then stepping out of the box at another location. Scenario (e), though, is unlike Scenarios (a), (b), (c), and (d). In Scenario (e), you may experience both survival and death. The backup copy that is activated clearly survives; he just experienced Scenario (a), (b), (c), and/or

(d). The original that is destroyed, though, knows that everything he has experienced since his last backup will be lost. In particular, what he is experiencing NOW, immediately before his destruction, will be gone forever. If he values his present experience at all, he has to experience his destruction as a form of death, maybe a "big death" and maybe a "little death". For us to not experience Scenario (e) as a "big death" we need to expand our experience to include situations closer to Scenario (e). Then we will be able to perceive the "rational" abstraction of ourselves (information or an information-bearing process) as real and incorporate it into our self-concept.

Kevin Q. Brown
Stanhope, NJ

To the Editors:

Max O'Connor makes a good argument for personal survival under a variety of circumstances. But he definitely loses me with scenario (e) (duplicates for backup purposes). In fact, I don't see why he didn't lose himself, so to speak.

To paraphrase O'Connor, we begin with Max_A. We perform the duplication. At a later time we have both Max_B and Max_C. Both are continuers of Max_A. Neither, and this is important, are continuers of the other. O'Connor says as much himself. Now, some accident obliterates Max_B. Max_A is still alive, because he has a continuer in Max_C. Max_C is still alive, because he is his own continuer. But Max_B doesn't have a continuer. Thus Max_B is dead.

What we seem to have here is a case of temporal confusion. Max O'Connor, at the present moment, says that having a duplicate would ensure his survival. He is correct, as he is in the position of Max_A. The duplication has not yet occurred. But at the time of the accident he will be Max_B, not Max_A. My prescription? Take two doses of General Semantics, and call a logician in the morning.

Brett P. Bellmore
Capac, MI

Max O'Connor Replies:

I don't need to reply to Kevin Brown's thoughtful letter because it seems to simply expand on my point that acceptance of survival through duplication will come through familiarity with the idea and living with the practice. Brett Bellmore, on the other hand, finds problems with scenario e) in which copies of yourself are stored and updated at intervals. One day you (your current body and brain) are damaged beyond repair and your most recent backup copy is activated. Your copy — you — does not have any memories of the last two weeks since the last update, but otherwise the new body and brain are identical to the original.

Bellmore's attack on my position misses the mark. First, at the time of the accident Max_A is -- or rather has survived in -- **both** Max_B and Max_C. Bellmore's problem arises because he has confused the notion of a continuer with that of one individual surviving in another. Think of a tree structure in

which the single root is the original individual who is duplicated, then the duplicates are further duplicated at a later time. A later individual can be a continuer of an earlier one if a line can be traced back through time which connects them, but one individual cannot be a continuer (as I, following Nozick, have defined the term) of another individual on a different and contemporaneous or earlier branch. One individual can, however, survive in an individual on another branch to the extent that they share information content.

It is therefore misleading to say that Max_B is dead (or simply wrong if death is defined in terms of failure of survival rather than in terms of identity) since though he has no continuer he does have a survivor -- he survives in Max_C. I'm not sure Bellmore's letter or my reply will be comprehensible on their own; but if the reader reads them in conjunction with my article in the July, 1987, CRYONICS, I don't think that any problems will be found to remain.

* * * * *

BOOK REVIEW: *To Sail Beyond The Sunset*

by Robert A. Heinlein, Ace/Putnam, \$18.95.

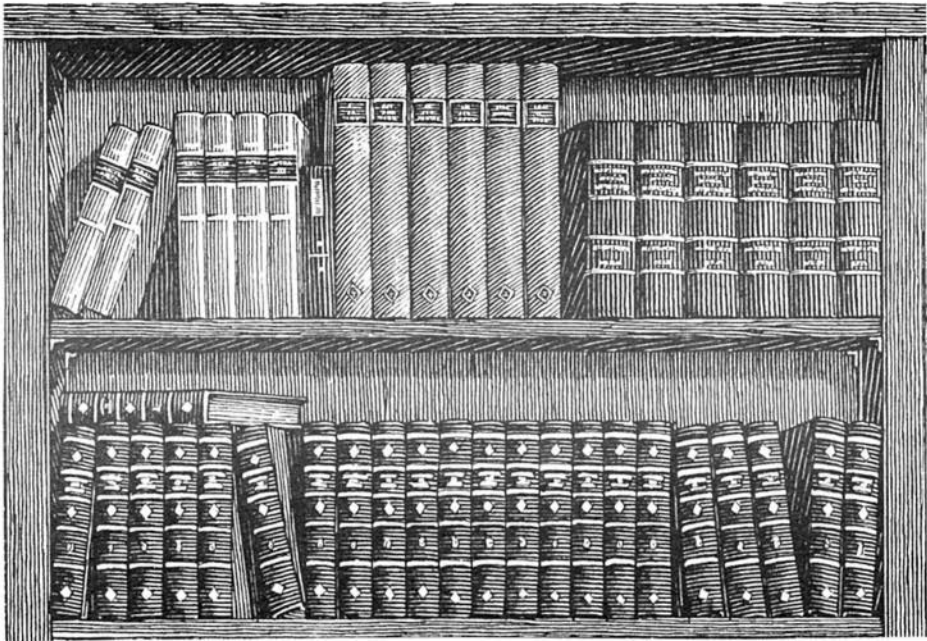
by H. Keith Henson

In *To Sail Beyond the Sunset*, Robert Heinlein continues his quest for a just universe, where the good find adventure, eternal youth, knowledge, and immortality, with just enough difficulty thrown in to give spice to life. It also carries on the profound reluctance Heinlein has shown over the past several books to let his more memorable characters die, rescuing them one by one from the fate that the rest of us must endure, by the manipulation of time and parallel universes. Lazarus Long (the oldest) has made it to over 2000 years by good genes, high technology, fast reflexes, and luck.

The book itself is from the viewpoint of Long's mother, who was rescued from sudden death and taken into the future two books back in *Number of the Beast* by multidimensional (including time) travel. Leave it to Heinlein to start things off with a bang: she wakes up in bed with a corpse!

To Sail Beyond the Sunset is a sequel to *The Cat Who Walked Through Walls*. It is also a continuation of the story, first told in *Methuselah's Children*, of the Howard Foundation, set up to promote life extension by encouraging those coming from long-lived stock to have lots of children with each other. Short of the intriguing new technologies that have recently appeared on the horizon, having long-lived relatives is still the best bet to live to a ripe old age.

To Sail... exhibits powerful sentiments in favor of suspended animation. People transported across thousands of years retrain and have no trouble becoming useful members of their society. Heinlein makes the value of people with roots deep into the past apparent as well. Our ability to understand the past, even the fairly recent past, is very poor without people who have lived there and can explain those times in terms of our ever-changing present



cultural knowledge. In many ways, the U.S. of the 1920's is more foreign to people born in the last 20 years than any western European country would be to them today. Reading this book has brought home to me again that the permanent loss of our older people when they could have been saved will be regarded as a most serious shortcoming of our century.

How much does the author resemble his characters? Robert Heinlein is a special case for me because I had extensive contact with him for several years when he was active in the affairs of the L5 Society (now sadly merged into the National Space Society). I can safely say that in my dealings with him during some very stressful times, he was as good as the best of his characters.

In recent years Heinlein has been putting more of himself and his solid Midwest, early-part-of-the-century background into his books, and in this one it comes through stronger than ever. While there is an active story in the present, most of the book (and the better part to me) is an episodic chronology of Maureen Johnson Smith, whose character I suspect is at least partly modeled on Heinlein's own mother. If so, she must have been a remarkable woman, whom (if we had time travel) I would enjoy meeting.

Sadly, we don't have this kind of time travel. It would sure be simpler than having to exercise all this foresight and present-day effort if we could just go back and pick up our loved ones. But I suspect that the universe is wired up so we can't get to go back in time, and we will have to make do with what we can save. (Zero, in an awful lot of cases.)

Among Heinlein's widely read works are such "cold sleep" classics as **Door into Summer** and **Methuselah's Children**. Cryonics gets mentioned by name or close description in all but one of his last half dozen books, including this

one, where it is mentioned by Lazarus Long (time traveling to 1917) in a list of future good investments for the Howard Foundation that included commercial aviation, television, atomic power, lasers, computers, genetic manipulation, frozen foods, and microwave cooking.

In shaping cultural attitudes toward cryonics, it could easily be argued that Robert Heinlein and Robert Ettinger (the founder of cryonics) are on a par. It is a cinch that a thousand times more people have read Heinlein's books than Ettinger's. And to read a Heinlein book is to be influenced by it, at least to some degree.

In my case, his books strongly predisposed me to consider and finally to make arrangements for me and my family's cryonic suspension should we run out of other medical options. I must admit that I waited until Drexler's nanotechnology work had made it clear that reversing freezing damage, aging, illnesses, etc. and reviving people using molecular scale computer-controlled cell repair devices looks very feasible. As one-way time travel, cryonics may be crude, but if you need it, it is the only game in town.

With all the plugs he has made for cryonics, has Heinlein (now 80 and in frail health) thought about it for himself? I simply don't know. I no longer have access to find out, though I have a remarkable set of letters from his wife Ginny as a result of offering to help fill out paperwork if they were interested.

If you have enjoyed Heinlein's last few books, you won't miss this one, in fact, most likely you will have already read it. I sure hope he continues to write.

* * * * *

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Mizar Introduces Cryonics To Britain

By Max O'Connor

As those of you who read the September, 1986 CRYONICS will know, the British group Mizar is the only functioning cryonics organization in Europe. It was set up on May 1, 1986, and was incorporated in July of that year. Although primitive compared to American groups, it is making reasonably rapid advances and has the advantage of being intimately connected with ALCOR. Since Mizar is incapable of providing a complete suspension capability, all its members must also be ALCOR suspension members. Currently Mizar has the equipment and organization necessary to carry out the initial transport procedures -- cooling, stabilization and transport of the patient to ALCOR's facility in Riverside, California. Since I last wrote on our activities we have made advances in the areas of equipment, training, newsletter production, organization, and public awareness.

I'll start with the most recent and exciting events first. In mid-July we sent out a press release; we didn't know what to expect -- a conflagration of media attention or the cold drizzle of media neglect. In the first week we heard from only one newspaper -- a rather bad Sunday tabloid which in the end

CHURCH BLAST FOR 'ETERNAL LIFE'

£125,000 TO LIVE FOR EVER

Last night's Evening News story that started the storm

DISGUSTED Church of England officials are today calling on the House of Lords to ban a west London company offering "eternal life" at £125,000 a shot. John Baldwin, the Church's Secretary of the Board of Social Responsibility, branded the firm as

"scandalous and highly offensive - we would like this question to be raised in the Lords."

The top religious ethics official denounced the British branch of US company Alcor and called on the Government to do all it can to dissuade people from getting involved with the firm, which freezes bodies in

the hope that future science can bring them back to life.

"Christian traditional teaching says when you are dead you are dead. Your soul then passes to heaven. Eternal life is not in the hands of humans. Eternity cannot be dashed out by man at a price," stormed Mr Baldwin.

He believes Alcor's offer of life after death brings science into disrepute and raises deep moral questions.

"Death is a part of being human. There's nothing that science can do to protect man from death," added the religious leader.

Mr Baldwin thinks the emotional pressure such a system involves could put deep distress on family and friends.

"This is a very important moral issue. Freezing people for a life eternal is folly in the extreme... it's quite offensive. I just hope the British people won't be gullible enough to consider this outrageous idea," he added.

didn't print the story. The first of two waves of attention came with a radio interview with Garret Smyth (our ex-secretary and current president) and Hugh Hixon of ALCOR. This was broadcast on the popular London station LBC then bought and re-broadcast by Capital Radio. This sparked off the previously docile newspapers into a frenzy of activity. Not a day went by without Garret and myself on the phone. It got so busy that I travelled to London to stay with Garret so that we'd be available together for face-to-face interviews at short notice.

The London Evening News ran a series of three pieces about us. After an initial story (which was the main front page feature in the second edition) they published a story based on a response from the Board of Social Responsibility of the Church of England which quoted that repository of all knowledge and wisdom as calling our activities "scandalous and highly offensive" and as asserting that "Death is part of being human. There's nothing that science can do to protect man from death." We telephoned the reporter to see if he would let us reply; the result was the wonderfully overblown headline: "STORM RAGES FROM FEAR TO ETERNITY". Even more amusing was the Bishop of Gloucester's statement that "The Church offers a much better service....You simply have to die in faith"! The most subtle headline came from that most dreadful of British papers, The Sun: "CHOP MY HEAD OFF AND STICK IT IN DEEP FREEZE". Fortunately a lengthy interview with the Medical Correspondent of the very high quality Sunday Times yielded a generally fair and intelligent article in the 2 August edition.

No doubt because The Sunday Times had deigned to run a story on us on page

London TIMES article.

Body-freezers give head start to eternal life

A COMPANY planning to bring body-freezing to Britain last week shrugged off complaints that the idea owes more to science fiction than reality, and invited sceptics to come up with better proposals for achieving immortality.

The technique, known as cryonic suspension, allows dead people to be specially treated and maintained at ultra-low temperatures. The idea is that at some future date, when medical advances allow the ageing process to be reversed, clients will be thawed out and their ailments repaired, enabling them to emerge into a brave new world where death no longer haunts humanity.

Mainstream cryobiologists - experts in the effects of very low temperatures on biological systems - say the idea is about as scientific as the stories of Rip Van Winkle or Sleeping Beauty. "What they are talking about is freezing meat. They are not freezing living cells," said Dr David Pegg, director of Medical Research Council's "Medical Cryo"

by Neville Hodgkinson
Medical Correspondent

need individual containers. These payments cover indefinite storage.

In the US, about 100 people have completed the sheaves of paperwork needed to become full members of Alcor's scheme. They pay an annual subscription entitling them to an emergency "suspension" should they die suddenly. Life insurance policies are the usual means of providing the lump sum payments for maintenance and storage.

So far, Alcor has performed one full-body suspension, while six "neuro-patients" share a single, tub-like flask of liquid nitrogen at minus 196C, set inside an earthquake-proof concrete vault. There are two other schemes in the US, which with Alcor have a total of about 250 "ilv signed-up subscr"

gen. As the swirls of vapour cleared away, you could see the patients hanging down below on wires in polythene bags."

Along with O'Connor and Smyth, the Mirar board comprises John Syles, 23, an Oxford mathematics graduate, and a physicist, Michael Price, 27. They are looking for premises to establish their own laboratories and deep-freeze facilities.

As well as rejecting the scientific criticisms, O'Connor brushed off complaints from church leaders that the plan is blasphemous. "I don't believe in life after death in the religious sense, but I enjoy life and I think cessation of consciousness is a bad thing," he said.

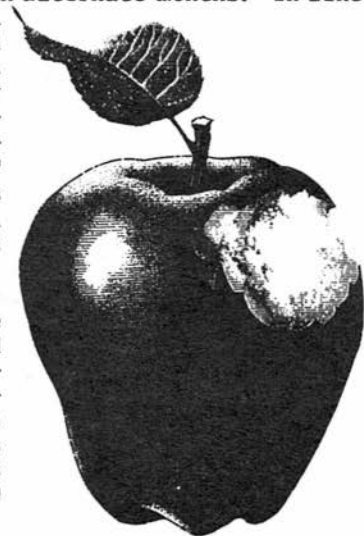
"Technology is going to provide for a healthy bodies, give us the ease of that will allow us to... troubles, and from political... d removal... e."

three, a second wave of more important publicity followed. First I was invited to appear on BBC's Breakfast Time TV to discuss cryonics and to debate a cryobiologist. This went well though it was only a total of 3 or 4 minutes with a relatively small audience. This led on to something with a vastly greater impact, something that I still find hard to believe really happened. I was asked to appear on the Terry Wogan Show - the British equivalent of Phil Donahue or Oprah Winfrey. It was a superb opportunity not only because of the size of the audience but also because I had something like seven or eight minutes in which to talk about cryonics. The questions varied from the stupid to the reasonable, but I managed to get across quite a bit of information. Something that particularly pleased me was that the previous guest was James Burke, a presenter of numerous popular science series and who is widely respected by the public; he stayed on while I talked and made two comments on what I was saying - both of which were supportive. I doubt that Mizar will receive a lot of new suspension members as a result, but certainly the British public will be far more aware of cryonics and will be much riper for seeding with the cryonics concept.

Mizar's ability to carry out the initial stages of the suspension procedure has improved considerably over the last year. In late 1986 we took delivery of an ALCOR Coordinator's rescue kit (HLR, drug box, and various other items) and have since added the oxygen cylinders necessary to run it after checking that they would be compatible with American equipment. A number of training sessions have been conducted with the equipment and Mizar now has a five-man suspension team (down to four while I'm in the USA). Sources of supply of ice, dry ice, and liquid nitrogen have been secured, and we have investigated the legal and transportation aspects of suspension so that we're reasonably confident that nothing should stop us from being able to transport a patient to Southern California.

On the organizational side we have centralized our files, bought filing cabinets and answering machines (we can't afford a paging system). We are now holding business meetings and social meetings on alternate months. In line with ALCOR's policy we are putting 10% of all (very meager) income into the Patient Care Fund even though we don't expect to need it for years. Our major organizational project right now is our application for charitable status. Mizar is currently registered as a limited liability for-profit company. Not only is the "for-profit" aspect a joke but also we feel that cryonics activities are not suited to a commercial legal structure (and not simply for public relations reasons).

Since my last report we have published five issues of our newsletter BIOSTASIS. This started off coming out three times a year and is now bi-monthly. Issues are 16-20 pages and cover anything of relevance to cryonics. Contributions from Americans are welcome. Subscription costs for ALCOR members are: One year \$25, two years \$35, or if paid in British currency, one year 10 pounds, two years 14 pounds.



In October the first meeting of cryonicists from three European countries will take place when Mizar members meet Dr. Ernst Fasan from Austria and Anatole Dolinoff from France. Hopefully these international meetings will continue and expand in scope and productivity so that the ALCOR/Mizar organization can provide a truly effective transnational rescue and suspension service.

What lies in the future for Mizar is difficult to say. Whatever happens I believe it will be a time of growth and consolidation. Though my four-year stay in Southern California will allow me to to benefit from ALCOR's proximity and to make possible the acquisition of skills I couldn't learn in England, I can't help feeling that I've abandoned a new-born baby that needs feeding and constant attention. At least I know that as American Mizar Representative I can provide thorough coordination and communication with ALCOR and I know that I've left Mizar in the capable hands of Garret Smyth (the new President), Mike Price (Secretary) and John Styles (Treasurer) as well as several other members who have shown themselves to be willing to help out at a time when we need it most. The next big goals are to acquire a set of perfusion equipment and a facility in which we could store patients and equipment. In the long term this is highly desirable no matter how close our links remain with ALCOR. The delay involved and the possible future legal or bureaucratic barriers to transatlantic transport mean that an optimal cryonic suspension program for Britain (and Europe) involves a good deal of independent capability.

Any contributions to the newsletter or inquiries should be sent to: Mizar, 54 Union Road, Northolt, Middlesex UB5 6UE, England. Tel: 011-44-1-845-0203.

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Women And Cryonics

by Mike Darwin

Some subjects simply cannot be discussed without causing controversy or offending someone. Such will probably be the case with the subject of this essay. No, its not about abortion or pornography or gay rights. Rather, it's about women in cryonics and women **and** cryonics. I'll say at the start I mean to offend no one, only to offer some honest thoughts and observations about the nature of the other half of the human race, how they have related to cryonics in the past and present, and how they may relate to it in the future.

The Beginning

I should probably start at the beginning. It's a little known fact that the first man frozen for future revival wasn't a man at all, but a woman. We don't know much about her, not even her name. We know that she died in Los Angeles around April, 1966, and that she had requested that she be placed into cryonic suspension when she died. When she deanimated she was not frozen, but rather was embalmed. Her son, a reportedly emotionally unstable young man, became consumed with guilt and grief and had her shipped to Cryo-Care's facilities in Phoenix, Arizona and frozen. There she remained in storage at Cryo-Care for less than a year, after which she was removed from her "cryocapsule" and conventionally buried. This suspension is not usually discussed since it was not very public at the time and was considered

"uncontrolled". In reality, it was only slightly less controlled than the freezing of James Bedford which came about a year later.

Very early on in the history of cryonics, circa 1962 to 1966, there were a number of women who were strong advocates for the program. These women included the liberal/humanist activist Marie Phelps-Sweet and, in a less public way, Elaine Ettinger, Robert Ettinger's wife. Mrs. Ettinger was reportedly instrumental in motivating her husband to write *THE PROSPECT OF IMMORTALITY* and was responsible for organizing and coordinating much of the public relations and media attention the book received. Another activist from the early days of cryonics, Marcelon Johnson, is still vigorously working and speaking for cryonics and is an ALCOR suspension member.

However, after cryonics had been around for awhile and public and scientific reaction hardened against it, women, a small minority within cryonics groups from the start, largely disappeared.

Historical Opposition

Not only have women historically not been attracted to cryonics, they have very often been vigorously opposed to it. In my 15 years or so of cryonics experience, the vigorous opposition of women to cryonics has not been because of a wildly emotional fundamental objection to the premise of cryonics, but rather to the threat it represents to other values which they hold very important. The problem with women and cryonics seems to have at least two parts:

First, historically, women seem far less likely than men to see cryonics as a worthwhile or workable undertaking (for reasons which I will speculate upon below).

Second, women correctly perceive that cryonics may very well represent a drain of time and resources from their family if their men become involved.

What do these two considerations mean in practice? After all, lots of people think cryonics won't work and yet they aren't very worked up about it. As long as they're not forced to pay for it, it is someone else's risk and someone else's problem. However, if a woman's husband or boyfriend or lover is attracted to cryonics and wishes to become involved...that's another matter altogether. Suddenly, **it's personal**.

Over the course of my career in cryonics I have encountered a fairly large number of men who were absolutely fascinated with cryonics and who



were interested in becoming deeply involved with it on every level. Repeatedly, a major "terminator" of such involvement was the woman in such a man's life. Being uninterested in cryonics, she usually quickly came to resent the time spent on it by "her man" and began to apply pressure in myriad ways. In some instances I've seen cryonics cause virtual open war in a marriage or relationship. In almost no case have I seen cryonics "win": a warm bed and a hot meal count for more than a chilly soak in liquid nitrogen and a long-shot gamble at eternity.

Thus, as I see it, women so often become polarized against cryonics because cryonics is perceived as a threat to the stability and well-being of their family life. It is seen as an alien and intrusive idea which demands major changes in lifestyle, threatens to separate husband and wife (even in death: she goes to the churchyard and he goes to ALCOR), and offers the added prospect of draining off resources which are often significant in a cash-tight family setting: insurance and ALCOR dues are a **vacation** for a family of three!

The question naturally arises, "Why don't women see cryonics as a good thing?" or "Why are there so few women, compared to men, who see cryonics as a good or at least potentially workable idea?"

To answer such a question is to put life and limb in peril. So I'll say at the start, "I don't really know the answer to that question." But I have some ideas and observations which I'll kick around a bit and open up for discussion.

First of all, women, at least historically, do not appear to be risk takers. Yes, I know there are many exceptions to this, but overall I think the generalization sticks pretty well. Women seem to be primarily concerned about stability and security. From a biological/evolutionary perspective this makes sense. They have a powerful responsibility to care for and nurture offspring. They suckle the young and they are most slowed down and burdened by the process of childbearing and child rearing.

Men Are More Adventurous

Men seem wilder and more adventurous than women. They commit more violent crimes, they range over the earth exploring and climb mountains "because they are there". I think it likely that the statistical diversity in behavior between men and women is strongly rooted in the biology of our species. No, I am not excluding the powerful role of society and the environment, but neither can I ignore my 25 years or so of observing men and women and their fundamental differences. Despite radical feminism, women have a far different "feel" to me than men do. And no, I'm not being facetious here. Women's minds and personalities, on average, are very different from men's in a number of critical ways.

Historically then, women have been a tiny minority in a male-dominated cryonics society. Often they have waged a relentless battle to alienate the men in their lives from cryonics, and their position towards cryonics, from a statistical standpoint, might best be described as adversarial.

Things Are Changing

How do things stand now, over 20 years after the start of the cryonics movement? Are women still a tiny minority and is their position still adversarial? The answers to these questions are interesting. I cannot speak about other cryonics groups since I have no access to their membership lists or to statistics concerning their members. But I can speak about what has been happening in ALCOR. And the trend is clear; out of 95 Suspension Members 25 are women. Many are recent additions to the ALCOR family and a surprising number are activists. In fact, a surprising number are women who have entered cryonics "singly", without the involvement of a spouse or lover. Typically the woman who comes into ALCOR in this fashion is a strong organizer and leader. Marce Johnson has been an active example of this kind of woman for many years. Recently, others have begun to show up and they have quickly assumed a powerful role in shaping ALCOR. Sherry Cosgrove, ALCOR's former treasurer, entered cryonics "alone" and became not only the ALCOR treasurer, but a valued Suspension Team member as well. Brenda Combest similarly entered cryonics on her own initiative and now serves on the ALCOR Board, occupies a position on the Suspension Team, and has been a key organizer of fundraising and other events.

And there are others. Angalee Shepherd heard about cryonics, relentlessly investigated the other cryonics organizations and settled on ALCOR. She has been involved in organizing several ALCOR events and has shown a relentless energy in her support of cryonics. Arel Lucas in Northern California has similarly shown outstanding support and enthusiasm in promoting cryonics. Of course Linda Chamberlain, one of the founders of ALCOR, has shown so much energy and determination over the years she is almost a legend.

What happens when women do become involved in cryonics is that they very often show a steady, relentless, and consistent level of support which typically overshadows the kind of performance we get from the average male who becomes involved. One interesting thing I've noticed is that I virtually never hear excuses from the women involved in cryonics. If they say they are going to do something, it is usually as good as done. I do not need to make the litany of phone calls to prod and prop up flagging enthusiasm that I often have to make with men. I have come to be spoiled by the women of ALCOR; I can virtually cease to worry about a task once it has been accepted by a woman volunteer. Men seem to have the initial enthusiasm, but often seem to lack the patience, tenacity, and follow-through which women provide.



Why The Change?

Why the change? Why are more women becoming involved in cryonics and why are they more relentless in its support once they are involved? I think the answers to those questions are complex and subtle. I can speculate that more women are becoming involved because more women are better educated and more independent today than has been the case in the past. Or perhaps it's just that the evidence for cryonics is getting better and the slow progress and "trailblazing" that's been done has made it seem more workable. Whatever the reason, one thing is very clear: once a woman perceives cryonics to be a potentially life saving, nurturing thing rather than a threat, she is the most powerful ally cryonics can have. In many cases it is the woman in the family that has masterminded signing up the whole family — filling out the paperwork and arranging for the insurance. If a woman sees cryonics as a way to safeguard those she has the responsibility to care for then she will pursue it with the same tenacity with which she would pursue milk for her child or a well-ordered home for her husband.

Does this sound maudlin and/or sexist? Maybe so. But it nevertheless seems to be the case. And I think it is a very positive situation for cryonics. I believe that increasing involvement of women in cryonics is critical to its long term success. I also believe very strongly that a major historical problem with cryonics has been the absence of women in its ranks. For ALCOR at least, this situation has already changed. Female faces are common at meetings and the caliber of women becoming involved with cryonics today is in my opinion, on average, higher than that of the men.

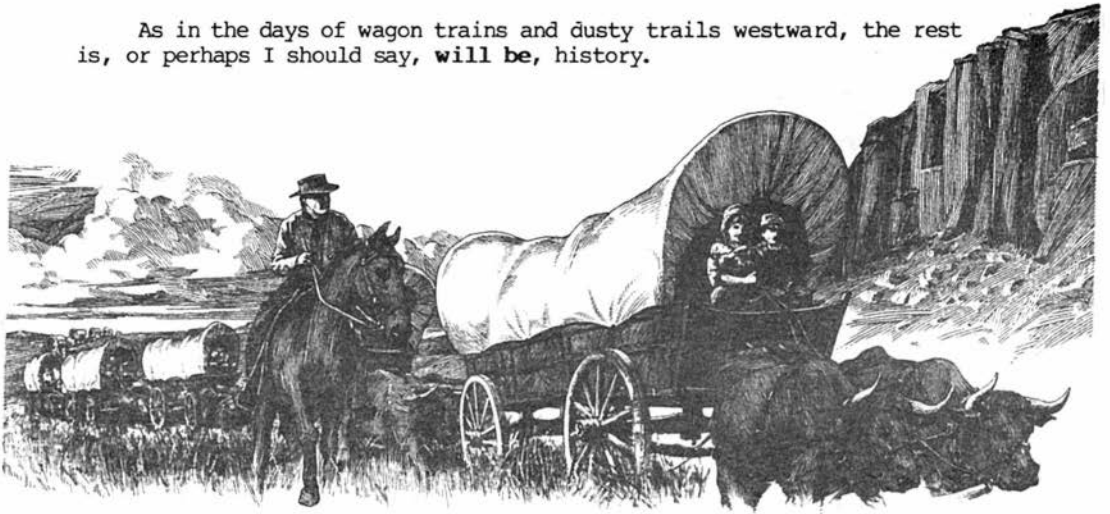
The Future

I suspect and hope that a great deal of stability, security, and tenacity will be brought to ALCOR by the women who become a part of it. I think even more women would be involved in cryonics if the women who are already involved made a concerted effort to provide a support network for them. I have noticed at cryonics social gatherings that women tend to cluster together and talk together about different aspects of cryonics (and life) than do the men. A more organized structure of support and cooperation among women involved in cryonics might be very desirable. If we do not yet have enough women involved for such networking, perhaps we soon will.

In the colonization of the American West it was the men who blazed the trail. The men were the crazy dreamers and intrepid wanderers — often loners whose restless itch to explore set them moving toward the far horizon. However, it was the women who made **homes** out of desert and prairie and who became as astute at shooting game and Indians as the men at their sides. Men may have been the first to appreciate the promise of the new world beyond the horizon, but it was women who made it accessible and turned it into home.

I feel very strongly that the same thing is coming to pass with cryonics. There are strong, fine women joining the ALCOR wagon train. They bring different skills than the haggard men and loners who've blazed the trail. But increasingly it is the women who **do see** the cryonics trail, see the tremendous potential of life and well being it offers them and their families, and act vigorously to make it available for them.

As in the days of wagon trains and dusty trails westward, the rest is, or perhaps I should say, **will be**, history.



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"BUNYIP"

Fiction By Cath Woof

Cath Woof is a long-time cryonicist and native of Australia who currently resides in the United States. Ms. Woof was one of the founders of the Cryonics Association of Australia and has a deep love for her native country. "Bunyip" she tells us is the Aboriginal's name for a mythical creature of a whimsical nature who dwells in swamps or other inaccessible places. "Bunyip" is set in Australia.

She had been immobile for some time now, waiting for the storm. The darkness was over the city, but hadn't reached her part yet. The low sun caught silver-yellow on the commuter planes, false-stars, reminding her of sulphur-crested cockatoos in flight before another storm in another time.

The memories were less painful now, but still they showed and would probably show many years from now. That was why they were called "Grievers" by the people who had revived her and her fellow cryonicists from the 20th century. She supposed she must seem like a soldier, back from a long and bloody battle, having lost friends, a sense of her time and having a psyche so acquainted with loss from death that it set her and her fellow Grievers apart.

The children were fascinated, however. "Let's go watch a Griever" was a favourite game. The Grievers did some really outlandish things. The time she started a garden, made a fork and dug it herself they were all lined up, amazed, staring and staring. But doing the old things helped to settle the



feeling of estrangement.

They had been so wide-eyed in the past with future expectations. She remembered lively discussions about what it would be like when they woke up - the time out for re-education, how they would learn about the history they had missed in their cold waiting, the scientific advances - what planet would they be on? But the emotional integration was what took the time. They had underestimated the sense of grief they would suffer when they realised that so many of their friends had died. Reading couldn't result in the sense of belonging that was needed to be a part of the future.

There was much to admire in these "future" people. They were more like trees in their patience - so much less impulsive than 20th Century man. Their independence was admirable, but it left nothing for her to hold onto, and she

did not know how to form a bond with them. They didn't need her, except for what she knew about the past, and didn't understand that she had to feel needed. They were friendly, but very foreign.

It was harder for her than for many of her friends -- she had been an artist, a painter, and what she had expressed belonged to another era, so that her paintings now were considered quaint. All she could do was live some more in this time for her paintings to come to have more meaning. When she got over her grief.

Out of the window she caught sight of some blue, then recognised a child who was her most frequent visitor. She panicked and looked for a place to hide. She was too introspective at the moment to entertain a child of the 22nd century, more knowledgeable and adjusted than she was, with her probing questions, sometimes tinged with superiority at finding an adult so backward and peculiar.

It was too late. The child had seen her and was at the door. "Come in." A resigned voice. "Help yourself to some cake on your way through."

The child entered the room, and she could see at once that something was wrong -- everything about the way she looked indicated that she was in shock.

"Why, what's the matter?"

"Bunyip." The short reply had a profound disturbance.

"Did he go walkabout?" she suggested, using one of their secret, old-time phrases.

"No."

"Sick?"

"No."

Twenty questions with a taciturn nine year old. Not missing, not sick.

"Did he bite you?"

"Don't be stupid."

"Well what? I can't read your mind."

"I can't say it."

She resisted an impulse to reach out and hug the child -- this had only been met with resistance in the past. They were independent at a very early age. She turned back to the window, trapped by the child inside and the storm outside. This was awkward.

"Look at those gums -- they're having a fit." The branches were waving about in a frenzy, foam was running down the trunk as the rain dissolved the resins in the sap.

She looked back at the child, who was now staring down at her hands. Why had she come here to tell her something, then couldn't say what it was? What did she want?

"Can you show me?"

Silently the child stood up and moved to the door. The storm was violent outside but she looked so determined that she didn't want to fuss about rain things. The child walked and she followed, the rain soaking them in minutes. They walked until they came to a culvert in the path. She looked down and saw something she hadn't seen since she rode to work on her bicycle in the old times. A dead, squashed animal. Bunyip. The rain had wet the fur and mixed with the blood. His mouth was drawn back to show the teeth. The place where his tiny mind had been was empty — its fragments rapidly being washed away by the rain — beyond recall of even the magic of 22nd century medical technology. She had always thought that in death animals took on a wilder quality. It was understood now why the child could not tell her. This kind of death so rarely occurred it was seldom talked about. These vegetarians rarely saw flesh so brutally displayed. Deanimation was a very rare thing, carefully controlled, that took place in a hospital, even for cherished pets. Accidents were very rare.

"Come on. We'll go back."

The child was sobbing quietly, at last. She put an arm around her but could not think of anything to say. All the platitudes about death that had so angered her in the past were repeating themselves in her mind. "Nature's way". "It happens to all of us". There were no words that made sense now.

When she got back she pulled the child onto her lap, and they sat, wet and cold, in the darkness. She had stopped crying, and the long slow process of assimilation had begun. The woman could sense the knots forming in the child's mind and personality, the understanding growing between them. She got up and brought the child a robe, turning a light on in the kitchen.

"Come here, and I'll show you how to make a cake the old way."

* * * * *

"Every man is the creature of of the age in which he lives; very few are able to raise themselves above the ideas of the time."

-- Voltaire

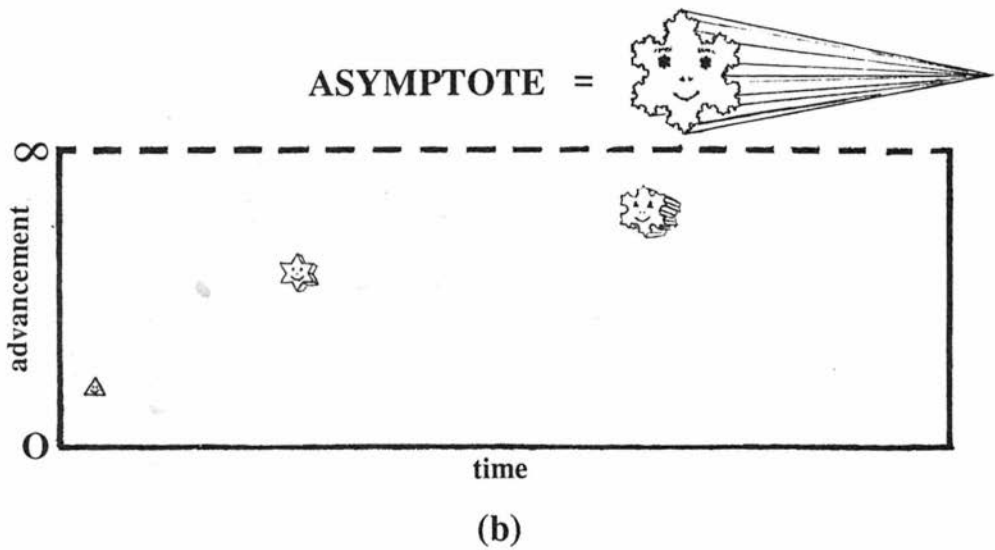
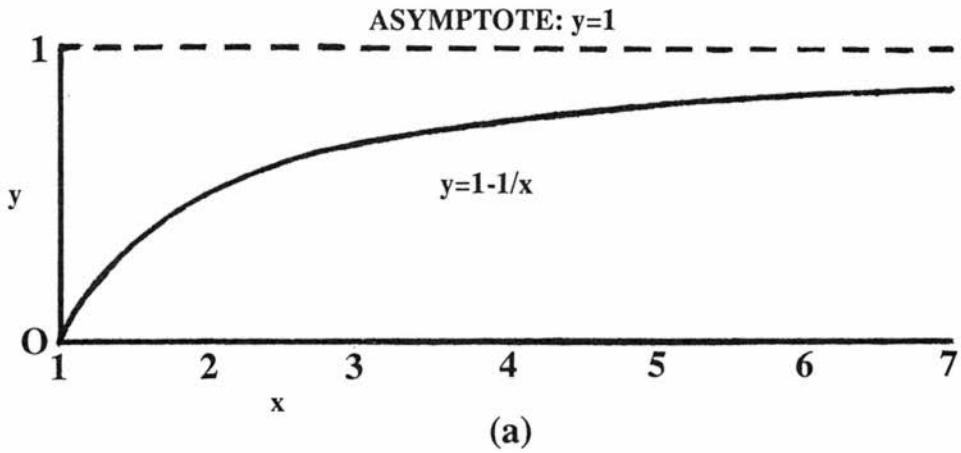


IDENTITY AND RESURRECTION

by R. Michael Perry, Ph.D.

Who are we? What are we? These questions have intrigued and tantalized the minds of philosophers down through the ages, but are of special interest to us who would bring about an end to death. What is it we wish to save? What is it we **can** save? When can we say we have brought some specific person back to consciousness? Answers to these questions and others like them depend in part on the nature of the world we live in, and for the rest, on our notions of personal identity. Here I would like to develop a viewpoint that I call the asymptotic theory of personal identity, in which identity, as a well-defined property, is realized, not at any specific point in time, but in the limit as time increases without bound. (The term asymptotic is explained by analogy with the graphing of a curve, in which the x-axis corresponds to time. A curve such as $y = 1 - 1/x$ will be approximated by the straight line $y=1$ for large x . This straight line is called an **asymptote** -- when x is large the curve is almost equal to its asymptote, or in other words the curve **converges** to its asymptote as x goes to infinity.) So, while at each moment in time a person may not be

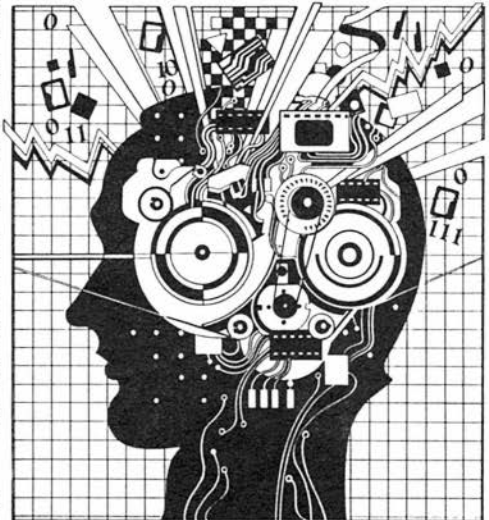
**ASYMPTOTES: (a) curve,
(b) personal identity (symbolic)**



definable with precision, a convergence to some definite entity occurs over infinite time, and the person thus is "going somewhere", progressing toward a goal that requires eternity for its full realization. It is a concept that has a nontrivial meaning only if we assume that the person is immortal, something that we, as immortalists, can at least seriously contemplate. On the other hand, if accepted, the asymptotic theory suggests some intriguing answers to such questions as "What happens to you after you die?" given varying assumptions about the preservation of the remains.

The starting point for the theory will be to take a look at our common notion of a "person". The people we know have been our acquaintances for a few decades, at most. As a rule they have maintained their physical appearance, size and shape, though with slow changes. On a microscopic level, though, we observe a very different picture, since most molecules in the body (even in brain cells that do not divide and replace themselves) are exchanged over a period of a few years. The "you" that you are today is not the "same", materially speaking, as your self of several years ago, even allowing for changes such as the acquisition of new memories. What survives of your former self, after a time, is mostly a copy. Yet we wish to maintain that this copy is really the "same" person. What is it about a copy that is the same as the original? The answer is, of course: information content. This suggests a preliminary definition of a person that could be called the **information paradigm** (a term whose final form I owe to Kevin Brown). The definition proceeds by a simple analogy with computers. A human body is a piece of hardware; in particular the brain, where the personality is housed, is analogous to a computer, in that it is a device for processing information. The personality itself, the part that can be said, in essence, to inhabit the brain, clearly is a piece of software. It is analogous to a running, interactive computer program.

The information paradigm could give us a good working definition of a person, so long as we do not have to confront such issues as death, personality changes, or the possibility of producing identical copies of one individual. With it, we are not troubled by the possibility that exchange of molecules in the body would give rise to a "different" person: there is no change in identity so long as the information remains the same. To actually determine the precise details that comprise a particular person according to this scheme, of course, would require access we don't now have to information written in the brain, but the principle is clear enough. Of course our designs would be frustrated by the fact that our personality program does not stay the same from moment to moment but is constantly changing. The simpler sorts of changes, however, would be straightforward to deal with, under what could be called the "timeline" concept.



Each person is not simply an arbitrary program, but has certain basic

features such as an understanding of events he has witnessed and a sense of self. Over a period of time a person constructs a model, through accumulating memories, of his state of mind and what he was doing at each particular point in his existence. Each person thus contains a timeline of personal history made of a sequence of "snapshots", each one of which is a recollection of the self at a particular moment. To a first-order approximation, a person, in the course of daily life, is simply adding to the sequence of snapshots. Ideally each snapshot, once it is filed away in longterm memory, should remain accessible, along with knowledge of its position within the sequence. In this way it becomes possible and reasonable to say "I was in Paris five years ago" or "I saw Jones last week". (Not all acquired information is "time-stamped" in this way, of course; much is "general knowledge" such as linguistic or mathematical skills, but enough remains to justify use of the timeline concept as an ordering principle.) Different individuals each contain their own personal timelines, and generally there is reasonable agreement between the recollections of different people whose paths have crossed. Moreover, memories once laid down tend to persist with relatively little alteration.

Let's assume for the moment that in fact the processes of storage, ordering and retrieval of memories are completely accurate. We are using "memories" loosely, to mean any information placed in permanent storage where it remains accessible or inferable indefinitely. It could include factual or emotional recollections, motor skills, or other talents or expertise. Assuming that memory acquisition is perfect will make it easier to see how to develop an asymptotic theory of identity, which can be adjusted afterward to fit a more realistic model of actual experience.

We will begin with a rudimentary, hypothetical personality, a robot which, let's say, starts out life with a certain amount of information already imprinted, and each day stores recollections that correspond to events over that particular day. The information on each day could be carefully chosen by some outside agent, or could be more haphazardly arrived at, as it is with people. In any case it will be a "snapshot" that will be filed away in an orderly sequence. Finally we will assume that the amount of information that can be stored per snapshot is very small, so that there are not many possible different snapshots. In fact we will assume the snapshots come in only ten varieties, like a stack of cards limited to aces, kings and two (distinguishable) jokers. These snapshots, in turn, will be assigned the values 0 through 9. Thus there will be many days with the same snapshot, say 5. Although this is rather far removed from our ordinary experience, in that it is hard to imagine only ten possible different ways the day could go, in fact we may experience a long succession of days that are pretty much the same, or perhaps that repeat at intervals, so that one weekend will seem much like another one, etc.

So now, suppose our robot starts life at the factory with a 3 imprinted, stays on the shelf for a period of time, a fact we'll denote by a period: ".", and after that is pressed into continuous service. The first day of its active life, the robot remembers as a 1, say, ("not one of my better days", it hopes) the second, a 4 ("improved"), etc. After many days, then, the robot's identity is described by the sequence: 3.1415926535 ... -- for convenience (and whimsy) we'll assume the digits always agree with the number pi -- that way it'll be easier to think about the robot's converging identity, and what it is converging to. The robot, of course, will have to reserve space in its memory for storing the snapshots, and this space must grow with time, though the

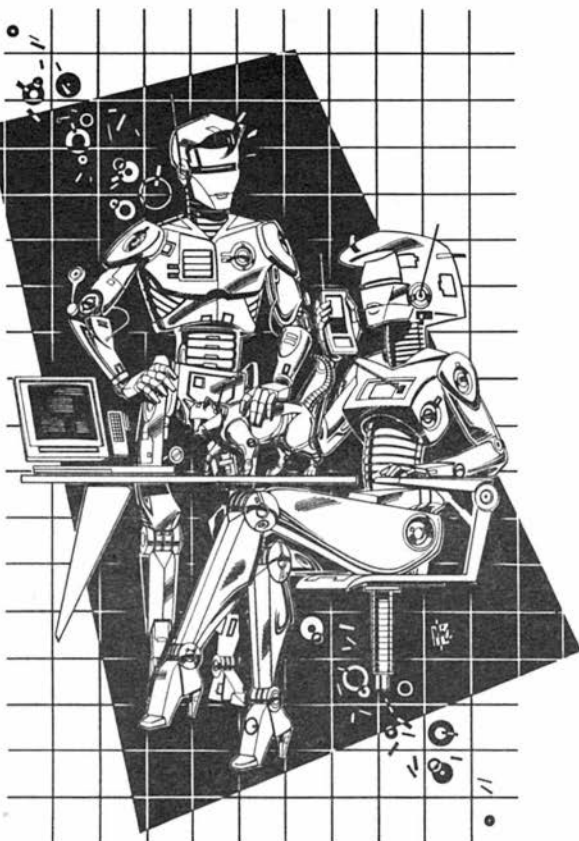
growth need not be very rapid. Thus in 100 years it will be approximately 36,500 days old, and will still need only a modest amount of memory, by today's computer standards. As time goes to infinity, however, the space requirement must grow without bound too, something that may be allowed, if we inhabit an infinite universe.

Now, suppose the robot is immortal, and consider a point in the remote future. To a very good approximation, the number pi, expressed in decimal notation, describes the robot's personal identity. The identity is never quite precisely defined -- new snapshots are always being added and thus the identity too is changing -- but the changes are less and less important overall. So, in the end, the identity converges to a limiting value that is exactly determined. To say that the identity "converges" this way, so that later changes are "less and less important overall", may seem objectionable, in that the present and the future are being devalued and the past unduly glorified. Certainly this criticism has at least a superficial validity, in that indeed the earlier experiences in life are given a greater weight.

But this is for a more-or-less formal purpose, to arrive at a meaningful notion of overall identity, not to set standards for how much the experiences at different points in life should be valued, at the time they are experienced. And on the other hand it can be argued that some sort of differential weighting may be necessary for a meaningful notion of "identity" to persist over a long period of time, when the experiences of life could vary considerably. Some persistent identification with one's psychological roots seems essential.

The idea of convergent identity is easy to generalize to the idealized case of people with perfect memories. Thus, for example, if instead of allowing a whole day to form a snapshot, we only allow only a nanosecond, it is not unreasonable to imagine that the possible snapshots would come in a small number of varieties, say 10. (If necessary the nanosecond interval could also be periodically shortened, to limit the possible varieties of snapshots, say, in the face of a growing capacity for parallel processing.) Memories in such tiny pieces would not necessarily have values such as "good" or "bad", but would simply be parts of much larger units having more recognizable features.

With this in mind we can invoke our robot model, and imagine in the same way that a person's true, limiting identity would be described by a decimal



expansion! In reducing identity to a "number" this way, though, we don't want to lose sight of the fact that it is the sequence of snapshots itself that constitutes the essence of the identity, not the number it would represent. Thus, for example, the first billion digits, "almost all" of the number, would correspond to only the first second of the person's life! Instead we recognize that the memories that are the "most important" for establishing identity may occur much later, seconds, months or even centuries after the point of origin or birth. Eventually they will have occurred, though, and the remaining memories will be of secondary importance for the definition of identity as a whole though possibly of greater significance in other ways.

Something should be said about implementations. How would future immortals conduct their affairs? What material structures would they press into service for their goal of endless, abundant life? What mechanisms would be needed to insure survival, particularly on the terms suggested here, in which memories are given paramount importance? These questions cannot be given their definitive answers now or, very likely, for a long time to come, but some useful insight may be provided by the information paradigm. It is not clear, for instance, what bodily forms will be found most appropriate for the future we hope to see, but there are good reasons to think that the options will be broadened very considerably. Our bodies we may choose to redesign, and perhaps we will soon evolve well beyond the present, biological byproduct; or perhaps the changes will be more gradual. In time we may be composed of disconnected groups of particles which communicate via photon emission and absorption. (Physicist Freeman Dyson, in particular, speculates that eventually our bodies may be made of positronium, when normal matter has broken down into particles — see *Omni*, Aug., 1986. If feasible, this will enable us to survive the "heat death" of the universe. A recent book that explores these and similar ideas is **The Anthropic Cosmological Principle** by Barrow and Tipler, Oxford University Press, 1986, reviewed by Brian Wowk in *CRYLONICS*, May, 1987.) But whatever the forms our physical makeup may take, we can expect that the mind's operations of storage, processing, and retrieval of information will be of continuing importance. A well-developed, growing body of memories will be essential to survival. It will not matter so much what the physical substrate of the brain may be and what the other organs are, so long as they act to maintain the functioning, happy existence of the personality who uses them.

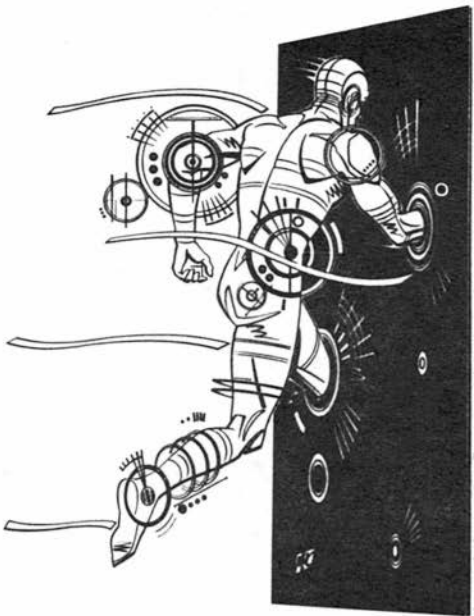
We have considered the problem of identity for the hypothetical case of individuals with perfect memory. Reality, of course, will force us to consider imperfections as well. Memories are not merely acquired but could be lost or distorted, and we need to allow for the effects this could have on identity. The effects in turn could vary widely with different individuals. Some may want to erase or falsify many of their memories, for instance, but such people, unless they can be cured, do not seem good prospects for immortality. Instead we may hope that the difficulties caused by imperfections will not be so great in the case of those who are truly interested in survival. Such people, it seems reasonable to argue, will tend to value their past experiences and the sweep of events in which they have taken part. Thus they should be especially interested in preserving their memories against loss or distortion. Future technology, in turn, should offer means beyond our own for achieving these aims, so that there is at least reason to hope that memory functions will approach the perfection assumed earlier, as time increases without limit. If this could happen, then the effects of distortion and loss would shrink toward the vanishing point, so that convergence to a well-defined entity would still occur, though by a more circuitous route.

This idea can be illustrated by our robot model. Before, when we assumed a perfect memory, each new day's experience was simply tacked onto the whole of previous experience, so that the successive approximations of identity converged rapidly: 3., 3.1, 3.14, 3.141, etc. Allowing distortions of previously stored memories, however, might yield a sequence like this: 4, 2.7, 3.47, 2.896, etc., which as it turns out, will converge to the same limit, pi, though much more slowly. In this case the new memories are repeatedly modified, and only gradually settle down to their permanent values.

In the same way we could imagine that a successful immortal may accumulate memories, which are subject to a certain risk of modification or loss (a form of modification) before finally being stabilized. (Actually, perfect stabilization, a 100% probability of surviving forever, could never occur in the sort of universe we inhabit, but instead it may be possible that the probability of survival could approach 100% with time.) Some sort of convergence along these lines seems essential for a claim that survival, in any reasonable sense, will occur. Otherwise the identity, at best, must eventually alter into something unrecognizably different, and according to our model, would not survive. (This viewpoint, in particular, is at variance with the notion that treats identity as simply a mapping from time into mental states; convergence demands something more.) In fact, the hopes of an individual of today who aspires to immortality must rest on the possibility that some, preferably a great deal, of his present personality will be permanently enshrined in the memories of his developing, future self.

If memories do stabilize in this way, it still leaves open the possibility of there being events the subject participates in but forgets, or events that are remembered for a time then forgotten. In fact it is an interesting question as to just how much forgetting is consistent with "survival". Too much obliteration can be taken as simply another word for death -- clearly that is not survival! -- but where do we draw the line? One possibility would be to insist that at least the quantity of memories that **do** survive must grow without bound -- otherwise the subject must forever stagnate in some particular time period, unable to acquire any new, permanent memories. (Cases like this are known to medical science; such people exist in a form of conscious, suspended animation, unable to function normally, and unable to understand why they must be hospitalized and cannot take their place in society.) So instead there must be at least a skeletal model of continuing events and the subject's place in them. (And all such models must be "skeletal", since it is hardly possible to record every event -- though some archives will be more ample than others.)

So now let's review our model of identity, before briefly exploring some of its consequences. Personal identity is based on the information paradigm, in which a person is held to be analogous to a running, interactive computer program. This seems adequate over a short period of time, during which there are no changes such as acquisition of new memories. To allow for such changes we introduce the asymptotic model, in which we assume that the "program" describing the personality is growing into a structure of infinite size which nevertheless is a well-defined entity. A person's "identity" at each point in time is simply an approximation of this limiting structure, and the approximation, overall, is improving with time, though by a possibly circuitous route. In the asymptotic model we do not single out particular features that are "essential" to survival and others that are "expendable", but simply assert that the personal identity is composed of those features, whatever their nature, that are destined to become established, eventually, and to persist



throughout eternity. Clearly the asymptotic model is nontrivial only if the subject, in some reasonable sense, is immortal. Whether this will be so or not depends on the structure of the universe and the actions that may be taken to further survival.

Some basic issues about the asymptotic model need clarification.

We claim that the body of information describing the personal identity should converge to an object of infinite size, but this overlooks the question of how it would physically reside in the universe. In particular, we don't see anything in the observable cosmos that suggests the vast memory archives of any advanced beings. Though our failure to observe such records doesn't rule out their existence, still it is interesting to speculate about possible alternatives to the presence of visible traces of far-advanced, extraterrestrial intelligence. One intriguing possibility is that the infinite object need not physically

reside anywhere at all! How could this seemingly mystical conclusion be possible? One way would be for a being, as it advances, to become increasingly rarefied, so that, although its memory is growing, fewer of its bits occupy any given volume of space. (There are many ways this could happen, given that parts of the individual need not be physically connected; in general, the number of bits divided by the volume they all occupy must go to zero as time goes to infinity.) Actually the limiting entity would "disappear" relative to a hypothetical fixed observer, but not relative to the evolving being (or presumably, its immediate neighbors). So at any given moment existence could be teeming with intelligences in varying stages of advancement, who for the most part are unaware of each others' presence.

Another problem concerns exactly what we mean by a specific individual. Up to now, we have considered what would constitute a description of a person, that is, the infinite body of information that is being built up with time. But this overlooks the difficulty that two or more individuals could conceivably have the same description. Thus it should be possible in the future to produce an exact duplicate of a given living body, for example, by placing it in suspended animation, disassembling it using molecular machinery, and, using the information extracted in this process, reassembling it along with a copy. But, on awakening, the two functioning personalities would begin to live separate lives, and thus would converge to different identities, barring an extraordinary conspiracy of some sort. In general it seems reasonable to speculate that any immortal being would record enough of its own, uniquely personal experiences that its identity as a whole would never agree precisely with that of any other being. Two or more such beings could have arisen by a duplication at some point in the past, however, and thus would have experiences in common. Though now separate and distinct, both would be continuers of the same individual, united by the coincidence of their early memories.

Normally one individual would have to be copied to produce two who are alike, but the possibility also exists of creating a duplicate by pure chance. Would this duplicate also be a continuer of the same individual? Suppose, for example, that this chance duplication happened very far away in the cosmos (or in "another universe", say), so that no causal interaction between the duplicate and the original could have occurred. Then, we might argue, it would be reasonable not to regard the duplicate as a continuer of the original, but as an entirely separate phenomenon, belonging to a different part of existence that has its own past history. Thus, according to this view, personal identity is dependent on a particular historical context. But if the copy was manufactured closer to home, even without knowledge of the original, a causal interaction of sorts would be mandated by physics, and it would be more credible to assign a common "origin" — psychologically at least — to both the copy and the original. According to this thinking it would not matter how the duplicates came into existence, given certain very minimal restrictions, but only that they contained identical memories.

On this basis it could also be argued that a person created at random, whose memories agreed precisely with those of another person who has died, is a continuer of that deceased person, and hence, that resurrection of the dead is always possible. This conclusion (vindicating the nineteenth-century philosopher, Fyodorov) will no doubt be controversial, but some possible ways of dealing with the major difficulties can be briefly mentioned.

We wish to consider the problem of restoring to life someone who is "dead" in the sense that essential personality information has been lost, and can only be recovered through a lucky guess. (Thus death is essentially a loss of information -- and here we are ruling out the possibility of being able to recover information about the "hidden past" though this, if it could happen, would simplify our problem considerably.) Such a stroke of death-reversing luck is always possible, since the amount of lost information, though normally very large, is always finite (this being one of the consequences of the information paradigm, and physics in general). To say it is possible means it is inevitable, if we try long and hard enough. (And in fact, such a lucky combination of circumstances could even happen through an unconscious process, suggesting that its inevitability does not depend on any willful action.) Note too that, for the continuer relation to hold, it would not be necessary for an outsider to **know** that the new person was the same as the original. In some sense the resuscitee himself would know he was a continuer, though the rest of the world might not!

We would expect, of course, that any attempt to reconstruct a deceased individual at random would require many, many false starts before the effort was crowned with success, and the success in turn, when it finally occurred, would escape our detection. (The magnitude of this effort cannot be indicated here, except to say that by far the simplest way of arguing its feasibility is to assume that time and space are infinite.) This, in particular, would result in a great many nearly identical individuals, only one of which was the "real" person he thought he was. Or another fascinating possibility, if the Many Worlds (parallel universes) hypothesis is accepted, is that each nearly identical person would be equally "real", based on the inadequate information that survived about the original! (Another interesting consequence of parallel universes is that parallel resurrection operations would also get underway, any time we chanced to venture into resurrection attempts ourselves, which would greatly reduce the labor needed to obtain "real" individuals in their many

varieties. The Many Worlds hypothesis, in turn, is supported by experiments in which a photon interferes with itself in a manner suggesting it has simultaneously traveled along different paths.)

Many may find these arguments unconvincing. Some will insist, as a minimum for a true resurrection, that information from the original must be copied, not merely recreated by guesswork. Others will demand still more — that the original material, in something approaching its original arrangement, must also be restored. These differences of opinion rest, in large part, on the extent of the causal connection that is insisted upon between the original and the resuscitee. In each case however, the net effect, in terms of the functioning personality that finally resulted, would be the same, at least if we allow that the original material, if revived, would be eventually replaced, as now occurs naturally. If only the weakest causal connection is acceptable then universal resurrection is possible. This idea, despite its difficulties, has considerable appeal, since it would mean that wrongs of even the distant past could eventually be righted through human effort alone. No mystical forces would have to be invoked for achieving aims now considered to be the exclusive province of theology.

The present century has witnessed incredible technological advances, not the least of which, potentially at least, are those relating to cold-storage preservation of tissues. Such procedures open the possibility, which a few of us now recognize, of achieving physical immortality through our own efforts. At present cryonic suspension (freezing) of the person offers the only realistic hope of preserving the essential personality information so that a restoration to life and health can occur later, when the necessary technology has been developed. Those of us who have made arrangements for cryonic suspension are acutely aware of the great promise we hope will be fulfilled through the application of this technique. If cryonics proves successful, on the other hand, many millions who could have been saved will have perished needlessly. For this reason we feel justified in promoting our cause with all vigor and urgency.

Would the possibility of an eventual, universal resurrection, along the lines we have considered, justify a lack of concern about our present mortality, given the scientific prospect of alleviating it? There are good reasons, I think, for rejecting any such attitude of unconcern about our present situation, whatever the ultimate prospects may be. The would-be immortal, who above all desires to be conscious and functional, will rightly seek survival, both short- and long-term, and will resolutely oppose and resist any threatened disruption. In fact it is natural and reasonable to act to minimize all potentially dangerous situations, whatever the estimated likelihood of eventual deliverance. (Who would prefer to break a leg, even with the knowledge that the bones will eventually heal and become stronger than ever?) So we are right in insisting that our remains be preserved at clinical death in the best way possible, through cryonics. In this way we have a chance of revival in the relatively near future, when the world at large may not be greatly different from what it is today. The original person will be used in the resuscitation, which should meet the objections of nearly all who accept a non-mystical explanation of the phenomenon of personality. Without cryonics the uncertainties about any sort of favorable outcome are far greater.

A resurrection, to be authentic, must at least restore the pattern of information that characterized the deceased individual. If some form of

eventual resurrection, in this sense, is inevitable, then all death will simply be a temporary interruption of consciousness, like a long, dreamless sleep. But those of us who value the shaping of our own lives will want to awaken as early as possible, when civilization will be nearer to our own level and it will be easier to assume an independent role again. Much later we may greatly appreciate the opportunity we had to pioneer in the fine art of survival, so that possibly others less fortunate could enjoy a full measure of it too, at last. We, the seekers of survival, must take full responsibility for making the choices that will largely shape our own future. We feel justified in choosing what to us appears to be the path of maximum certainty and security, based on reason and the weight of evidence. We have the most to gain from cryonics, and also from life in general.

(Dr. Perry's Ph.D. thesis was on Artificial Intelligence)



SCIENCE UPDATES

by Thomas Donaldson

CONTROL OF YOUR BABY'S SEX

For many years scientists and others have speculated about the consequences of ways to control the sex of children before birth. Often this speculation has concerned indirect methods of control. In fact, very direct methods of control already exist. This is to use amniocentesis to find out the sex of a fetus and abort it if the sex isn't the one preferred.

In the United States and other European countries this option hasn't caught on. Many years ago some surveys suggested that most Americans wanted a 2 child, one boy, one girl family. Apparently more than 50% wanted the first child to be a boy. But for the U.S., means to control the sex of those children born just wouldn't cause an imbalance. Furthermore, if even a large minority held strong views on controlling the sex of their children, we'd expect legal or illegal clinics to offer that control. It's quite significant that no such clinics seem to exist. In fact, whatever preferences Americans have for their children's sex, few of them feel so strongly that they actually want to put their preferences into effect.

But surveys of America don't hold for other countries with very different traditions. Recently in *NATURE* (324, 202 (1986)) Radhakrishna Rao, an Indian correspondent for *NATURE*, reports about clinics in India which abort fetuses which are not male. The government of India plans laws to prevent use of these techniques. Women's groups in Bombay and New Delhi have campaigned against sex-linked abortion. The claim is that such measures protect Indian women, who on the average suffer from considerable anemia and malnutrition (I don't think this claim is true. The women having the abortions probably aren't the same as the women suffering from anemia and malnutrition).

Of course there is a controversy. Supporters of female abortion say that availability of this technique will reduce the number of unwanted female children and that scarcity of women will raise their status.

Since these clinics subsist in a gray area of the law, nobody knows how many there are. Many are in industrially and agriculturally advanced states such as Maharashtra or the Punjab. Most present themselves as maternity homes, clinical laboratories, and family health centers.

I feel sure that laws against sex-linked abortion will promote yet another criminal activity. The interesting part of this story, of course, is the display of how biotechnology and popular beliefs interact. When they could not control their children's sex, Indians could have beliefs about the desirability of males which would swiftly become impractical if control were granted.

In more enlightened societies such as the United States, people understand this relation very well. That is why they spend so much effort and research on heart disease and cancer. Actual cure of these diseases, of course, would create a vast army of senile elderly who must be constantly cared for in their wheelchairs and rest homes.

WHY SEX?

Sex plays a big role in our lives. Since we can seriously think about redesigning ourselves, now and then someone in cryonics or even outside it raises the idea that we might do away with the whole messy process and reproduce by **cloning**.

However, designs are not arbitrary. Many attributes of human beings result from a very long history of natural selection. The force of natural selection will bear just as hard on us after we learn how to modify ourselves as it does now. We see this in the immortality issue itself. The **REAL** reason why we can expect to live forever isn't the direct biological technology which will make it possible. It is the fact that we have lowered our death rate so much over the last few centuries that **aging** (an internal barrier) became **THE** leading cause of death. Before that time, most people didn't die of aging but of disease or starvation. Why worry about immortality if you're much more worried about your next meal?

And so it is of interest to understand the pressures of natural selection which work on us now. One evolutionary problem of great interest, in fact, is the problem of why some animals reproduce sexually while others do not. A good recent book on evolutionary thinking about sex is G. Bell, **THE MASTERPIECE OF NATURE**, 1982.

"Sex" in evolutionary terms consists of mixture of the genes of two (or more?) organisms to produce the genetic plans for a new organism. Even the division between male and female is secondary to the genetic mixture. There are two major theories of sex. One states that sex is selected for because the combination of genes every generation gives the parental genes better chances of survival in an environment which is constantly changing and probably differs from that in which the parents were born (this is the "Red Queen Theory": we have to run hard just to keep up). The second theory states that sex is selected for because it makes the offspring less competitive among themselves (the "Tangled Bank Theory").

Up to now the major evidence for these theories has consisted of comparative studies across animal species. Recently in **NATURE** (326, 803-4 (1987)) A. Burt and G. Bell have come up with some clear **genetic** evidence for the Red Queen Theory.

During sexual reproduction, the chromosomes of the two parents transfer whole sections back and forth. This means that after a few generations, the original chromosomes will have broken up into pieces. They will no longer exist as separate units. The points on a chromosome where these exchanged segments start are called the **chiasmata**. If there are lots of chiasmata, it means that there is a lot of recombination of the chromosomal pieces. This recombination is exactly what sex is about (you didn't know that, did you?).

It is another important consequence of the Red Queen Theory that animals with a long time between generations should be most likely to reproduce sexually. The reason for this is that the longer these animals live, the more likely it is that their environment will change. This makes the selective pressure for sex stronger.

Burt and Bell therefore studied a selection of 24 mammalian species to

compare their respective numbers of chiasmata. They found, in fact, a very good correlation between chiasmata and the age to maturity of a species. Their diagram of these relations is very striking.

We would like to see a similar diagram for plants. We can also note that age to maturity is not the same as longevity. However the major relation is really likely to be with birth rate, which will certainly correlate with longevity. The longer-lived an animal or plant may be the more likely they are to reproduce sexually rather than asexually.

For what it's worth, this relation suggests that if anything, we are even more likely to reproduce sexually (that is, when we reproduce, which will be very rare compared to the present) than we are now. But of course, there are other factors also involved, and firm conclusions can't be drawn.

* * * * *

SEPTEMBER - OCTOBER 1987 MEETING CALENDAR

ALCOR meetings are usually held on the first Sunday of the month. Guests are welcome. Unless otherwise noted, meetings start at 1:00 PM. For meeting directions, or if you get lost, call ALCOR at (714) 736-1703 and page the technician on call.



DUE TO THE PRESENCE OF ALCOR AT CACTUSCON (NORTH AMERICAN SCIENCE FICTION CONVENTION) 3 - 7 SEPTEMBER, 1987, IN PHOENIX, AZ, THERE WILL BE NO SEPTEMBER MEETING.

The OCTOBER meeting will be at the home of:

(SUN, 4 OCT 1987) Paul Genteman
535 S. Alexandria, #325
Los Angeles, CA

DIRECTIONS: From the Santa Monica Freeway (Interstate 10), exit at Vermont Avenue, and go north to 6th St.
From the Hollywood Freeway (US 101), exit at Vermont Avenue, and go south to 6th St.
Go west on 6th 4 blocks to Alexandria, and turn right. 535 is the first apartment building on the west side of the street. Ring #325 (Note: See the building directory for the correct phone number to punch) and someone will come down to let you in.

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