CRYONICS

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EDITORIAL MATTERS

Usually "Editorial Matters" is reserved for correcting errors or describing problems with the previous issue of CRYONICS. This month, we'd like use it to talk about problems with this issue of CRYONICS -- and how they were solved. Some issues are easy to put out. Contributors supply you with good quality camera-ready copy, there are plenty of "filler" items lying around, and the creative juices are flowing to fill in the spaces the fillers and feature articles don't take up. Everything hums along smoothly. . . And then there's this kind of issue. No editor likes to see press time draw near and not see a steady stream of incoming copy. . . or

no copy at all! That's how this month's issue started off. On month's like that, the editors have to sit down and write. Due to Thomas Donaldson's traveling about the United States our normal quota of "Science Updates" and feature articles from him was interrupted. More frustratingly still, a lengthy feature article which took many tens of hours to prepare was (and is) tantalizingly lost on disk: a computer error damaged a disk and put the data (probably forever) out of reach.

We fixed (or so we thought) the ailing computer, and sat down and started to write. Donaldson called from New York to say that he'd be sending along some last minute copy and Dick Marsh promised to write a "Bay Area Updates," even though the press of other business would have prevented him from doing so this month. Things were starting to come together when. . . we found out the computer wasn't fixed after all. Another error, this time on the CRYONICS disk and 28 pages of magazine vanished into the maw of inaccessible data. Twenty-eight pages of information experienced clinical death and the computer equivalent of cryonic suspension: still in existence, but nonfunctional and inaccessible to those without sufficiently advanced technology.

Soooo, we start from scratch at the 11th hour. Then, a possible suspension began to materialize. Airline arrangements to make, relatives to talk to, physicians to phone, finances to set in order. All this and a magazine too?!

Well, it wasn't easy but we made it. The March issue materialized. Largely it materialized because of folks like Donaldson, Marsh and one who can't be named. These are the people who can be counted on to pull you out of a bind at the last minute. It feels good to have folks like that around and we'd like to get to the point of this month's "Editorial Matters" which is a very special thank you to the columnists and contributors who are the lifeblood of CRYONICS magazine.

Thank you, one and all.

To our readers, an apology if this issue seems a little uneven or if there are any glaring errors. Believe us when we say it wasn't easy! MD & HLH

FROSTY THERMOMETER

Frosty's warming up fast! Last month we received several hundred dollars for the vault, this month we received a $500 contribution from Herman Earl! Herman's donation, along with contributions from Simon Carter, Kathy Woof and Thomas Donaldson should enable us to proceed with placing the patients in the vault! Our thanks!

LETTERS TO THE EDITORS

Dear Editor,

I have just read Saul Kent's article on "Programming People for

Immortality," in the January CRYONICS. I find myself having to take exception with his comments (on p 31, 3rd para) regarding our "totally rejecting the inevitability" of death as well as the "spiritual afterlife promised by religion."

My daughter and I are among the "fewer than one hundred" people who have "chosen to engage in hand-to-hand combat with death by making preparations for cryonic suspension."

I wish only to make it clear that Saul does not speak for us when he writes that we reject any spiritual afterlife. We are non-fanatical but staunch, hard-core committed Christians who know and love the Lord.

My motivation to become a cryonicist, as a person, was because I love life and I'm prepared to take every reasonable means to extend my life that is available to me.

But as a Christian, I am motivated to live to bring Him glory, further His kingdom, and spread His love.

Clearly, not many Christians agree with me, but then few non-Christians agree with us either. The point here is not to "beat" death, but rather making use of our talents and our technology to live long, healthy lives.

We would be fools to think that we could accomplish our common goal if God does not want to allow it to happen. It's my feeling that what we will need to succeed will be research -- and prayer.

Long Life
Michel Laprade

There is and there must continue to be plenty of room in cryonics for everyone. There is no reason why Christianity should be incompatible with cryonics. While many cryonicists are atheists or agnostics, a significant number are religious. ALCOR welcomes all. We wish there were more Christians signed up. --MD

Dear Mike and Hugh,

This letter is overdue. It should have been written long ago.

In the February issue, you wrote "Editing CRYONICS. . . is a little like being in love with a movie star. You scarcely ever know how much of what you write is being read -- or appreciated." We want you to know that when CRYONICS arrives each month it goes to the top of our reading stack and stays there. For people like ourselves who are not in your immediate vicinity, CRYONICS is virtually the only contact with life extension we have most of the year.

The artwork has been improving steadily over the years, but the new Macintosh is very apparent in what it's enabling you to do with making CRYONICS more communicative and attractive. The diversity of articles is great. Your treatment of the recent experiment in "diary" fashion is an excellent example of how to give lay readers a look at what happens in the sort of research you are doing. . . . It mixes technical detail with events to which anyone can relate in a way which entertains and educates at the same time.

We also want you to know that we appreciate the tremendous burden that putting out a publication the size and quality of CRYONICS requires. Some of us who have tried to put out newsletters in the past are, perhaps, better able to appreciate what you have done and what you are doing with extremely restricted manpower and other limitations of resources. . . how

easy it would be for you to put out shorter, less comprehensive issues, or decide to go "bimonthly" because of the load, etc. Thanks for being willing to go all of those "extra miles" to provide coverage which is truly years ahead of what would be expected at the current stage of development.

Long Life,
Fred and Linda Chamberlain

PATIENT'S RIGHTS -- MORE PROGRESS

The past year has seen a number of important victories for patients and families seeking to escape gruesome, degrading and useless medical care which serves only to prolong dying and enrich physicians. It appears as though the gains in patients' rights are going to be sustained and extended over the coming year.

As many of our readers will recall, we reported in-depth on the case of Clarence Herbert, a middle-aged

California man who sustained massive brain damage during hernia surgery. Herbert was removed from a respirator and oral and intravenous fluid and food were withdrawn as well. In short, Herbert was allowed to starve to death. Since he did not meet the criteria of California's Brain Death Act, this action resulted in his physicians being indicted for murder.

After numerous efforts on the part of the Los Angeles District Attorney to prosecute the two attending physicians, the California Court of Appeals ruled that the physicians acted within the law and within the limits of their professional code by allowing Herbert to die of dehydration and starvation.

A similar, but even more significant case as far as cryonicists are concerned has recently been decided by the New Jersey Supreme Court. The case is of even more relevance than the Herbert case because the patient, 84-year-old Claire Conroy, although confined to bed in a nursing home, was neither severely brain injured nor comatose. Conroy was terminally ill, suffering from gangrene secondary to diabetes, heart disease, and mental confusion of sufficient severity that she could no longer feed herself or even swallow. Over the objections of Thomas Whittemore, Conroy's guardian and only living relative, a stomach tube was placed to facilitate feeding. Whittemore petitioned the court to ask that the feeding tube be removed and Conroy allowed to die, since her physicians all agreed that there was no reasonable prospect for her recovery and that her continued existence was one of discomfort and anguish.

As far as Conroy was concerned, the court decision did little good, since she died while the case was being considered by an appeals court. However, for others her case does establish an important precedent. The judges, in their 82-page opinion, ruled that life-sustaining treatment may be withdrawn from an incompetent patient "when there is evidence the patient would have refused it and a guardian is satisfied that the burdens of living outweigh the benefits." The justices went on to reaffirm the basic, constitutional right of competent individuals to refuse treatment, even life sustaining treatment: "A competent patient has the right to

decline any medical treatment, including artificial feeding, and should retain that right when and if he becomes incompetent. In addition, in the case of an incompetent patient who has given little or no trustworthy indication of an intent to decline treatment and for whom it becomes necessary to engage in balancing. . . the pain and invasiveness of an artificial feeding device, and the pain of withdrawing that device, the situation should be evaluated in the same way as the results of administering or withholding any other medical treatment."

The justices closed their opinion by stating that "Analytically, artificial feeding by means of a nasogastric tube or intravenous infusion can be seen as equivalent to artificial breathing by means of a respirator."

This decision, and others like it which are being handed down with increasing frequency, are of tremendous importance to cryonicists. None of us would like to find ourselves incarcerated in a nursing home or hospital being given useless and agonizing treatment while our funds for suspension dwindle, and our brains, and consequently our memories and personalities, are eroded away by disease.

Once again, we urge each and every one of you to sit down and write out a directive to your physician(s) and health care provider(s), or fill out the

ALCOR version of this form. We also urge those of you who are living in California or in other states where Living Wills are valid, to execute one and send a copy to your physician. Get this paperwork in order NOW and appoint someone you trust to act as your medical surrogate or medical power of attorney. Otherwise you may find yourself trapped in a nightmare, with people making life or death decisions for you who could care less about your long term survival.

"FROZEN" CHILD SURVIVES

Just about every winter the press carries a story about a child wandering out into subfreezing weather or getting lost in a snowbank, and making a marvelous recovery after being rescued and resuscitated. We don't even bother to report on these incidents because they are so routine. However, a recent UPI story (Feb 3, 1985) about a 2-year-old Milwaukee boy is worth relating. Not only was the child deeply hypothermic, he had also partially frozen. The child was brought to Milwaukee Children's Hospital after wandering, clad only in his pajamas, into 22 degree below zero weather (with a wind chill factor of -60øF).

Paramedics began CPR and continued it until a heart-lung machine was prepared and the child could be coupled to it for core rewarming and metabolic support. The child's limbs were stiff and deeply frozen; nursing personnel who handled him said his skin and tissues "crunched with ice." The boy's core temperature was reported to be 60 oF, the lowest

temperature from which a human being has been known to recover from accidental hypothermia.

Following rewarming, the boy's limbs became massively edematous and it was necessary to slit the skin along the limbs to allow fluid to drain (this relieves the pressure and allows blood flow to continue in the limbs).

According to press and television reports, the child is doing well, is alert and responsive, and shows no signs of brain or other organ system damage. Skin grafts will be needed to close over surgical wounds and some muscle damage is feared in his left hand. We mention this case because it seems to bear out Smith's work with hamsters in humans. Also, it seems likely that if the child's limbs were frozen "stiff" and his rectal temperature was only 60øF, his brain, or at least the outer regions of the cerebral cortex, also experienced considerable ice formation.

While this was a real tragedy for the child, it is somewhat reassuring to know that formation of significant amounts of ice in humans is not incompatible with survival. And of course it provides ammunition to deal with that most fundamental and important of questions: "Where did his soul go?"

TOTAL BODY WASHOUT #6 COMPLETED

We have now completed all but one in our Total Body Washout (TBW) series

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*** CAPTION --

"Brenda Peters (left) and Sherry Cosgrove (right) monitor Ghost's rewarming from 4øC."

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and we are relieved to report that TBW-6 went smoother than any of the preceding experiments, including our one-hour perfusion, TBW-1 (Star). "Ghost," a pure white German Shepherd who was the experimental animal, recovered at a rate comparable to that seen in dogs who had merely been placed on bypass and NOT washed out. Ghost was eating within 12 hours of the conclusion of the washout and four-hour, blood-free perfusion. He was walking and exhibiting normal energy levels within less than a week.

Thomas Donaldson, head of the Australian cryonics contingent, attended the session and was able to get his hands wet (literally in this case, since one of the things Thomas did was to fill ice bags). Thomas was also able to get a short course in some more sophisticated skills such as manual ventilation,

medical packaging and drug dosages. It was also an opportunity for Thomas to "get the feel" of the clinical environment during a situation which closely parallels a cryonic suspension.

We're not certain why Ghost recovered faster than our other TBWs, but we strongly suspect that it was a result of better regulation of perfusion pH. In the past we have had persistent problems with acidosis during the recirculation period of perfusion. After we get down to 4øC or so, perfusatepH becomes progressively more acid with pH sometimes falling as low as 6.99! Normally, this is considered a lethal pH, but we have consistently had animals recover from a pH this low. Our strategy in past experiments has been to treat the low pH by giving periodic doses of sodium bicarbonate. During our last perfusion with Dixie, our pH problems were so persistent that we decided to continuously administer intravenous sodium bicarbonate throughout the perfusion. We started this maneuver about halfway through the perfusion. Our pH was much better controlled by the slow bicarb drip than we had expected it would be.

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*** CAPTION --

"Mike Darwin (center) begins dialysis as Al Lopp (left), Thomas Donaldson, and Lawrence Gale (right) look on."

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*** CAPTION --

"Anna Tyeb getting a little sleep during Ghost's recovery."

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As a consequence, with Ghost we decided to start a bicarb drip from the beginning. Much as we expected, perfusion pH was the best it had ever been: 7.56 almost from start to finish. We are excited by Ghost's prompt recovery, and especially excited by the results of the blood concentrations of tissue enzyme we monitor as indi-

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cators of injury. Ghost had very low elevations of liver, pancreatic and other tissue enzymes compared to the previous animals.

"Forty-eight hours after perfusion Ghost gets a bath."

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It's too soon to tell if better control of pH was responsible for Ghost's improved biochemical and functional recovery. Hopefully the final experiment in our series will bear out the good results achieved with continuous buffering. If this turns out to be the case, it will be real cause for excitement since it implies that most of the injury we have been observing so far and attributing to perfusion, may really be nothing more than a failure to adequately control pH.

REDUCED COST SUSPENSION OPTION BEING CONSIDERED

Many times in the pages of CRYONICS we've discussed the cost of cryonics. We have repeatedly noted that cryonic suspension isn't really any more expensive than a wide variety of other medical procedures (such as bypass surgery, heart transplants and dialysis) and in fact is "underpriced" compared to what it really costs to deliver the treatment. All of this may be true, but it doesn't make it any easier for those who are too old or who are seriously disabled and cannot get life insurance. It also doesn't make it any easier for younger cryonicists who face the intense frustration of being unable to afford to suspend a parent or other loved one who is uninsurable.

All too frequently we have had to agonize with someone over the decision to suspend a parent or other relative when, through no fault of anyone, the money just isn't there. These are economic realities and they must be faced. As much as we would like to save everyone, we cannot just give suspensions away.

However, between "giving suspensions away" and "giving up" there is a long distance. As cryonics procedures are currently structured every attempt is made to use techniques consistent with contemporary medical standards. Additionally, many procedures are employed to monitor important parameters (such as cryoprotective distribution) which not only materially affect the quality of the operation, but also raise the cost. Over the past year we have been looking long and hard at cost reducing measures which could be applied to cases where the "best available" translates to the "best unavailable."

Clearly, the simplest and most direct way to cut costs is to decrease the amount of baggage taken along. Neuropreservation is a good example of

that kind of cost cutting and it is something we have practiced since our inception as an organization. Beyond that, the next most extreme measure would be to simply dispense with cryoprotective perfusion. This is something that virtually every cryonicist we have spoken with feels uncomfortable about. We know from conventional cryobiological research as well as our own work that disruption and injury on both a gross and molecular level are considerably worse with straight freezing. While it might (and has been) argued that changes as a consequence of straight freezing can be inferred from the remaining damaged structure, it is also likely that repair in such situations is likely to be a far more difficult problem and that rapid autolysis after thawing (due to ruptured lysosomes and cell membranes) may significantly increase loss of critical structure/information and thus identity. Few would want to give up the advantage of cryoprotective perfusion if there were any alternative.

To this end ALCOR has been looking into ways to reduce the cost of perfusion by stripping it down to its bare essentials. By using outdated supplies, a lower grade of water (suitable for hemodialysis but not injection) and dispensing with full sterile technique we feel we can greatly reduce the expense of perfusion. By limiting the availability of this procedure to those who really need it (i.e., relatives of ALCOR members

and the aged or severely disabled) we believe we can keep the economic burden to a tolerable level.

Because we firmly believe that the place to start cutting costs is at the sixth cervical vertebrae, this reduced cost or Special Case Option (SCO) would be available only in neuropreservation cases. Our preliminary estimates of the cost of the SCO are in the vicinity of $17,000. While this is not a trivial amount of money, it is well within the financial reach of a much larger segment of the population.

We should be very explicit in pointing out that the quality of perfusion delivered under SCO is likely to be lower than that delivered under the normal mode of operation. As an example, as research yields better perfusate formulations, new supplies are purchased and prepared for use. In the past we have used Dextran 40 as a colloid to replace plasma protein (the latter of which is prohibitively expensive and probably not suitable for use during deep hypothermia). Over the last year our total body washout research has demonstrated the overwhelming superiority of hydroxyethyl starch as a colloid. Consequently we are now left with enough Dextran 40 to carry out two suspensions.

Under the SCO, the Dextran 40 and similar "outmoded" materials would be used as an alternative to the more costly "best" supplies. A smaller crew of perfusion team members would be used, and limits of time and energy of personnel would much more greatly impact what is or isn't done. An example of this would be resuscitation and transport. There can be no denying that avoiding postmortem changes by prompt cardiopulmonary support is a highly desirable thing. It means less likelihood of autolysis (cell disintegration) and consequent information loss, and it means few if any problems with clotting and subsequent poor distribution of cryoprotective agent. In practice such stabilization and standby are expensive. Under the SCO, the team would not normally be involved in standby, stabilization

and transport. The patient would simply be packed in ice at the time of death and then transported, and the responsibility for more sophisticated transport and stabilization would rest with the next of kin. (In the past some family members have undertaken CPR and administration of transport medications for a parent dying away from trained cryonics personnel.)

These cost-cutting measures represent a considerable and serious compromise. And yet, they are the kinds of things that can happen to any of us as a result of an accident, sudden death, or other circumstances beyond our control, and they are the kinds of things that early suspension patients encountered routinely. Most of us would agree that receiving "less than the best" care is better than receiving no care at all.

In some instances, patients treated under the SCO mode would get care almost undistinguishable from care given to "regular" patients. A good

part of any cryonic suspension at this point in time is the learning experience. Bringing a team out to do a standby and transport on a human (rather than an animal) is a good training exercise. SCO patients offer both training and research opportunities. Since we have done so few human cases our confidence level about every aspect of the procedure is low. It may well be to our advantage to offer to SCO cases (until and if our volume of suspensions rises) many of the procedures we would ostensibly reserve for regular patients.

It is also important to point out that an SCO program can only be undertaken if it does not become a burden or a financial drain which destroys the organization offering it. In this way it is no different from the mutual aid provided by charitable and religious organizations to their members and the community at large. No church or mutual aid organization would last long if it spent every cent and every effort on feeding the hungry or helping needy members. Churches and service organizations must be discretionary in their use of charitable resources. We are no different. If we are to offer an SCO program it must be a discretionary one--based not only on objective criteria, but also on the individual situation.

Before the ALCOR Board of Directors can move to offer such a program they must have some idea of how many people would be interested. The Board is also anxious to hear feedback from members on the desirability of the program in general terms. Is this something you, as an ALCOR suspension member, feel we should do?

The SCO, as currently envisioned, would leave ALCOR with slightly less than the $15,000 of long term care funds now required for each patient as a suspension fund minimum for neuropreservation. Raising the charge for the SCO to $18,000 would redress this imbalance, but push us over the $17,000 ceiling which we set as an arbitrary, but

nevertheless useful, affordable limit. Making a decision as to where to fix the price for the SCO will be a tough one, and we can use all the advice we can get -- if we decide to proceed in offering this option at all.

We would like to get your opinion. To this end we have enclosed a questionnaire which we ask you to fill out and mail back to us. This is especially important for you to do if you think that you, or a parent or other loved one, may need the SCO in the future. Our decision in this matter will be largely governed by your response.

WHAT YOU CAN DO: PART 5

by Thomas Donaldson

Many cryonicists who don't happen to live in Los Angeles or San Francisco feel that they can do little to improve their own chances. In CRYONICS we've discussed quite a number of suggestions for what you can do about this problem. Lots of things are possible short of full suspension capability; even small groups of people, two people or even only one, can do a lot to improve their

prospects. Up to now, we've only discussed equipment; in this article I'm going to talk about training.

*** PHOTO SPACE ***
*** CAPTION --

"Thomas Donaldson at work filling ice bags."

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Recently I had the opportunity to observe (and in a very minor way, participate) in a dog washout experiment at Cryovita. Just watching this has given me several ideas about things someone can learn to do which will help out capability. I hope to put these ideas into action as soon as I return to Australia, and in any case they're worth sharing with other cryonicists who might be as isolated as I am, if not more so.

Several years ago I read an interesting book by a sociologist who worked in a factory for a year as a "tourist," to see what factory work was like. He had, like many well educated people, come to feel that "manual trades" didn't really require much intelligence. At least not like philosophy or sociology require intelligence. In the book he said he had come to think that opinion quite mistaken, that he found it easy to learn how to assemble electronic parts (it was a Western Electric factory) but that it was quite hard to learn how to do so efficiently. And of course, if we are to do anything we'll need to know how to do it efficiently.

I particularly remembered what this man said when I had the chance to

participate in a dog wash-out experiment. I've had virtually no "hands on" experience with this kind of science. The last time I had anything to do with a biological experiment was in high school, dissecting a frog. The kinds of skills I'm about to discuss sound quite simple. They are not. In a suspension it will be very important to have people around who can do these things without supervision, and do them well. And most important, just because they sound simple doesn't mean that they are, or that someone could make themselves useful if asked to do them when they've never had any chance to do them before.

And of course, true to the spirit of this discussion, I'll list these things not in order of their "importance" but in the order of the amount of commitment someone would have to make to learn them.

1. FILLING SYRINGES AND GENERAL PREPARATION WORK. For good reasons, there are many different dosage forms that drugs have. The bottles that an injectable drug comes in are of different shapes and sizes, and all of these have a purpose. Some drugs, such as insulin, need careful handling: too much agitation will damage them, causing denaturation. It can be very tempting to shake a bottle vigorously in

order to make a uniform solution; when that is just the wrong thing to do. Other drug forms, like Solu Medrol, come in powdered form in special bottles which contain the water in another compartment; in preparing the injection you must learn to dissolve the powder without agitating the bottle. The caps of the bottles have differing devices to maintain sterility and allow withdrawal of the product; you have to learn how to deal with each device.

Those are just the bottles. You will also need to know how to fill the syringes. Syringes have caps on them for the sake of sterility (and safety), and you need to know how to take these caps off. You will need to learn how to deal with a used syringe (the unprotected needles, contaminated with blood, are a real safety hazard. You need to learn not to throw them in the paper trash, but in special cans set aside for that: at Cryovita, these were plastic containers, labeled SHARPS).

Finally, all of these operations, including filling the syringe and putting the cap back on, require some manual dexterity and practice at the task. I found that part quite unsimple at first, and botched it. The bottles are sealed, and you have to deal with the vacuum you would create by drawing off the drug, while at the same time pulling back on the plunger of a syringe which doesn't fit easily in the hand. It's easy to drop the whole assembly, or to pull the plunger too far, or otherwise to mess up.

I believe that any reasonable person with a day of study and practice could learn this task. It would be easy to forget the details, though, so that you

would need a "refresher" every few months at least. The point is that this is not a complex surgical task, but something very simple, yet at the same time anyone who knows how to do it would be of real value during a suspension.

2. SURGEONS AND SURGICAL INSTRUMENTS, THEIR CARE AND HANDLING. In an operation, besides the person who actually does the operation, you will see someone else who is handing the instruments to the surgeon. This requires learning at least the names of the instruments and sometimes more than that, having an idea when a particular instrument will be needed so that's it's ready even before being asked for. There is a system to laying them out so that they'll be ready, and of course there are proper and improper ways to hand these things on.

> Someone who is familiar with these instruments and devices can perform a valuable service. It's easy to see why. Let's suppose that he or she wasn't there when needed. This would mean that the surgeon will have to turn away from his work and rummage among all the instruments for the one he needs. Have you ever tried to find a screwdriver in a toolbox full of 20 other screwdrivers, 5 pairs of pliers, assorted loose nails, a ruler, a carpenter's brace, three calipers, two coping saws. . . and suppose that you needed that screwdriver URGENTLY?

Furthermore, besides preparing the area, there are also the skills needed to prepare the surgeon. This consists of knowing how to dress oneself, and then dress the surgeon using sterile technique (you will notice the surgeon doesn't dress him/herself). We can't just let gowns drag on the floor as we pull them on! On the whole, it resembles one of those puzzles that test one's mental and manual dexterity; devise a series of moves so that at no time will any sterile surface that may come in contact with the operating area comes in contact with any non-sterile surface. Unlike the puzzle, the problem is life-or-death serious, and over many years, good solutions have been devised. What you must learn is a simple, but exact, choreography of moves, and a mindset about sterile technique that allows you to look to the next move, and see and deal with unexpected problems. It's sort of like the fundamental rule for riding a bike: At no time must the rider come in contact with anything but the bike.

To have someone competent to lay out all the equipment for an operation, prepare the area, and set everything but the patient up for it, is very useful, particularly when everything needs doing very quickly.

I believe that this topic is another which a reasonably intelligent person can learn in a day. Like the first, it really needs practice because with no exposure to the techniques and the instruments, any human being is apt to forget what's needed. But these are simple bits of knowledge someone can learn without putting out a lot of effort, and they are skills that would be extremely useful if a suspension had to be done in your area.

3. ARTIFICIAL RESPIRATION AND RESUSCITATION. This is something worth learning even if you never expect to be suspended or to help out with a suspension. Besides the elementary form involved in doing it by hand

(which is a first stage) there is the more complex form involved in learning and practicing how to load someone on an HLR. Both of these are likely to be very useful in case a suspension is imminent, and moreover useful in that they may

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help you to AVOID having to suspend someone close to you.

One of the best things about CPR, however, is that unlike the techniques I've discussed above, you don't need the cooperation of cryonicists to learn them. There are First Aid courses available from the Red Cross and other organizations too. You can learn all about this technique for free. For this reason, particularly if you are a cryonicist living far from others, it's very easy to take CPR as a first step towards becoming cryonically educated.

The more advanced form, of course, consists of learning how, and practicing to load someone onto an HLR. If you are ever personally present when someone's heart stops on the way to suspension (and of course not the main person involved), this skill will be very important. Loading someone onto an HLR is the principle thing to be done for them at that time. On the other hand, of course, it's much harder to learn this than to learn artificial respiration and heart compression.

4. INTUBATION AND CANNULATION. To assist breathing it's common to put a tube in the windpipe. If someone vomits while unconscious (a not uncommon occurrence during CPR), they can easily get vomit into their lungs, which will quickly suffocate them. We can deal with this potential problem by making sure that there is always a clear airway, with a tube.

Furthermore, part of a dog wash out, and a suspension as well, is the administration of antacid to neutralize the stomach acids. At the low temperatures of perfusion, the stomach acids are likely to eat holes in the stomach wall, causing serious hemorrhage or leakage of perfusate. To get the antacid into the stomach, we use a tube.

Finally, many drugs and solutions must be given by slow drip into the bloodstream. At the dog experiment I witnessed, for instance, Mike and Jerry used sodium bicarbonate to control the acidity of the dog's blood (and later of the perfusate that replaced the blood). To do this we have to have a line into the bloodstream, that is, a cannula.

I believe that learning to do these things and practicing them until reasonably competent should consume about two days. It's likely to be hard to practice after that, since you will need a compliant animal to practice on. However, even the fact that you've done so once is likely to be helpful.

HOW TO LEARN THESE SKILLS. Unfortunately cryonics is not

really widespread, or else there would be regular classes in all of these techniques. However if you live in the continental United States it's not terrifically expensive to visit Cryovita, where you can receive instruction (always assuming you warn the personnel of Cryovita well before your arrival!). If you wish to

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*** CAPTION --

"Thomas Donaldson and Sherry Cosgrove maintaining a post-operative watch."

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practice CPR you can buy a practice dummy; it's also easy to obtain examples of all the dosage forms of drugs, and the necessary syringes, for practice. The same is true of the surgical instruments.

Not only will these things help you to practice the necessary skills, but if you have them on hand you will have taken a significant step towards improving your local capability to do suspensions. Just having the surgical instruments and drugs on hand is a useful step. I will say, though, that if it is simply a matter of priorities for acquiring equipment, then heavy things, or things hard to acquire on short notice, such as water and oxygen, deserve priority. I personally feel that learning these skills is a bigger commitment, and in that sense should come after you have acquired basic equipment and supplies such as water for perfusion.

The most important point of this article, though, is the observation that you don't need to learn how to do major surgery in order to acquire skills which can significantly help out in the event someone needs suspension in your area. For a long time, skills such as those of a surgeon or physician needed to actually carry out a suspension will remain very rare. If you live far away from a cryonics center, you'll simply have to accept that you can't have such a person living nearby. However, there are useful steps that you and other cryonicists in your area can take to build up your abilities and make local suspensions far easier to perform for the suspension team which you bring in from the outside.

"Every man desires to live long; but no man would be old."

"When men grow virtuous in old age, they only make a sacrifice to God of the devil's leavings."

-- Johnathan Swift

BAY AREA UPDATE

by Dick Marsh

Coppola on Cryonics? Harman Hits a Homer?

Two noted Bay Area scholars were talking about cryonics recently, probably without realizing it.

The first is August Coppola, new Dean of the School of Creative Arts, San Francisco State University, and brother of noted filmmaker Francis Coppola. In a story by Ruthie Stein (San Francisco "Chronicle," December 18, 1984), Dr. Coppola is quoted as saying, "Everything that has been done in our civilization has been the result of a few people who had the daring and imagination to try something new."

Futurist and former Stanford University Professor Willis Harman and collaborator Howard Rheingold could also have been talking about cryonics when they wrote in "The Spectrum of Creativity" ("New Reality," Jan./Feb. 85): "The only certain rule is that the greater the novelty, originality, and depth of the breakthrough -- be it an idea, a work of art, or a scientific discovery -- the more likely it is to be seen at first as false, pernicious, or just plain foolish."

"Foolish," of course applies not to the concept of cryonics, but to those who prefer the guarantee of permanent death provided by cremation and embalming to the hope of extended life offered by cryonics.

BACS SAMPLER

Wind in the Right Direction at Gerontology Meeting?

No implications of faulty personal hygiene are intended in the above question. Just that things may be about to blow our way at last. What happened is this:

BACS Governors Paul Segall and Hal Sternberg attended the 37th meeting of the American Gerontology Society recently in San Antonio along with BACS member Saul Kent and other life-extension-oriented scientists. They found that, in contrast to the AGE meeting a month earlier in New York, the AGS meeting had attracted a poor turnout of scientific researchers. However, the meeting was nonetheless encouraging in several ways:

** It produced verbal encouragement from former National Institute of Aging Director Dr. Robert Butler to apply for NIA funding for life-extension-related aging research. When Paul directly confronted Dr. Butler with a

question about whether administrators at the NIA were still reluctant to support such research, Dr. Butler replied that if anti-aging scientists would just persevere through the admittedly cumbersome process of submitting applications for NIA funding, these applications would be taken very seriously.

** It produced an invitation to Paul Segall to attend the upcoming

prestigious Gordon Research Conference on the Biology of Aging. The invitation was extended to Paul by the Conference organizer although normally attendance at this Conference is by approval of application only. Such attendance generally reflects a certain kind of acceptance of a scientist and his work.

Perhaps the winds blowing in the direction of cryonics from out of the biological establishment are indeed becoming more favorable.

Another benefit to Drs. Sternberg and Segall of attending the AGS meeting was the opportunity to consult briefly with Audry Muggleton-Harris, a pioneer in the technology of vertebrate cloning. From her they learned that the controversy about the work of Drs. Peter Hoppe and Karl Illmensee, who have published papers on the cloning of mice from embryonic cells, as well as on the creation of the homozygous diploid, may not be as clear-cut as it once seemed.

Although there was controversy at the Conference about cloning, Paul's opinion is that "mammalian cloning can not at this time be excluded as potentially important to life extension."

In contrast, Dr. Richard Greulich, Director of the NIA's Gerontology Research has said ("Discover," Dec. 84) that he is interested in improving life rather than extending it. (Live one glorious day, then die?) Paul suggests, however that this lack of enthusiasm about life extension may simply reflect a "split in the ranks" and not "A unified negative stance."

Hamster Suspension Marches on.

An abstract has been submitted by Paul Segall, Harry Waitz, Hal Sternberg, and UC Berkeley Senior Sandra Gan of a presentation which Sandra hopes to make at the April, 1985, meeting of the Federation of American Societies for Experimental Biology (FASEB). Subject: advances in BACS-sponsored Hamster Suspension Project.

Talking It Up.

PBS television station KCET in L.A. aired "War on Aging," containing interviews with Paul Segall, Art Quaife, and Dr. Roy Walford. The November 28th broadcast contained footage of BACS-sponsored hamster research taped at the University of California at Berkeley together with segments filmed at Trans Time of people being frozen to liquid nitrogen temperatures. PBS bought national rights from Trans Time for the latter, and the show is expected to be shown around the country and perhaps in other English-speaking parts of the world.

Talk Radio an Untapped Public Relations Outlet?

A marvelous opportunity for free publicity opened up recently in San Francisco when KGO radio talk show host Ron Owens invited his listeners to participate in a discussion of the "right to die" issue. I phoned in, was put on the air, and explained that although my central interest is the life extension movement, I support the right to die. My reason: I have made arrangements to be frozen at death and I strongly prefer to be allowed to die

should death appear to be "inevitable" rather than to be kept alive as a

rotting vegetable with diminished chance for resuscitation and cure after being thawed.

I was careful to mention the name of the Bay Area Cryonics Society. This amounted to the name of the Bay Area Cryonics Society. This amounted to a free commercial promoting life extension and cryonics to an audience listening for program content and therefore open rather than braced against hearing a commercial message. Host Ron Owens was very courteous and receptive. He called my position "logical."

Surveys have shown that KGO has the largest radio audience in Northern California and that the Ron Owens show is one of the most popular of the KGO programs and is heard throughout the State and in several contiguous states.

I suggest that we cryonicists would be wise to be on the alert for the many opportunities for low-key but effective "propagandizing" provided by numerous radio and television talk shows. A commercial on a major station like KGO (which would have encountered the resistance and indifference often invited by commercials) would have cost in the hundreds of dollars. This "commercial" -- probably listened to by many with innocent openness -- was free. It took only a quick decision to act.

Managing Patients' Money.

At its November meeting, the BACS Board heard a report from Jim Yount, Chair of The Suspension Fund Advisory Committee, that the Committee is looking into the operation of the money funds which contain a substantial portion of BACS-held suspension funding. Jim promised a report on these and their utility at the next Board meeting. The Board then discussed: (a) higher risk investments which pay higher dividends and (b) The possibility of seeking additional funds from relatives of suspended patients.

Jim said also that he plans to make recommendations about more formal procedures to safeguard suspension funds.

BACS Eyeing TT and Cryovita.

The BACS Board is eyeing the scheduled negotiations for a new suspension contract between Trans Time and Cryovita Laboratories. Paul Segall emphasizes the need for a new Trans Time facility if BACS scientists are to participate in large animal experimentation and human hypothermic perfusion, preferably in collaboration with Cryovita.

Tahoe Talk.

Paul Segall suggested that Jack Zinn, he, and the UPDATE editor "give informational presentations about BACS goals and accomplishments at the upcoming Lake Tahoe Life Extension Conference to be held during the Memorial Day Weekend."

Sorry, John Krug.

Former BACS Governor John Krug has protested that I erred in a previous UPDATE report in attributing his recent resignation to "a loss of faith in all cryonics organizations." He writes, "I do not recall making such a statement to Dr. Marsh."

He is absolutely right. The statement was made to me by a third person, and I made the journalistic blunder of accepting hearsay evidence as direct evidence. I should have investigated more carefully or labeled the remark "opinion" and identified the source.

I hope John has not been hurt too much. He is a very able and industrious person who deserves better.

Incidentally, I have now forgotten who made the unfortunate remark to me in the first place.

BACS Board Reelected.

At the January 27 meeting. BACS members: Want new names and faces? Run yourself.

Little Sheba Rides Again.

Perhaps you'll be tempted to run for the BACS Board after you read this item about the recent BACS-Trans Time Holiday Party.

Professional Belly Dancing was a feature of that party. One BACS officer misread his cue, tried to hoist up the dancer's seductively sagging cinch with his hand when it was undulated before his eyes instead of stuffing paper money into it as its writhing occupant presumably intended.

TRANS TIME SAMPLER

TT Profits Up.

Trans Time profits rose from $250.63 in September to $3501.18 in October. Principal reason: sale of videotape rights. (Thus, TT survives --but it is not the money-making "scam" it was once accused of being by an East Coast newspaper.)

Videotapes for Sale.

Two recent mailing have gone out which offer for sale videotapes of cryonic suspensions performed by Trans Time. International: TV stations in Australia, Britain, Japan, and elsewhere -- 271 pieces. Domestic: 1565 pieces. Another mailing will offer slides, photographs, and interviews.

Facility Acquisition.

Still high priority, high energy, low accomplishment. But we're hanging in. We need a home, a building, a place wherewith to lay our heads.

Security for TT Customers.

TT has moved to maintain any advance customer deposits for emergency responsibility fees and long term storage fees in accounts separate from its general operating accounts and totally secured against use by TT except in the event of default of payment.

BACS/TT OK as Insurance Co-holders.

Highly experienced insurance agent Jim Yount reports that either BACS

Trans Time would be acceptable to most insurance companies as a co-holder of a suspension insurance policy.

Zinn and TT to Split Difference.

Trans Time consented to split the difference with Jack Zinn between two possible interpretations of their agreement about profits from the recent video mailing campaign. Civilization, it's wonderful.

RESEARCH SAMPLER

What Have Drs. Segall, Waitz, and Sternberg Been Up To?

They have: Temporarily abandoned the use of intracellular type perfusates (ICP) because of unpredictability of results *** gone back to use of pre-perfusion extracellular-type of blood substitutions *** reduced the amount of Tham buffer to its original level *** learned new ways of preventing the pH from becoming excessively acide *** explored a new procedure for harvesting the blood necessary for revival which does not involve injecting the blood donor hamsters with ketamine.

Using these new techniques they have revived a hamster which had been stored at a deep body temperature of 1.0ø for more than an hour. The animal lived for several hours. But because of the use of hyper-anticoagulation, it eventually died of hypovolemic hemorrhagic shock.

They have updated the design of their surgical stage so that it is now fully detachable. After perfusion is complete, they can now move the stage into either an insulated chest filled with crushed ice, a refrigerator, or even a freezer. This prevents the head from warming when circulation ceases, as the head region is not packed in ice and must be cooled by chilled perfusion or external refrigeration after cardiac arrest.

That should give you a rough idea.

Achievement, Optimism, and Progress.

In the BACS NOTEBOOK for November-December, 1984, are two very readable pieces which I commend to you. These are Paul Segall's "Outline: BACS Research Accomplishments -- 1984" and BACS President H. Jackson Zinn's "1984 -- YEAR OF PROGRESS." The first summarizes the substantial research successes of BACS for the year (many of which have been reported in BAY AREA UPDATE), and the second is an exuberantly optimistic assessment of the positive aspects of the year from the cryonics standpoint, both locally and generally. (Zinn writes, "I maintain, with some justification, that 1984 has been the greatest year in the history of cryonics in general and the Bay Area Cryonics Society in particular.")

Space limitation -- and CRYONICS' policy preferring not to republish material already published elsewhere -- prevent duplication of these here. But if you have a copy of the BACS NOTEBOOK in question lying around, take a look at these and see what you think.

Holiday Insight.

As it probably was in your part of the country, Handel's "Messiah" was broadcast by many Bay Area radio and television stations during the recent Holiday season. I'm not conventionally religious, yet whenever the Hallelujah

Chorus rang out with the marvelous line "And He shall reign for ever and ever," I could feel the little hairs on the back of my neck stand up.

Why? Why does it turn me on?

To answer this I want to go Jungian. The line is a symbolic assertion of my immortality -- i.e., the immortality of my consciousness in the physical body. "He" is not a kindly old man with a long white beard, magical powers, rigid morals, and a short temper, but a symbol for "consciousness" -- MY consciousness -- rooted in THIS body, which I hope will live for ever and ever. Or at least until I get tired of it, which seems very unlikely at this moment.

REVIEW OF THE ABSTRACTS OF THE 21ST ANNUAL MEETING OF THE SOCIETY FOR CRYOBIOLOGY

by Thomas Donaldson

When cryobiologists first attempted to freeze whole organs for long-term storage, they first did the obvious thing, which was to freeze a lot of organs. They used various regimens of drugs, cooling, and thawing. Some had tiny slivers of success; out of relatively large numbers of organs frozen at relatively high temperatures, a very small number functioned for a very short time. Perhaps Halasz had the best results of all, though of course his results wouldn't serve to do anything useful.

Of course, it was right to try this. We don't know that the obvious thing won't work until we actually try it and see. By now, though, it's clear to many careful readers of the literature of cryobiology that a direct, bullheaded approach to freezing organs simply isn't going to work. There are far too many variables for a successful trial-and-error approach to freezing whole organs. Indeed, there are so many dead ends by this time that we can safely conclude that useful whole-organ freezings without more fundamental understanding are TOTALLY OUT OF THE QUESTION.

With this in mind, cryonicists can conclude that whole body freezings and revivals are even less likely to succeed, without much more understanding of the exact damage sustained by organs and tissues in freezing. Immense amounts of money could pour into suspensions, but without more understanding, it will lead nowhere. I feel that these comments deserve much attention by those who are funding such research.

I'm reminded of the old experiment with chickens on one side of a fence, and food on the other. The chickens can see their food, just beyond their reach on the other side. Lacking brains, however, they can't think of trying

to reach those grains of wheat they see on the other side. We human beings think poorly of the mental powers of chickens, but many researchers and funding agencies, not just in cryonics, but in cryobiology and medicine, behave in virtually identical ways when faced by a goal they desire intensely and which is just beyond their reach. Most of the funding problems of aging research, versus the vast sums spent on cancer, stem from exactly the attitudes of such myopic chickens.

However, I digress.

Many of the papers presented at the 21st Annual Meeting will interest cryonicists. Unlike the meeting last year, fewer cryobiologists presented papers aimed directly at freezing whole organs. On close reading, however, many papers were indirect studies of phenomena which should affect whole organ freezing. Perhaps at least for cryobiologists and organ freezing, scientists have begun to act less like chickens and more like human beings.

First, there was work on intermediate short-term ways of preserving organs. This work is interesting for the main goal in three ways. If we freeze an organ, we will inevitably hold it for some time at a temperature ABOVE freezing. We will need special solutions. If a solution can't even allow an organ to survive at temperatures ABOVE zero, we can't expect it will help BELOW zero. Secondly, short-term methods of preserving organs will help alleviate the problem which frozen organ storage should ultimately solve. Thirdly, successes in short-term preservation of organs may increase public and private funding for work in this area.

Several interesting papers explored the possibility that free radicals, the old enemies of many immortalists, may also play a role in damage to organs stored at low (but above zero) temperatures. C. J. Green et al (Abstract 51) reported using chemical techniques to study oxidation reactions in cooled kidneys. They did this by measuring the level of lipid peroxides in kidneys. Lipid peroxides are simply the chemical result of free radical reactions on lipids.

Greene et al found that if they flushed the kidneys with saline, they got lipid peroxide levels two times higher than if they flushed the same kidneys with citrate. The higher the levels of GLUTATHIONE (a cell antioxidant), the lower the levels of lipid peroxide.

N. A. Halasz, G. M. Collins, et al carried this line of thought further. They reported their results in directly adding two different antioxidants to their perfusate (Abstract 53). They tried two different chemicals, ascorbate (a form of Vitamin C) and glutathione. This was successful, allowing them to maintain rabbit kidneys for 24 hours while perfusing them at low temperatures. Kidneys perfused without these antioxidants worked much less well after 24 hours.

Halasz et al also tried other kinds of antioxidants which would function in a different way, chemically, from the two above. Ascorbate and glutathione act as antioxidants by providing substrates on which the oxygen-based free radicals can work. This prevents injury to other parts of the cells. Two other chemicals which tend to inhibit these reactions, Vitamin E and superoxide dismutase, didn't help survival of the kidneys. In fact, both substances caused more damage than was seen in the control kidneys. (Superoxide dismutase

is an enzyme whose function is protection of cells from free radical damage.)

Another group composed of Halasz, Collins, Bry, and Bennett, found that with the right combination of perfusates, they could make superoxide dismutase work very well in protecting against free radical injury. In this second series of experiments, they used a combination of two different enzymes, catalase and superoxide dismutase. This combination protected rabbit kidneys very well from the effects of prolonged perfusion at near-zero temperatures. When these experimenters tried binding the superoxide dismutase to polyethylene glycol (a cryoprotectant), they got even better protection (Abstract 57).

Secondly, there has been some quite significant work on fundamental mechanisms of injury. On the cellular level, L. E. McGann, J. M. Turc, and others at the Canadian Red Cross report several experiments on how freezing affects cell membranes, both with and without cryoprotectants. In Abstract 24, these scientists report their results from a study of exactly how DMSO affects the ability of water to pass through cell membranes.

This problem is very important because when we attempt to remove the cryoprotectant after freezing, the cells can simply draw up more water, and eventually burst. There are reasonably good biophysical laws describing osmosis and swelling in such a case. However, among cryoprotectants, DMSO particularly will change the properties of cell membranes. We wouldn't expect these laws to hold for DMSO.

McGann et al found that in white blood cells, DMSO did not cause any deviation from established biophysical laws. They point out that their experiment shows that permeability of cell membranes to water does not depend on their lipid content, since DMSO affects the lipids. These scientists also presented some ideas on how to measure the stress on the cell membranes during perfusion, by measuring the light scattered from them. Such measures should tell us in much more detail just how cells are affected by freezing and solutions of cryoprotectant. They later went on (Abstract 31) to use their technique in studying the effects of freezing upon permeability of cell membranes. Using human white blood cells, they found a very high correlation between injury to the cells and changes in permeability during freezing without cryoprotectant. However, this correlation wasn't perfect: one type of white blood cell, the granulocyte, showed injury by freezing even before permeability changed.

Freezing injury to organs happens not just on a cellular level, but on the level of the tissues too. One very important part of that freezing injury consists of damage to the vascular system. Damage the vascular system, of course, and frozen organs will find it hard to recover after thawing, since they'll get no oxygen or nutrients to support recovery. D. E. Pegg and others at the Medical Research Council Cryobiology Group at Cambridge, England reported their work (Abstract 58) on one method of studying this vascular injury. Their method was to make a preparation from the mesentery (these are the transparent curtains which maintain our body organs in place in the body cavity), freeze it, and study what happens to its vascular system as a result. Rapidly adding glycerol at temperatures above zero caused a dramatic increase in the permeability of the vascular system. Pegg et al felt that this came from the breaking of the junctions between cells. Rapidly removing the glycerol caused swelling of the vascular cells, which blocked circulation. Both of these effects happened on a very small scale, to the capillaries and

the venules rather than to large arteries and veins. In their preparation, glycerol did provide some protection to the vascular system during freezing.

I feel that this work is only a beginning on an important study, the study of means of preventing the damage to the vascular system that happens during freezing. We've reported in other issues of CRYONICS about the growing indication that damage to the vascular system is a major reason why whole organ freezings work out worse than we would expect from single-cell experiments.

Finally, two teams of experimenters reported results which would interest cryonicists less for the basic knowledge achieved than because they have a direct relevance to the effects of cryonic suspension right now. G. M. Fahy and A. M. Crane report in Abstract 59 that only half the level of glycerol used (3M glycerol, rather than 6M) would still give excellent preservation of the cell structure of RABBIT BRAINS. In their experiment, Fahy and Crane perfused their rabbit brains at room temperature 25 degrees C. When they tried the same perfusion at 15 degrees C, they found that the brain cells tended to shrink, and the axons (where neurons communicate with each other) tended to separate. A lower temperature is more acceptable in terms of reducing biochemical activity during perfusion, but is contraindicated by these results.

Finally, Paul Segall, Harry Waitz, and others who are openly cryonicists, presented another interesting paper. Paul Segall reported on his work with low temperature perfusion in hamsters; fundamentally, Paul is working on the problem of whole body washout in small mammals. The major interest in such a technique is that hamsters are far less costly than, for instance, dogs. Any ideas we get from hampsters will need testing on dogs, but such an experimental preparation shows promise as a means of letting us test out ideas much more cheaply. Since all progress costs money, that may mean more rapid progress. Segall and his coworkers have now worked out how to do a whole body workout on hamsters. The longest survival they've gotten so far is six hours after the experiment. They need better perfusates, of course. One major problem is simply that the animals are very small. It's not clear to me that the usefulness of their preparation really lies in the long term survival of the hampsters anyway.

"In Nature's infinite book of secrecy
A Little can be read."

-- Shakespeare

"For man walketh in a vain shadow, and dis-
quieteth himself in vain: he heapeth up riches
and cannot tell who shall gather them."

-- The Common Book of Prayer

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by Mike Darwin

It has been our custom to bring fairly in-depth reviews of the Society for Cryobiology's annual meetings. In the past we have tried to summarize work of importance to cryonics as well as work which represents a fundamental advance in our insight into the basic mechanisms of cryoinjury. It is a sad commentary on the state of the Society for Cryobiology and of cryobiology in general that this year we will not be presenting such an in-depth review of the meeting. It is the consensus of the people who have reviewed the meetings in the past that CRYO'84 does not merit the necessary effort. I will cover a few of the papers I found of interest, but I wish to note at the outset that I am not a professional cryobiologist and probably missed the mark on many of the presentations. Elsewhere in this issue Thomas Donaldson presents a view of the meeting based on the published abstracts.

I have attended many professional and scientific meetings, including one previous Society for Cryobiology meeting, but I think I can honestly say I have never attended a meeting of poorer quality than the Society's 21st Annual Meeting. Things got off to a less than rosy start when it became apparent that the host of the meeting, Geof Collins, was not present. Dr. Collins had recently moved from his position at the Veterans Hospital in La Jolla to take a position in San Francisco. The organization and hosting of the meeting thus fell to Janice Parr, the University of California at San Diego (UCSD) Continuing Medical Education Coordinator. Ms. Parr did an outstanding job in what must have been a trying situation, but could not be expected to give the little touches and personal concern that make the difference between success and failure of a meeting. Dr. Collins' absence was heightened by a current of rumors about the reasons for his leaving and whether or not he would show up for any of the meeting. No formal announcement was made to explain or even take notice of his absence, and worst of all, apparently no one from the Society was appointed to act in his place as host. The continuing expectation was that Dr. Collins would shortly put in an appearance. In fact he never did, and we were all left with the uncomfortable feeling of being at a party where the guest of honor has failed to show.

The sessions were held in Petersen hall (two lecture rooms, an exhibit room and a foyer) at UCSD -- a considerable distance from anything of interest -- not even a grocery store or a restaurant where surcease could be found from the horrid little "box lunches" which were served every day. The atmosphere at the meeting was reminiscent of being stuck in a Head-Start Program for four days: endless repetition of the basics and stale cookies and room temperature milk in the same institutional yellow room. The section of the UCSD campus where the meeting was held is among the ugliest and most lackluster I have ever seen.

The surroundings might best be described as "early industrial revolution." To compound the dismal atmosphere, it rained two days of the four-day meeting and the sun did not break through a deep overcast until the final hours of the closing session.

Much of the really interesting fundamental cryobiology being done these days is being done with plant protoplasts. One paper which was quite worthwhile was "Lamellar to Hexagonal II Phase Transitions in the Plasma Membrane of Isolated Protoplasts as a Result of Freeze-Induced Dehydration"

by Gordon-Kamm and Steponkus of Cornell University. The work was of particular interest because it documents on an ultrastructural level membrane changes associated with freezing injury. Several types of phase transitions are observed in the membrane of the protoplasts of non-cold acclimated rye leaves. These occur as a result of the increase in osmolality (reduction of available water) associated with freezing. Basically what happens is that the relatively amorphous membrane structure normally present alters quite radically during freezing to become organized first into enriched lipid regions (lateral phase separation) and then into hexagonal tubular structures. The integrity of the membrane (as indicated by loss of osmotic responsiveness upon thawing) is breached by this reorganization of the membrane. This kind of membrane phase change was documented by freeze fracture scanning electron microscopy and was found to occur not only during freezing but also during other kinds of osmotic stress such as subjecting the cells to 5 to 13 osm sorbitol at 9 degrees centigrade. Cooling to -10 degrees centigrade in the absence of freezing (by supercooling the sample) was NOT associated with this kind of membrane change.

Perhaps one of the most encouraging aspects of this work is that it demonstrates, essentially on a molecular level, several different kinds of injury which can be sustained during freezing. Whether the sorts of changes observed in plants apply to cryopreserved mammalian cells remains to be determined. In any case, it seems likely that such changes are relatively slight from an information loss standpoint, and may be readily reversible with even very simple kinds of repair techniques.

The entire Symposium on Cold Tolerance and Plant Cryobiology was interesting, but little really new or exciting material was presented. Even the Hex II phase transitions and lateral separations have been reported before. I definitely got the impression that Peter Steponkus is THE leading figure in membrane cryobiology these days. Virtually every paper of elegance or interest in this symposium was produced by Steponkus or one of his graduate students.

The second symposium was on The Physiology of the Isolated Perfused Organ and was moderated by James Southard, a Madison, Wisconsin organ preservationist who is to host the Society's meeting next year. There were several papers of some interest in this session, among them "The Physiology of the Isolated Perfused Dog Live and Its Use in Organ Preservation" by Luc Lambotte of Brussels, Belgium. Lambotte has been working to develop a better understanding of the pathology of ischemia and of perfusion injury. He has evaluated the impact of these changes by examining membrane potential as a function of membrane permeability and active ion transport. Also of interest was a dinner conversation we had at the San Diego Zoo with Dr. Lambotte where we learned that liver cells are very permeable to mannitol and that Lambotte has been unable to use mannitol as an impermeant osmotic agent during hypothermic preservation. Dr. Lambotte also commented that his group is now able to achieve 24-hour liver preservation with a high rate of success (for clinical application). This is of

interest to cryonicists because we are currently using mannitol in our base perfusates as the primary impermeant osmotic agent. If the liver becomes a limiting factor in our total body washout work, Dr. Lambotte suggested we consider sucrose (table sugar) as an alternative osmotic agent.

Another paper worth discussing as Toledo-Pereyra's work on "The

Physiology of the Isolated Perfused Pancreas." Pereyra has been able to achieve successful 24-48-hour preservation of the dog pancreas employing a solution called "TP-II" or "silica gel fraction" based on its method of preparation. Current clinical limits on pancreas preservation are in the 12-hour range. Unfortunately, Toledo-Pereyra's delivery was rushed along and poorly organized so that it was difficult to follow his train of thought.

In another session, Japanese researchers Knaai et al. reported that they were also able to greatly improve pancreas preservation using the new Japanese prostacycline derivative, OP-41483.

Southard presented a lengthy paper on the physiology of the isolated perfused kidney which demonstrated once again that ATP levels do not seem to correlate well (or perhaps even at all) with subsequent viability of the graft. One of the most sensitive indicators they found was diminished capacity of stored organs to reabsorb sodium. A series of absolutely breathtaking scanning electron micrographs were made of the various functional units of the kidney (glomerulus, tubules, and so on), detailing on an ultrastructural level the kinds of changes which occurred as a consequence of extended (beyond 3 days) hypothermic storage. Not surprisingly, many of the changes that appeared to be responsible for graft failure were centered in the vasculature. Blebbing, roughening, and general breakdown of the surface of the capillary endothelial cells started to become particularly pronounced after three days of storage. This kind of evaluative work may be of great importance because it offers the investigator a way to actually see if a modification in approach will result in inhibition of these undesirable changes.

The final paper in this session was something of a technical tour de force by V.C. Marshall of Monash University at Melbourne, Australia. Dr. Marshall presented extended work correlating various in vitro assay for viability with subsequent performance of the implanted graft. He presented a massive amount of work using transplantation of rat kidneys as his primary model. Dr. Marshall seems to have established organ performance during in vitro normothermic asanguineous perfusion as a highly predictive way of evaluating subsequent graft function. His paper was technically excellent and lucidly presented. The work, which entailed carrying out literally hundreds of kidney transplants in rats, is enough to give one pause of thought.

Session II, which began Tuesday afternoon, contained just about the largest group of poorly conceived, nearly worthless scientific presentations I have yet seen. It opened with a very crude paper on freezing and cold-shock effects on the marine diatom Thalassiosira weissflogii by Michael Meyer of Texas A&M University. This paper was poorly presented and contained little if any information of either practical or theoretical use. It was followed by two papers by Locksley McGann, et al of the Department of Pathology of the University of Alberta in Edmonton, Canada. McGann was attempting to develop predictive mathematics for relating intracellular water volume during freezing to temperature, cooling rate, cell surface area, membrane water permeability, nd particularly the temperature dependence of water permeability. Well and good

so far. Unfortunately he then went on in his second paper "Influence of DMSO on Water Permeability" to confuse DMSO permeability with water

permeability. In the published abstract, the confusion mounts because he claims one must pay attention to DMSO permeability because it has no effect on water permeation rate! McGann's work was criticized at the meeting, and I heard several investigators comment "privately" that they felt it was somewhat of an embarrassment for him.

Midway through the session was an interesting paper (the only good on in this reviewer's opinion) by David Pegg of Cambridge, England on "The Possible Roles of Unfrozen Liquid Volume, Solute Concentration, and Low Temperature in the Causation of Freezing Injury." This is an example of Pegg's current series of outstanding theoretical efforts. It presented work indicating that freezing injury in the model system they employed (red blood cells) is due primarily to only two damaging factors: remaining liquid liquid volume fraction and salt concentration. Interestingly, salt concentration did not become a significant factor in injury until concentrations exceeding 5g/100 cc of solution were reached as a result of concentration during freezing. These results partly confirm Mazur's current theory of "slow freezing" injury, but disagree with Mazur in finding a better correlation between injury and unfrozen volume than between injury and unfrozen water. This may be hopeful for cryonicists because it may predict less freezing injury and because it allows us to predict protective concentrations of glycerol for the brain more easily.

There were a few other papers of interest such as Jacobsen and Pegg's presentation: "Attempts to Reduce Vascular Injury to Kidneys During Freezing and Thawing." The authors subjected rabbit kidneys to careful osmotic buffering during deglycerolization (following glycerolization to 2M, freezing to -80 degrees centigrade and thawing) and also to gas perfusion with helium. In no case was vascular recovery good. Somewhat surprisingly, in view of several previous favorable reports was the finding that vascular perfusion with gaseous helium increased vascular injury. Following the session, I questioned Dr. Jacobsen about the protocol they employed for helium perfusion. Apparently they continuously perfused the kidneys with dry helium gas (open circuit) during cooling (at a rate of 1 degree C per hour) and rewarming (1 degree C per min.). I pointed out that such a lengthy period of perfusion at high subzero temperatures was likely to result in dehydration of the vascular endothelium -- which could account for their poor results. Dr. Jacobsen agreed and indicated that this was something he hadn't previously considered. He also commented that they had found helium gas emboli to be a problem.

Greg Fahy of the Red Cross Blood Research Lab in Bethesda, Maryland presented a report on his extremely important work on "Histological Cryoprotection of Rabbit Brains with 3 Molar Glycerol." This was something of a surprise, as his original abstract had announced success at completely suppressing the toxicity of vitrifiable solutions of cryoprotective agents. Apparently his success could not be reproduced, and the abstract was withdrawn. Despite this disappointment, Fahy's substitute paper was quite a worthwhile replacement and demonstrated that strikingly good histological protection of the rabbit brain can be attained following freezing to dry ice temperature using only 3 molar glycerol. His earlier work had shown good protection with 6 molar glycerol, which is a much harder concentration to reach in practice. One negative finding was that even 3 molar glycerol caused massive shrinkage of brain cells if perfusion was at 15 degrees centigrade rather than room temperature. This could be a problem because the toxicity of glycerol will be

much higher at room temperature. We may have to choose between toxicity on the one hand, and excessive cell shrinkage on the other.

G.G. Pollock, D.E. Pegg, and I.R. Hardie presented their work on establishing a good model of vascular cryoinjury, which everyone agrees on is a very important area of research now receiving very little direct attention. They managed to spread the transparent but well vascularized mesentery of a rat onto a cryomicroscope stage, perfuse it with cryoprotectants, and freeze and thaw it while observing it microscopically. Although they were not successful at freezing and thawing the mesentery without damaging its vascular system, they showed that the vasculature behaves as it should based on theory and experiments on whole organs, and that it seems therefore to be a nice model system for more thorough work in the future.

The only other paper of interest on the cryobiology of organs was one by Frank Guttman, et al, of McGill University in Quebec. Guttman reported fairly good in vitro recovery of rabbit kidneys following perfusion and removal of 4M DMSO, but very poor function after cooling to -15 or -20 degrees C at a rate of either 0.1 or 0.5 degrees C per min. Better function, though by no means approaching control, was achieved at a cooling rate of 1 degree C/min with cooling to -10 degrees C. Unfortunately, these results conflict with those of Pegg et al, who found that slower cooling rates are necessary to prevent vascular cryoinjury. This could represent a dilemma if the viability of kidney cells requires higher cooling rates than are tolerable for the vasculature.

Bry, Halasz, and Collins presented a fascinating paper on the effects of modulating "redox" potential during hypothermic kidney preservation. For some time, it has been felt that simple flushing followed by ice storage is superior to continuous perfusion. One reason this may be so is that perfusion (with concomitant oxygenation) may be causing oxidative injury or free radical injury or both. The investigators perfused rabbit kidneys and continuously controlled the "electron buffering" capacity of the perfusate by measuring and adjusting redox potential. They were able to achieve function in perfused kidneys equal to that achieved in fresh kidneys by adding 12 to 17 micromoles each of the reducing agents glutathione and ascorbate. Their results indicated that it was control of redox potential rather than free radical activity that was important. This work is of concern to cryonicists since we must continuously perfuse suspension patients, sometimes for up to 8 hours, in order to introduce cryoprotective agents. Any technique which allowed us to reduce perfusion injury and thus be able to perfuse longer, or with fewer complications, is thus of special relevance. In this regard we appear to have been on the right track since we have been adding glutathione, as a reducing agent, to our perfusate for some time. We may wish to consider the addition of ascorbate as well.

Another paper Bennett, Bry, Collins, and Halasz seemed to further implicate free radical damage as a culprit in hypothermic perfusion. These investigators found that superoxide dismutase (SOD) plus catalase, two potent free radical inhibitors, were also were effective in reducing injury and improving function in perfused rabbit kidneys, such that performance was comparable to the function of fresh kidneys.

Without a doubt the most interesting, enjoyable, and amazing paper presented at the meeting was one by Ken Storey of Carleton University in Ottawa, Canada, on the "Freeze Tolerance in Terrestrial Frogs." He has pursued work on the freezing tolerance of land-dwelling frogs and has found some rather

remarkable things about these animals. Apparently these frogs do not begin to produce cryoprotectant (in this case, glucose and glycerol) until freezing has already begun! Then, within seconds to minutes they produce cryoprotective agent in the liver and distribute it to other tissues of the body. Storey has also documented that these animals appear to withstand freezing to lower temperatures than was previously thought (perhaps as low as -8 degrees C). The animals' hearts may not start beating until hours after thawing takes place! Storey is a gift storyteller. His presentation was both fascinating and funny, and his conversation with us after his lecture was a pleasure. He was one of the few people I encountered at the cryobiology meeting who seemed to have any real enthusiasm for the work he was doing.

Paul Segall of the Bay Area Cryonics Society presented a paper on the hamster work he and Harold "Frosty" Waitz, and others are working on. The main significance of his work may be the fact that his presentation was allowed to take place at all. No really hostile questions or comments were uttered, and the talk went successfully.

U. Schneider from Peter Mazur's group at the Oak Ridge National Laboratory gave an important paper on mechanisms of freezing injury in mouse embryos. Basically, he and his co-workers tested Mazur's new concept that freezing injury is caused mainly by compression of cells between sheets of ice during freezing. This idea has come from studies on red blood cells and it is critical to know if this type of behavior applies to "real" systems like embryos. The answer is: "maybe and maybe not." Unfortunately, the results were sufficiently confused to preclude a simple conclusion. However, the embryos definitely did not seem to mind high salt concentrations. In fact, in some cases survival was better when high salt concentrations were used.

Stanley Leibo, Michael Dowgert, and Peter Steponkus reported some really new and fundamental cryobiological phenomena using bovine embryos as a model system. Their elegant experiments were concerned with better defining the conditions that lead to the formation of intracellular ice. Essentially, all embryos were frozen sufficiently rapidly to experience intracellular freezing, and the temperatures at which this ice formed during cooling and melted during warming were observed using Steponkus' super cryomicroscope. The difference between the freezing temperature and the melting temperature indicates how supercooled the cells were at the time they froze. What they found was that the higher the cooling rate, the higher the temperature at which the embryos froze and the lower the extent of the supercooling. Apparently, because slow cooling leaves less freezable water in cells, this water can supercool more than the large quantity of supercooled water left in cells during rapid cooling. This doesn't really have any value for cryonics, but at least it shows some intelligent work going on in the field of cryobiology!

I have probably missed many papers of some relevance to basic cryobiology. Several of the sessions overlapped and it was not possible to attend to all of the papers of interest due to conflicts in timing. This was yet another frustrating aspect to the meeting. In fact, the times of several symposia were changed with very slight notice, at least on one occasion resulting in two interesting blocks of material being scheduled opposite each other and one investigator having two papers to present at the same time.

Some additional general observations about the meeting are in order. First of all and perhaps most importantly, it was very poorly attended. One got the

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feeling that the Society for Cryobiology was not very alive, and that few if any people felt that airing of research work at such a meeting would be of much benefit to them. Attendance at the organ preservation session was especially dismal, with 8 of 40 attendees being cryonicists. The only session which was more poorly attended was the cryosurgery session in which better than half of the ten attendees were cryonicists! This was unfortunate since a very excellent paper by UCLA's Dr. Robert Rand on cryosurgery for breast cancer was presented to a virtually empty auditorium. Dr. Rand was able to demonstrate a 20% recurrence of breast cancer in mice subjected to "cryolumpectomy" (where the tumor was frozen, surgically removed, and the surrounding tissues subjected to several freeze-thaw cycles) versus an 80% recurrence when the tumor was simply removed using a conventional surgical approach.

Most of the cryobiologists I spoke with socially seemed very reserved about their work and few had any real enthusiasm. Even David Pegg seemed somewhat discouraged, and expressed little optimism about the prospects for progress. Perhaps most disturbing, I found little in the way of new ideas or approaches looming on the horizon, or waiting to be tried out. The dominant attitude seemed to be: "Now what?" I can unhappily contrast the cryobiology meeting with a session on spinal cord regeneration/repair which I attended a few months later. The Spinal Cord Society's (SCS) meeting was characterized by a cross section of investigators quite excited and enthusiastic about their work, and teeming with ideas, both theoretical and empirical, about how to achieve cord regeneration. A more important difference still was that the SCS meeting was heavily attended by cord-injured patients and the researchers welcomed their presence and actively solicited their help and support.

By contrast, the attitude of cryobiologists was one of fear and loathing of cryonicists. Few of the old guard cryobiologists (such as Meryman, Pegg, Baust, Mazur, and so on) wanted to have anything to do with us. All were courteous, and I think all were impressed with the professionalism and knowledge we brought to the meeting, BUT, that's where it stopped. They were not friendly, and they ARE hostile. The lunches and social affairs were a bit painful, with cryonicists huddled at one table and cryobiologists at the others.

The few in-depth conversations I had with cryobiologists such as with Michael Taylor (of Pegg's group -- although he is currently in South Carolina) were not very encouraging. I got the feeling that cryobiologists understand fairly well what we want, but are actually very hostile to us getting it. They do not, I think, want to see suspended animation for humans, or even human brains, developed. At one point I overhead two cryobiologists talking (who were unaware of my presence) and one remarked to the other that "These cryonicists are no fools. They appear to be quite scientifically sophisticated and very well informed on what's happening with the Society." "Perhaps too sophisticated," the other remarked.

In this same vein several cryobiologists from the Red Cross Blood Research Lab had a bit of a confrontation (all very civilized) with Paul Segall and I. The group from Red Cross included Harold Meryman, his close

associate Mary Douglas, and Greg Fahy. Segall protested the exclusion of cryonicists from the Society's ranks and Meryman responded that it was not the Society's intention to stop scientific disclosure or prevent competent and scientifically creditable individuals from participating. Nevertheless, the Society, Meryman observed, could not allowed itself to be tarred with the cryonics brush, and that what we as

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cryonicists were doing was without scientific foundation and in fact did not constitute science at all. Both Paul and I countered this nonsense with numerous hard examples, but the upshot was that the Society leadership and presumably membership were not going to be swayed by the facts.

Looking back on the meeting, I feel an intense sense of frustration and despair. It is apparent that the Society is not doing well. The really awful quality of many of the papers (including an especially disgraceful personal propaganda presentation by Japanese "cryobiologist" S. Sumida) indicates just how bad things are. Almost nowhere was there any real motivation to make progress and succeed (with the exception of Fahy's work and possibly Pegg's) and there were only a handful of youthful investigators present -- most of whom seemed, not surprisingly, very discouraged by the meeting. The dominant mood was one of a rather droll, academic game of chess going on in some old gentleman's club where the participants are more interested in marking time in some socially acceptable and reassuring kind of way rather than really winning.

About the only "establishment" people at the Cryobiology meeting I felt we had any improved rapport with were the cryogenics people (i.e., the vendors). In particular, I had several long, (maybe even the adjective productive applies) conversations with Peter Orenski, the national sales manager for Union Carbide's cryogenic equipment. I was a bit reluctant to talk about cryonics to Orenski since Union Carbide (under the rabid direction of Arthur Rinfret) has been less than cordial to cryonics. In fact, at one time Linde (then the cryogenic division of Union Carbide) actually had "hit squads" organized which went around to local grade schools and high schools to "educate" youngsters about cryogenics. Nearly a third of their presentation consisted of misinformation, lies, and distortion of facts aimed at discrediting cryonics. I know they used to do this because they came to my high school. (By the time I encountered them I had already been involved in a perfusion and freezing, and I gave them what might politely be described as a bit of a verbal working over.) It is my understanding that Rinfret was responsible for this attitude.

Apparently times have changed, and Rinfret and the cryobiological mafia no longer hold sway over Union Carbide. The Linde division is gone and the company's management has been restructured. Orenski was friendly and interested in what we are doing. He even requested (and got) a subscription to CRYONICS. I think Union Carbide's cryogenics division is not insensitive to the fact that they are now selling thousands of dollars worth of liquid nitrogen a year to us and that sales are going up, rather than down. In fact, as one distributor commented during the meeting, "I've sold three times the amount of cryogenic equipment and liquid nitrogen to YOU people than I have to any of these cryobiologists." As another vendor sagely observed: "You guys need liquid nitrogen year in and year out. You need new equipment year after year. For you the demand doesn't go away. These guys (cryobiologists) are seasonal birds. Grants are cancelled, projects are over. One steady customer is worth a dozen occasional small customers." If they had an illusions about the economic clout of

cryobiologists these days, the vendors were (by the close of the meeting) painfully aware that cryobiologists are not big spenders -- funding just isn't there.

I feel that Orenski and others were well aware that I was likely to represent perhaps the greatest potential there for big sales. Cryonicists' need for custom dewars and special storage systems (we specifically discussed the cracking problem) means MONEY. In a relatively small and highly competitive

industry this is a fact which I believe will not long be overlooked. Increasingly, MONEY is something we have, and those vendors who get it when it comes time for capital equipment purchases will be those who treat us decently and with respect, regardless of what they may think of us. The thrust of this is that vendors are more interested in money than in enforcing the Society's principles. Apparently gone are the days when the Society for Cryobiology could threaten a major manufacturer of cryogenic equipment with being "blacklisted" for making dewars for us. The pathetic gathering in San Diego isn't going to be "blacklisting" anyone for very much longer unless they experience a real change in direction and injection of fresh, new blood.

It is very hard to assess what kind of future the Society has in store for it. The current leadership (Arthur Rowe, of the New York Blood Center, is now President) seems unimaginative and very bound by tradition. No efforts were made to welcome the few new investigators who attended, and several of these people, for lack of better company, gravitated to our group. A number of newcomers who were from Europe and attending the meeting for the first time, found themselves totally cut off from any socializing, and, like us, were left to fend for themselves during the four long days of the meeting. Such disgraceful behavior is yet another indication of the current state of the Society. As one newcomer from Northern Europe remarked, "At no time has anyone approached me to welcome me, inquire if my accommodations are acceptable or even to invite me to social events. Such lack of hospitality is shameful." I echo his sentiments. But then, what can you expect from a bunch of people who are genuinely hostile and indeed even terrified of the notion that cryonicists may actually figure out a way to go on living by infringing on cryobiologists' territory? How stupid, uncultured, and uncivilized of us to interrupt their little academic game of chess with something as crude as wanting to survive.

A.I.D.S.
AN UPDATE

In 1983 we ran an article on the AIDS epidemic cautioning our readers to avoid promiscuity and pointing out the risks of this illness and its likelihood for large scale growth. While initial projections on the rate of doubling have proven too pessimistic (people have responded by being more careful: incidence of gonorrhea and other sexually transmitted diseases have dropped dramatically as well), the problem is not a small one and it is not going away. In the United States at present, AIDS cases are doubling approximately every year. As of the

end of 1984 over 7,000 had been afflicted with the disease. Each week for the last two weeks the Centers for Disease Control (CDC) has reported 120 new cases of AIDS.

In Zaire, Africa, the disease has become quite explosive and is primarily a heterosexual disease, as is also the case in Haiti, where the number of cases is increasing dramatically as well. There are increasing numbers of cases of AIDS being reported in the heterosexual community and as of this writing 11% of all new AIDS cases are in women. It seems very likely that within a year or two at most, AIDS will have ceased to be a predominately homosexual problem.

Health officials in the United States and Europe have expressed concern over the ability of the medical system to handle the number of AIDS cases likely to develop in the coming year. Current estimates are that 150,000 to 250,000 people in the United States have been exposed to HTLV-III, the virus which is widely accepted to be the causative agent of AIDS. Within the next one to five years it is anticipated that 20,000 to 30,000 of these individuals will go on to develop the "full blown" or terminal phase of the disease. Many times that number will suffer varying degrees of disability and poor health and will act as carriers, but will not immediately die of "classical" AIDS. Some estimates put the number of "pre-AIDS" patients, or people with enlarged lymph nodes and reduced immune function from the virus, as high as 10 to 1 for every patient who develops the lethal form.

Unfortunately, even those who are not clearly ill with AIDS may not be spared in the long run. Recent research has shown that the AIDS virus is directly responsible for dementia seen in AIDS and pre-AIDS patients. For sometime it has been known that a fair number of AIDS patients without secondary central nervous system disease (such as parasitic, bacterial or viral infection of the brain) develop a progressive dementia characterized early on by lack of ability to concentrate and progressive memory loss. This syndrome has now been better classified (SCIENCE, vol. 227, pg. 177, 11 January, 1985) and appears to be due to direct action of HTLV-III on brain and glial cells. It appears that HTLV-III is closely related to and shares a number of properties in common with visna virus, a lentivirus that causes chronic degenerative neurological disease in sheep. Brain cells and T lymphocytes are known to share common cell surface antigens and the recent work reported in SCIENCE has demonstrated HTLV-III sequences in the brains of AIDS patients with dementia.

From a cryonics standpoint, AIDS is a specially bad disease to get. A significant number of AIDS patients die of massive CNS infections which might well make cryonic suspension a useless exercise. The recent work documenting multiple and extensive brain lesions as a direct result of HTLV-III is yet another reason for extreme caution.

In a recent interview, CDC's Robert Gallo (American discoverer of HTLV-III) offered the following advice: "What I believe is far more cautious than avoiding certain sexual practices. I would advocate sexual abstinence until this problem is solved. It may be awhile. It may be a lifetime. I'm sorry, I'm doing my best." Unfortunately, we are forced to echo Dr. Gallo's advice as being the safest and sanest around right now.

On the treatment front, three chemotherapeutic agents have shown promise in vitro in inhibiting multiplication of the HTLV-III virus in T-

cells. Clinical trials with these two drugs, Suramin and DMFO, both normally used in treating African Sleeping Sickness, are now underway. Another drug, an immune stimulating agent and antiviral, isoprinosine, is also being evaluated clinically in AIDS and (reportedly with more hopeful results) in pre-AIDS patients.

AIDS is not by any means a highly contagious disease, such as are its distant retrovirus cousins, the cold viruses. However, it is shed in semen, saliva, urine, feces and sweat. How much of the virus is required to achieve infection appears to depend in part on the status of the host's immune system. Activated T-cells, in other words T-cells responding to foreign antigens such as other

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viruses, semen, bacterial infection or alien protein, are highly susceptible to infection by HTLV-III. Clearly, avoiding exposure to multiple viral and bacterial infections which almost invariably result from promiscuity could be an important factor in reducing risk of infection following exposure. Being careful not to engage in promiscuous sex while ill (with a cold, flu or allergy for example) or when recovering from illness would seem especially important.

Recent studies have shown that sharing a household with a person in a high risk category increases the risk of contracting the disease. While it should be noted that AIDS is NOT passed by a handshake or casual contact, it may well be transmitted by chronic exposure in a household setting. Those sharing quarters with high risk individuals or those who have already developed AIDS should minimize possible sources of environmental contact with body fluids such as urine or saliva (i.e., sharing food or beverages) . There are now numerous cases of children contracting AIDS from infected parents by normal (i.e., nonsexual) household contact among family members.

Since both ALCOR and BACS have gay suspension members, and in view of the fact that the disease has infected 5% of the heterosexual population in Zaire since 1977 (and presumably could spread similarly here as well) we have undertaken a special effort to avoid possible contamination of suspension team personnel during perfusion operations. Policies dealing with recapping of hypodermic needles and the handling of other sharps have been laid down and rigorously enforced. During our six TBW training/research sessions conducted to date, no team member has yet been stuck or cut with dirty sharps.

ALCOR has also put together a special volunteer team to handle any patients with AIDS or other infectious illness which we may be called upon to suspend. Since the incubation period for AIDS appears to be as long as 3 to 5 years and the infected individual is most infectious when he/she appears to be symptom free (once the disease develops fully there are few T-cells left and consequently few opportunities for the virus to replicate) we are treating virtually every suspension patient as a potential AIDS candidate.

We urge all of our promiscuous members to carefully consider the odds. Right now upwards of 250,000 people have been exposed to HTLV-III. There may be 10,000 to 20,000 people in the U.S. who are carrying the AIDS virus and who are infectious. At this time there is no effective cure or treatment for AIDS and the mortality at 5 years for the fully developed form of the disease appears to be 100%. Please be careful.

SCIENCE UPDATES
by Thomas Donaldson

CLONING IS NOT AN EASY PROBLEM

One technology which may lead to effective means to grow substitute organs and body parts is cloning. It's certainly not the only such technology; methods to cause regeneration of a limb, an organ, or even a whole body from a head alone may prove a far more effective method in the end. However, if we know how to clone mammals, we have gone one step towards finding a way to generate (say) a headless human body ready for transplant of a head.

No one should minimize the difficulties involved in cloning. A recent paper in SCIENCE by James McGrath and Davor Solter at the Wistar Institute in Philadelphia reports an attempt to reproduce the cloning experiments of Ilmansee and Hoppe (PROC NAT ACAD SCI USA, 79d, 1912 (1982)); an attempt which was unsuccessful. However, their results do provide some interesting ideas and suggestions as to exactly why cloning experiments with mammals may fail.

Basically, they attempted to discover if there were any changes in the cell nucleus at early stages of development which prevented transplanted nuclei from functioning as replacements for an old cell nucleus which had been removed. They did this by systematically transplanting the nuclei from cells at later and later stages of development, to see at just what stage these nuclei lost the ability to grow into a whole creature.

If we simply transfer the nucleus from one one-celled embryo into the cell body of another, more than 90% of embryos so treated will grow to the blastocyst stage. This is the stage of development in which the embryo has grown into a bag of cells, a layer of cells surrounding a cavity. It is as if, Ontogeny recapitulating phylogeny, the embryo has developed to the stage of a starfish or sea anemone.

However, if McGrath and Solter tried to transplant nuclei from the two-celled stage of an embryo (i. e. - one in which the single cell has divided into two), then only 19% of cells so treated will get as far as the blastocyst stage. If they tried a transplant from the four-cell stage, then only 5% will grow to the blastocyst stage; if the transplant comes from the 8-celled stage, NONE AT ALL will get as far as the blastocyst stage.

The suggestion here is that nuclei become in some way committed to develop in one way by the time they have got to the 8-celled stage, at the very latest. That is, the cells somehow know that they will grow into brain cells in one case and body cells in another. We can of course see in these results either optimism or pessimism. On the optimism side, these experiments give us quite a good handle on the sort of changes that may be happening at this time. This knowledge may give us a key to finding exactly how cells become committed to developing as they do. Furthermore, it's interesting that a smal percentage of cells can in fact develop at all, even if they are from the 4-celled stage. Once we work out the exact mechanism by which changes in the nucleus regulate cell development, we may find means to exert much more control over development than we have. Among the kinds of control this may mean are things like growing organs for

transplant.

HETEROCHRONIC MUTATIONS AND DEVELOPMENT

Do not be disturbed if you don't know what "heterochronic" means. It is a new word. THe concept underlying this word is that of genes which change the timing of developmental events. That is, they displace these events to "another time."

Recently in SCIENCE (226, 409 (1984)) two scientists at Harvard and MIT, Victor Ambros and H.R. Horvitz, have found new mutations in the roundworm (Caenorabdis elegans). These mutations affect development heterochronically. Previous to their work, scientists knew of several genes which affected development by causing (for instance) growth of body parts in the wrong location. Both fruit flies and roundworms show such mutations; for instance, one mutation causes antennae to develop instead of legs. This type of mutation, heterochrony, may tell us much more about the timing of development.

In their, Ambros and Horvitz focus their interest on the possible evolutionary implications of such mutations. Their ideas about evolution come from the ideas of S.J. Gould (ONTOGENY AND PHYLOGENY) and others, who champion the idea that evolution can occur through rapid jumps. Personally, I've not found this idea convincing: in any case, it isn't of principal interest here.

Rather than discuss evolutionary implications, I would like to discuss the possible implications of these mutations for the understanding and modification of aging as one form of development.

One commonplace of gerontology (like most commonplaces, largely ignored in practice) is the thought that only a few genes may greatly affect our lifespans. For instance, chimpanzees live about half as long as human beings, yet share a great many genes with us. Chimpanzees in particular share so many genes that we might reasonably argue that chimpanzees and human beings are different species of the same genus (i.e. we shouldn't be called "Homo sapiens" but perhaps "Pan sapiens").

Given this close genetic identity, there can't be many genes involved in doubling our lifespan over that of chimpanzees, and these genes would be of a heterchronic type. That is, timing of a developmental event is changed.

Scientists have studied development in both fruit flies and roundworms quite intensively. In the case of roundworms, we know the complete sequence of development. One gene involved in heterchrony is called "lin-14"; Ambros and Horvitz have studied it most intensively. Mutations in this gene cause it to produce varying amounts of some chemical (unknown). Mutations which cause precocious development of some cells cause less production of this chemical, while those which cause retarded development cause more production. Ambros suggests that the level of production goes down as the animal grown older; this level gives the cells a timing device to tell them just what stage of development to express.

Ambros and Horvitz have so far characterized three other heterochronic genes, "lin-4," "lin-28," and "lin-29." Of course they need to do much more work on how all these genes operate.

Roundworms are not human beings, or even vertebrates. The interest of studies on roundworms is that a good, explicit characterization of how their genes control their development should give us many clues about development in human beings. The idea that some small number of genes may provide a timing device by the level of production of some particular cell chemical, and the example of these heterochronic mutations for roundworms therefore gives us suggestive ideas about aging in human beings.

*** TYPIST NOTE: A SHORT "CLAUSTROPHOBIA" MAILING FORM FOLLOWED, WITH THE ADDRESS 5047 SW 26TH DR., PORTLAND, OR 97201. ***