

INTIMATIONS OF IMMORTALITY: CLONES, CYRONS AND THE LAW

BY
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This article examines some legal and moral issues associated with two developing areas of biomedicine; cloning and cryonics. The author firstly considers the practical benefits to society of developing, perfecting and utilising the process of cloning. These include the ability to overcome inheritable genetic defects and the provision of organs for transplantation. Against this must be weighed some moral and ethical problems of genetic engineering. Professor Smith then discusses the process of deep-freezing a person and the development of cryonics as a social movement. The major legal problem stemming from cryonics is determining the time at which a cryonically suspended individual dies, important in settling his estate. The author concludes that these difficult problems in biomedicine are to be resolved not by avoidance, but by striking a careful balance between individual need and social good.

It is expected that within the not too distant future a human will be cloned¹ and the first person undergoing cryonic or deep freeze suspension, or in other words a 'cryon',

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1 Kass, "Making Babies — The New Biology and the 'Old' Morality" (1972) 26 *Public Interest* 18, 41 (originally predicted by the end of the decade). An earlier claim that a human had been cloned (D. Rorvick, *In His Image: The Cloning of Man* (1978)) resulted in a lawsuit being initiated over its veracity. See Hiltz, "Trial Begins in Suit Against Book Claiming a Man was Cloned" (1982) April 6 *Washington Post* 11. A settlement was made subsequently by the publisher acknowledging the author's fabrication: "Cloning Book Suit is Settled" (1982) April 18 *New York Times* 24.

will be resuscitated.² When perfected, these bio-technological achievements may guarantee immortality which has been sought by man for so long.³ A plethora of problems, medical, legal, social, economic, philosophical and religious, mark the pathway for development and utilisation of these scientific inventions. The direction of this present inquiry will be an exploration of the extent to which law should develop its basic postulates and the basic legislative justifications from science,⁴ or whether it should be merely responsive in a non-anticipatory manner to challenges of the "New Biology".⁵

The central question which is posited from present experimental work in cloning and cryonics is whether genetic engineering of this nature should be promoted and encouraged as a basic recognition of the freedom of scientific inquiry and right to privacy or whether the common good recognises such scientific pursuits as a hinderance to the future development of mankind and, as such, dictates a policy of cautious containment and review. Viewed as an instrument to revolutionise, genetic engineering does away with natural selection and favours programmed decision making which serves to facilitate rational thinking rather than impede it. Is it shameful reality to acknowledge that man has the capability to be in control of himself? The lack of control over the years has spawned a type of "evolutionary wisdom" which, in turn, resulted in the bubonic plague, smallpox, yellow fever, typhoid, diabetes and cancer. The quest for maximum utilisation of biological and medical knowledge represents but one of the tenets of modern "evolutionary wisdom".⁶

A number of Post Darwinians in the scientific community assert that there is no wisdom in evolution — only chance occurrence. However, few would be willing to accept unconditionally all that nature bestows, particularly disease. Science therefore finds itself in a position of trying to both influence and, in many cases, control the process of evolution. Some would go so far as to suggest that dangerous knowledge is never half as damaging as dangerous ignorance.⁷

Basically it will be shown that an inherent balancing test to decision making, legal and otherwise, should be developed, pursued and implemented. Management of the "New Biology" will be linked either to the maintenance of an *a priori* standard or a situation ethic. In an *a priori* standard, balancing occurs, at least in theory, *before* the actual standard is set. A situation ethic considers the consequences of each proposed

2 D. Wallechninsky and A. Wallace, *The Book of Predictions* (1981) 162-163, 312 is the target date for the resuscitation. A few years after, it is predicted that a large number of terminally ill and hopelessly aged individuals will be frozen prior to death for re-animation after medical remedies for their various maladies are discovered. I have coined the word "cryon" to describe individuals who are cryogenically suspended. The term is not found in the literature.

3 See O. Segerberg, *The Immortality Factor* (1974); R. Ettinger, *Man into Superman* (1972); A Harrington, *The Immortalist* (1969); C. Sappideen, "Life After Death: Sperm Banks, Wills and Perpetuities" (1979) 53 *A.L.J.* 311.

4 O. Holmes, *Collected Legal Papers* (1920) 138.

5 W. Burger, "Reflections on Law and Experimental Medicine" (1967-68) 15 *U.C.L.A. L. Rev.* 436.

6 Smith, "Beyond the Land of Oz: Clones, Cyborgs and Chimeras" Paper presented to the Sixth World Congress on Medical Law, Gent, Belgium, August 23 1982, 2-3; Tribe, "Science Fiction and Legal Thought in the Making of Life" Paper presented at the Kennedy Lectures, Georgetown University, Washington D.C., April 1978. See generally T. Dobzhansky, *Mankind Evolving* (1962).

7 Note 6 *supra*. See also Smith, "Manipulating the Genetic Code: Jurisprudential Conundrums" (1976) 64 *Geo.L.J.* 697; Symposium, "The Law and the Biological Revolution" (1973) 10 *Colum.J.L. & Soc. Prob.* 47.

biomedical action, carefully weighs them and concludes with an ethical posture or the structuring of a penultimate standard of *modus operandi*.⁸

I. CLONING

As early as 1952, investigators at The Institute for Cancer Research in Philadelphia, Pennsylvania, recorded the successful removal of the nuclei from mature yet unfertilised frog eggs and proceeded to replace them with nuclei derived from the tissue cells of other embryos or tadpoles. In approximately half of the cases studied the renucleated eggs went on to develop in the same manner as though fertilisation had been achieved. With one notable exception, each egg yielded an exact genetic reproduction of the frog which had been the source of the donor nucleus.⁹ Thus the word "cloning" and "asexual reproduction" are used interchangeably to describe a technology of nuclear transplantation whereby an enucleated egg is renucleated with a body cell nucleus from an existing body source, or as the case may be, a human.¹⁰

Thus while laboratory successes with genetic engineering through the cloning process have been recorded with lower life forms, vegetables,¹¹ and more recently with various enzymes,¹² the major obstacle to human cloning relates to the process of perfecting enucleating and renucleating techniques for the comparatively small sized human egg cells. Another obstacle is perfecting techniques which permit a clonal embryo to be brought to term without extensive experimentation and damage to imperfect embryos.¹³ So far as the biologist is concerned, the most compelling argument in favour of cloning is that the study and perfection of such processes would give rise to a more advanced study of the factors responsible for cell growth, multiplication and

8 Smith, "Uncertainties on the Spiral Staircase: Metaethics and the New Biology" (1978) 10 *Pharos Medical Journal* 41.

9 Briggs and King, "Transplantation of Living Nuclei from Blastula Cells into Enucleated Frogs' Eggs" (1952) 38 *Proceedings of the National Academy of Sciences (U.S.A.)* 455. In 1966 Oxford University biologists announced they had grown seven frogs from the intestinal cells of tadpoles: G. Leach, *The Biocrats* (1970) 94.

10 See Lederberg, "Experimental Genetics and Human Evolution" (1966) 100 *American Naturalist* 519; Watson, "Moving Toward the Clonal Man" (1971 May) 227 *The Atlantic* 50. Another form of asexual reproduction is parthenogenesis where male sperm is supplanted by either a chemical or electrical stimulus which causes the female cell to begin reproducing. This is often referred to as a virgin birth. See Steeves, "Artificial Human Reproduction: Legal Problems Presented by the Test Tube Baby" (1979) 28 *Emory L.J.* 1045; Flannery, Weisman, Lipsett and Braverman, "Test Tube Babies: Legal Issues Raised by *In Vitro* Fertilisation" (1979) 67 *Geo. L.J.* 1295; Kindregan, "State Power Over Human Fertility and Individual Liberty" (1972) 23 *Hastings L.J.* 1401, 1418-1419. Ectogenesis is yet another form of reproduction involving growth of an embryo outside the uterus, under laboratory conditions. In order to facilitate this process an artificial placenta would have to be developed. If human cloning were to succeed, ectogenesis would have to be perfected to a high degree. See Walters note 15 *infra*, 115; A Rosenfeld, *The Second Genesis* (1969) 118-120.

11 The cloning of vegetables, especially asparagus, for obtaining greater strength and quality has been quite successful: "The Cloning of a Vegetable" (1978) April 8 *Washington Post* 14.

12 Not only have bioengineering technologies developed plants which make their own fertiliser and new "miracle" drugs such as interferon, but recently Collaborative Research Inc. in Lexington, Mass. announced that their scientists were using bioengineering techniques to clone an enzyme, rennin, used to coagulate milk for manufacturing cheese: (1982) May 17 *Newsweek* 5. See also Y. Cripps, *Controlling Technology: Genetic Engineering and the Law* (1980); Smith, "The Promise of Abundant Life: Patenting a Magnificent Obsession" (1982) 8 *Utah Journal of Contemporary Law*.

13 See Lederberg note 10 *supra*; Watson note 10 *supra*.

differentiation. This would allow for investigation of various disease aetiologies with the obvious end purpose being to advance the overall state of man's health and thereby improve his genetic endowment.¹⁴ Specifically, research in combating cancer would be advanced through the study and perfected use of cloning, as would the study of gerontology. The rate of aging could be diminished and the human cycle increased. A better understanding of the body's immunological responses to disease would advance the management of allergies, infections, wound healing and organ transplantation.¹⁵

There are a number of other reasons to support scientific investigation into asexual reproduction and the ultimate production of a human clone. First and foremost is the positive effect that it would have in providing a solution to infertility and problems of genetic inheritance. A man who is incapable of producing sperm or a woman who is unable to ovulate or produce eggs could be helped by cloning. In the absence of sperm cells, a man could arrange for the nucleus from one of his body cells to replace the nucleus of an egg cell from his wife. Similarly, the female without eggs could arrange for one of her body cell nuclei to replace the nucleus of an egg which would be donated by another woman. If a successful embryo was produced, it could then be transferred to the uterus of the nucleus donor or, for that matter, to that of the egg cell donor for development.¹⁶ The second reason is the effect human cloning would have on combating genetic anomalies. Thus, in those cases where one party to a marriage was genetically handicapped, cloning with the genetic material of the other party would avoid transmission of a defect to any offspring.¹⁷ Here cloning could serve as a positive force in halting the deterioration of the human gene pool and, as such, improving the quality of health for all and promoting a programme of positive eugenics.¹⁸

One distinguished author, stressing a purely utilitarian approach to cloning, has suggested that clones could act as organ donors for one another, and thus serve to overcome or alleviate the present serious difficulties in obtaining vital organs for transplantation. Furthermore they could also serve as members of specialised task forces who could perform functions which would otherwise be beyond consideration for the average person. Special characteristics of either a physical or mental nature could be developed.¹⁹ The intrusion into the personal liberty and autonomy of the clone would have to be weighed against the communal goal of perfecting clones for such use. An ever pressing concern would be to avoid genetic bondage or enslavement of the clones by pursuing and utilising such levels of specialisation.²⁰

14 See Lederberg note 10 *supra*; Watson note 10 *supra*; R. McKinnel, *Cloning: A Biologist Reports* (1979) 50-77.

15 Walters, "Cloning, Ectogenesis and Hybrids: Things to Come" in W.A. Walters and P. Singer (eds), *Test Tube Babies* (1982) 115.

16 *Id.*, 114.

17 Note 15 *supra*.

18 G. Smith, *Genetics, Ethics and the Law* (1981) 106.

19 J. Fletcher, *The Ethics of Genetic Controls: Ending Reproductive Roulette* (1974) 147-187; Fletcher, "Ethical Aspects of Genetic Controls" (1971) 285 *N. Engl. J. Med.* 776. See generally R. Cowper, *Clone* (1972).

20 Pizzulli, "Asexual Reproduction and Genetic Engineering: A Constitutional Assessment of the Technology of Cloning" (1974) 47 *So. Calif. L.Rev.* 476, *passim* 517. A recent science fiction movie entitled "Blade Runner", and set in the year 2019, probes the difficulties of clone-like cyborgs called "replicants" who, although limited to four year life spans, have wrought havoc on the society which created them: (1982) July 12 *Time* 68.

While the human clone would be recognised as a total human being, the extent to which legal and societal rights and obligations would be granted and imposed pose difficult problems.²¹ Having once determined that a pre-existing cell donor will control the genetic destiny of another by cloning, it can be seen easily that the extent to which the clone has legal rights and obligations is determined largely by the circumstances surrounding its "birth". It should be understood that all important aspects of the donor's life will be replicated in the clone and this will shape expectations of the clone's ability. Indeed, those expectations will create for the clone an experience of living robbed totally of openness and indeterminacy.

Perhaps if any real "evil" exists in efforts designed to clone a human, it is in seeking to relive one's life through another. However, this attitude is not unique to those who wish to clone. It is shared by a number of "ordinary" parents who engage in normal procreation.²² Although programmed conception may well be more humane than chance, the most serious argument advanced thus far against human cloning is that it disrupts a more authentic form of self-discovery, or in other words, it compromises personal liberty in the name of advancing science.²³

When human cloning becomes totally feasible, basic decisions will have to be made about who may be cloned and the circumstances surrounding their cloning. A number of critics have opposed development of this field of biomedicine in order to avoid making these difficult decisions. They would willingly forget the admonition that "Decisions determine Destiny". They would rather allow blind circumstance to dictate the future course of events instead of agonising over immediate threshold decisions which are flavoured with political dimensions.²⁴

Under the principle of positive eugenics, emphasis is placed on encouraging those individuals with the best genetic profile to breed. A legislative scheme which sought to embody the concept of positive eugenics and thereby permitted only those individuals with superior genetic endowments to clone would pose a rather serious constitutional issue. In order to be upheld, a statute of this nature would require safeguards in order to ensure against large scale cloning efforts of certain particular types of individuals.²⁵ Absence of these safeguards would decrease the need for genetic variation, so important to the process of natural selection, but would be subject to Equal Protection Clause challenges under the United States Constitution.²⁶ Accordingly, if an American court determined that a cloning statute affected a fundamental right, the State would then need to show that the legislation served a compelling State interest.²⁷

Obviously, the right to procreate is a fundamental right.²⁸ Yet, the denial of cloning procedures to those individuals who are capable of reproducing in the normal manner may not be of such an infringing nature as to trigger the compelling State interest

21 Frankfurt, "Freedom of the Will and the Concept of a Person" (1971) 68 *Journal of Philosophy* 5, 7.

22 Tribe note 6 *supra*.

23 *Ibid*.

24 Conavan, "Genetics, Politics and the Image of Man" in G. Smith (ed.), *Ethical, Legal and Social Challenges to the Brave New World* (1982); Davis, "Ethical and Technical Aspects of Genetic Intervention" (1971) 285 *N. Engl. J. Med.* 799.

25 Note 18 *supra*.

26 *Ibid*.

27 *Ibid*; Pizzulli note 20 *supra*, 560.

28 *Skinner v. Oklahoma* 316 U.S. 535, 541 (1942); *Griswold v. Connecticut* 381 U.S. 479 (1965) (limitations upon the freedom to procreate are generally regarded as suspect).

requirement.²⁹ If it were not regarded as an infringement, the State would only be required to show that a rational relation existed between the legislation and an existing legitimate State interest.³⁰ A court could determine that the State interest in the propagation of superior traits is impermissible because it violates the nobility clause of the United States Constitution or the prohibition against involuntary servitude found in the Thirteenth Amendment.³¹ On the contrary, were a court to determine that there is a legitimate State interest in the strengthening of its gene pool through the propagation of superior traits, it would presumably have little difficulty sustaining the cloning legislation and thus finding a complementary relation to that purpose.³²

It is possible that a meritorious claim could be maintained by those individuals who carry recessive traits by asserting that by permitting only genetically superior people to clone, their right to procreate is infringed. If successful, such a claim would trigger a strict judicial scrutiny of the cloning legislation and require the State to show a compelling interest for its legislative action.³³ The usual triggering action for the strict scrutiny test is found in legislation which threatens a basic or fundamental civil right or contains a classification which is suspect because of the nature of the group classified and their disadvantages.³⁴

Interestingly, the High Court has rarely employed the strict scrutiny test outside the area of racial discrimination.³⁵ In those classifications held to be non-racial, it would appear that the Court utilises a balancing test and considers three factors: "... the character of the classification in question, the relative importance to individuals in the class discriminated against of the governmental benefits that they do not receive, and the asserted state interests in support of the classification".³⁶ Those legislative classifications which are based on individual qualities adjudged wholly or largely beyond the control of the individual are regarded as suspect.³⁷

It is obvious from this analysis that cloning legislation at this time in American society, given the lack of scientific certainty regarding the process itself and the even greater lack of education and sophistication of the public in all matters scientific, would foredoom social acceptance of the process. However, this attitude should not prevent continued experimentation in the field of asexual reproduction and the production of scholarly investigations which seek to probe the multiple confines of the problem area. It is only by continued effort that real progress through education can be achieved.³⁸ Impatience with the unknown and terror over spontaneity must be conquered.

29 Pizzulli note 20 *supra*, 550-552.

30 *Shapiro v. Thompson* 349 U.S. 618, 638 (1969); note 18 *supra*.

31 Note 18 *supra*.

32 *Ibid.*

33 *Ibid.*

34 *Ibid.* See also *Shapiro v. Thompson* note 30 *supra*.

35 Note 18 *supra*, 117.

36 *Dandridge v. Williams* 397 U.S. 471, 521 (1970) *per* Marshall J. dissenting.

37 See *e.g. Levy v. Louisiana* 391 U.S. 68 (1968) — classification disfavouring illegitimate children.

38 S. Lederberg, "Law and Cloning: The State as Regulator of Gene Function" in A. Milunsky and G. Annas (eds), *Genetics and the Law* (1976) 377.

II. CRYOBIOLOGY

Cryobiology, or the study of low temperature biology, has been both the source and impetus for maintaining an abiding faith that death may be conquered.³⁹ The contributions of cryobiology to medicine include freeze-preservation, cryosurgery, advanced research into the freeze-preservation of large mammalian organs and a plethora of other exciting uses.⁴⁰ Although experimentation and success in transplantation of human organs proceeds with definite success,⁴¹ the total cryonic suspension of an entire human body *and its revival* remains speculative at best.⁴²

In the 1950's biologists working with low temperatures coined the term "cryobiology" in order to describe those biological investigations which were conducted well below normal body temperature.⁴³ Cryogenics refers broadly to the technology of low-temperature experiments, while cryonics pertains to all disciplines and programmes centred on human cold-storage.⁴⁴ Interestingly, in 1663, an English scientist, Henry Power, composed a mixture of ice and salt and immersed a jar of eels in it, thereby freezing them. After one night they were revived and the phenomenon known as "suspended animation" was originated.⁴⁵

As malfunctioning parts of a human body become subject to replacement, the procurement and preservation of new organs becomes of central importance.⁴⁶ While the molecular bases of freezing damage are not fully understood, it is certain that some whole organs subjected to freezing below a certain temperature have either been nonfunctional after thawing or have become nonfunctional within a short time.⁴⁷ Thus it is understood that a successful freezing and restorative organ programme requires mastery of more than the mere ability to successfully freeze the component cells.⁴⁸

The subject of the first freezing or cryonic suspension of a human was a Dr Harold Greene, after his death on January 12, 1967. The whole process of perfusing Dr Greene took four hours.⁴⁹ The greatest danger for any person undergoing cryonic suspension is the need to provide as much expeditious care as possible to protect the brain and the cells. The brain remains intact for anywhere from three to five minutes, at normal body temperature, after death. However, the brain can remain without

39 See A. Smith (ed.), *Current Trends in Cryobiology* (1970); H. Merryman, *Cryobiology* (1966).

40 R. Prehoda, *Suspended Animation* (1969); Guttman, Khalessi and Berdinkoff, "Whole Organ Preservation" (1970) 6 *Cryobiology* 339; Mazur, "Cryobiology: The Freezing of Biological Systems" (1970) 168 *Science* 939; Valeri and Brodine, "Current Methods for Processing Frozen Red Cells" (1968) 5 *Cryobiology* 129; Smith, "Through a Test Tube Darkly: Artificial Insemination and the Law" (1968) 67 *Mich. L. Rev.* 127.

41 See E. Nizsalovsky, *A Legal Approach to Organ Transplantation* (1974).

42 See generally B. Luyet and P. Gehenio, *Life and Death at Low Temperatures* (1940).

43 Prehoda, note 40 *supra*, 9.

44 Ettinger, note 3 *supra*, 251; E. Graham (ed.), *The Science Dictionary in Basic English* (1965) 98; A. MacNalty (ed.), *Butterworths Medical Dictionary* (1965) 369.

45 Prehoda, note 40 *supra*, 73.

46 See Guttman, Khalessi and Berdinkoff and Mazur note 40 *supra*.

47 Mazur, note 40 *supra*, 945-946.

48 *Ibid.*

49 See R. Nelson, *We Froze the First Man* (1968). However, there appears to be some confusion regarding who can claim the distinction of being the first person suspended. It has been recorded that in January, 1967 a Dr. James H. Bedford became the first such person: L. Kavalier, *Freezing Point* (1970) 256. In 1976 there were a reported 24 bodies in cryonic suspension: (1976) August 16 *Newsweek* 11.

oxygen for even longer periods of time as the body temperature is decreased to -196° Celsius. At this temperature all changes virtually stabilise and the body may remain in a near perfect state of preservation for an indefinite period.⁵⁰

The body cells would, if left unprotected, literally burst on freezing because the human body is composed of seventy-five percent of its weight in water and this water would expand on freezing. Since the prevention of ice crystals inside the body cells is the basic purpose of perfusion, this method, as opposed to embalming, is the lynch-pin of successful cryonic suspension. In perfusion a protective chemical, glycerol, is combined with dimethyl sulfoxide (DMSO), which serves as a rapid penetrant in carrying the glycerol to the cells through the bloodstream. Consequently, ninety percent of the cells' water is absorbed. This combination assures that the formation of ice crystals will occur not inside the cell but outside.⁵¹ Since perfusates with a high percentage of glycerol or DMSO are acknowledged to be toxic to the cells, other chemicals must also be used in the perfusion.⁵²

III. THE CRYONICS OR IMMORTALIST MOVEMENT

It has been speculated that the desire for future life is due to a perception that most lives are, for whatever reason, incomplete. There is also the desire to renew friendships which have ended prematurely.⁵³ While the motivation of the cryonic movement may well be acknowledged to be an unconscious desire for immortality, the movement cannot be separated totally from a sustained effort by society as a whole over recent years to prolong healthy living, with dignity.⁵⁴

For the modern immortalist, the pathway to his goal begins in a freezer. After death cryonic suspension is administered and the body frozen and stored at either the temperature of liquid nitrogen or liquid helium until medical and scientific advances are such that the incurable illness that brought about death has been conquered and new life may be resumed. The cryonically suspended individual is then taken from his container/coffin, thawed, revived, repaired and given new life.

In 1965 the first cryonic society was established in New York and in 1966 a Life Extension Society Conference was held in Washington D.C. The impetus for this activity was the publication in 1964 of Robert Ettinger's book, *The Prospect of*

50 Nelson, *id.*, 48. Once death occurs the candidate must be taken to the coldest room in the immediate surroundings so that deterioration may be prevented. The crucial step here is to maintain the dead person's circulation. Irreparable damage to the cells will occur if the circulatory system stops before completion of the freezing process. While some may have access to a heart-lung machine, others must rely totally on artificial respiration and external heart massage. While either heart pump or artificial respiration is being conducted, the body temperature is lowered to 50°F by means of ice packs and the perfusion process undertaken. Once the perfusion is completed the body is placed in a box or container with liquid nitrogen and placed in a cryogenic warehouse, mausoleum or what has been termed a cryatorium. The main expense then is replacing the liquid nitrogen. For a good discussion of this procedure, see Kavalier, *id.*, 248-252.

51 Nelson, *id.*, 49.

52 For a detailed and graphic description of the procedure used to prepare an individual for cryonic suspension, see Nelson, *id.*, 136-56 and Kavalier, note 49 *supra*, 248-56.

53 J. Haldane, *Daedalus or Science and the Future* (1924) 73.

54 See generally, *Older Americans*, Pub. L. 89-73, 42 U.S.C. §3001 et seq. (1977).

Immortality.⁵⁵ The Cryonics Association, formerly the Cryonics Society of Michigan, has been the vanguard of effort to study and promote interest in life extension, gerontology, aging research, cryonics, futurism, death and dying since the early 1970's.⁵⁶ In 1976 the total reported world membership of all cryonic societies was listed as being one hundred and fifty-five.⁵⁷

It is obvious that the cryonics movement is not growing. Although not based on logic, this in itself is not the central reason for the movement's failure, for logic has never been a distinct hallmark for a political or social movement's growth and perpetuation. Rather, to become an active movement or force, there is a need for a leader possessed of considerable magnetism or charisma, a tangible track record of some success, and a shared philosophy. Robert Ettinger, who is head of the Cryonics Association and universally recognised as the father of the cryonics movement, is regarded as an "unassuming, middle-aged physician professor, an intellectual and idealist who is inspired rather than inspiring".⁵⁸ There is no recorded success of a cryonic suspension *and* revivication⁵⁹ and, for some, the very promise of immortality inextricably tied to the movement is "in actuality, a threat to one's peace of mind".⁶⁰ The escalating costs of preparing and sustaining the suspension process under modern pressures of inflation preclude a strong enrolment in the ranks of the movement.⁶¹ The growing absence of a skilled and professionally competent organisation to maintain the suspension process is also of negative import to would-be cryonicists.⁶²

Still another obstacle to the movement's success is current public opinion, for those who espouse a radical philosophy of self interest are viewed as an outrage by those who hold to the present societal ideal of self sacrifice.⁶³ Indeed a pervasive lethargy can even be found in the ranks of the cryonic societies. Membership in a group which offers little social activity or neglects to structure a rewards system for its members but seeks to postpone all forms of individual and group gratification until death obviously has a tremendous obstacle to overcome in order to maintain contemporary vitality.⁶⁴ Until such time as the first cryonaut is revived, no validity or efficacy will attach to the cryonics movement.⁶⁵ Even beyond a successful revival, the cryonaut will face serious problems concerning social and economic adaptation in a society where family and friends are dead and the indicia of economic wealth have changed dramatically. Thus the personal problems he faces become the problems of the whole movement itself.

55 Bryant and Snizek, "The Cryonics Movement and Frozen Immortality" (1973) 11 *Society* 56.

56 See Bryant and Snizek, *ibid.*, and R. Ettinger *The Prospect of Immortality* (1964).

57 E. Rievman, *The Cryonics Society: A Study of Variant Behaviour Among Immortalists* (1976) 38. Ms Rievman's doctoral dissertation offers the most definitive study of the cryonics movement. The Sydney branch of the Australian Cryonics Society is listed at 14 Koorabar Street, Menai.

58 Kavalier, note 49 *supra*, 258.

59 Bryant and Snizek, note 55 *supra*, 60-61.

60 Kavalier, note 49 *supra*, 228.

61 In 1976 it was determined that the cost of preparation and indefinite storage was approximately \$50,000; *Newsweek*, note 49 *supra*. Indeed the Cryonics Society of South Florida required each potential member to take out a \$50,000 insurance policy with the society named as beneficiary: E. Rievman, note 57 *supra*, 58-59.

62 See (1981) June 22 *Time* 77, for the report of a successful lawsuit against a Cryonics Association for negligence in allowing two suspended individuals to thaw.

63 Ettinger, note 44 *supra*, 274.

64 Rievman, note 57 *supra*, 92.

65 A. Harrington, *The Immortalist* (1969) 256.

On balance, the message of the cryonics or immortalist movement should not be seen as a shallow, unsophisticated philosophy of hope bereft of an organised and rational form of operation. Rather the message should be viewed as a call to expand our sights and visions regarding gerontology and the most persistent disease of all — the aging process. Viewed in this context the movement becomes less a group of frenzied immortalists and more a group of concerned and devoted individuals seeking to learn the message of death through active, healthy living.

IV. DEFINING DEATH

There are basically two types of death; clinical and biological.⁶⁶ Clinical death precedes biological death and occurs normally when one's heart and respiratory systems stop. The pupils simultaneously become fixed and dilated and tendon reflexes cease.⁶⁷ However, from a biological point of view death occurs gradually. Thus even after a recognition of clinical death certain biological activities occur.⁶⁸

Death is classically defined as the cessation of three interdependent vital body functions — circulation, respiration and brain activity.⁶⁹ Cessation of breathing and loss of heartbeat are still viewed by many as the crucial death signs.⁷⁰ Only when artificial means are utilised to sustain these two functions has it been recognised that new criteria in determining death should be considered.⁷¹ Owing to recent and startling advances in medical technology⁷² and in the field of organ transplantation,⁷³ it is now recognised that death may occur when the brain ceases to function. Such an occurrence is termed "brain death".⁷⁴

66 See Albano, "The Medical Examiner's Viewpoint" in A. Winter (ed.) *The Moment of Death: A Symposium* (1969) 19, 20. It has also been suggested that there is a third form or degree of death — cellular death. This is not complete until at least two days after clinical death and refers to the irreversible degeneration or disorganisation of individual body cells: See R. Ettinger, "Lasting Indefinitely" *Esquire* (May, 1965) 64. Three additional forms of death have been suggested. The first is apparent death which occurs when the outward appearances of vital functions such as respiration, circulation and motor activity have ceased. The second is relative death which is a term used to describe the bodily state between the cessation of cardiac and respiratory activity. Complete resuscitation is quite possible in the early stages of relative death. Finally there is absolute death or the condition where the resuscitation of a body as a whole or even where the resumption of physiological functions of either individual organs or cells is impossible: See A. Malnin and L. Perry "A Review of Tissue and Organ Viability" (1967) 4 *Cryobiology* 104. See generally, D. High "Is Natural Death an Illusion?" (August, 1978) *Hastings Centre Report* 37; Capron and Kass "A Statutory Definition of the Standards for Determining Human Death: An Appraisal and a Proposal" (1972) 121 *U. Pa. L. Rev.* 87.

67 Albano, note 66 *supra*. See generally, A Report Issued by the President Commission for the Study of Ethical Problems in Medical, Biomedical and Behavioural Research, *Defining Death: A Report on the Medical Legal and Ethical Issues in the Determination of Death* (1981).

68 Albano, *ibid.*

69 D. Hendin, *Death as a fact of Life* (1973) 25.

71 *Id.*, 19.

72 See generally, G. Smith, note 7 *supra* and G. Smith, "Challenge of Preparing For A Brave Yet Somewhat Frightening New World" (1977) 5 *J. Leg. Med.* 9.

73 Dukenminier and Sanders, "Organ Transplantation: A Proposal for Route Salvaging of Cadaver Organs" (1968) 279 *N. Engl. J. Med.* 413; Dukenminier "Supplying Organs for Transplantation" (1970) 68 *Mich. L. Rev.* 811; Robertson, "Organ Donations by Incompetents and The Substituted Judgement Doctrine" (1976) 76 *Colum. L. Rev.* 48.

74 J. Korein, *Brain Death: Interrelated Medical and Social Issues* (1979).

While some commentators have drawn attention to what they perceive as sharp distinctions between the legal and the medical definitions of biological death,⁷⁵ the law generally treats the matter as a medical question of fact determined by the "ordinary standards of medical practice" in each community, and the laws and customs of each state.⁷⁶ The Uniform Anatomical Gift Act, while establishing procedures for regulating donations of organs, acknowledges simply that the death of a donor will be determined by the donor's attending physician.⁷⁷ The Act does not however define death but rather appears to operate on the premise that the act of death will be determined by those standards which are widely accepted and applied in the ordinary course of events.⁷⁸

Meeting in Australia in 1968, the World Medical Association argued against the use of a precise statutory definition of death by noting:

This definition [of the time of death] will be based on a clinical judgement supplemented if necessary by a number of diagnostic aids [of which the electroencephalograph is currently the most helpful]. However, no single technical criterion is entirely satisfactory in the present state of medicine, nor can any one technologic procedure be substituted for the overall judgement of the physician.⁷⁹

Interestingly, the President's Commission for the Study of Ethical Problems in Medicine and Biomedical and Behavioural Research unanimously approved, in drafting the Uniform Determination of Death Act, that death be defined as an occurrence in which there is;

(1) irreversible cessation of circulatory and respiratory functions or (2) irreversible cessation of all functions of the entire brain; including the brain stem. A determination of death must be made in accordance with accepted medical standards.⁸⁰

None of the current movement in clarifying the legal and medical concepts of death is particularly heartening to either individuals presently in cryonic suspension or those anticipating its use. If one were "suspended" before death, the real issue becomes how should the law deal with this occurrence, especially from the standpoint of the disposition of a decedent's estate. Presently there exists in the law of property a doctrine termed the "Wait-and-See" approach which is used to determine whether an interest vests within the period of time allowed.⁸¹ This approach mitigates the harshness of the rule against perpetuities which held "a non-vested interest in property failed unless it was certain to vest, if it ever vested, within the period of the rule"⁸² — twenty-one years plus lives in being.

The same approach could be utilised in developing a working definition of cryogenic suspension. Thus, cryogenic suspension would be recognised and defined in law and

75 Task Force on Death and Dying of the Institute of Society, Ethics and Life Sciences, "Refinements in Criteria for the Determination of Death", (1972) 221 *J.A.M.A.* 48, 51-52.

76 *Ibid.* The various definitions of death which may be found among state laws serve specific purposes in deciding, for example, issues of inheritance and survivorship. For an interesting study of the dilemma of decision making in this area, see *In the Matter of Karen Quinlan — The Complete Briefs, Oral Arguments and Opinions in the New Jersey Supreme Court* (1976).

77 Uniform Anatomical Gift Act, s. 7(b).

78 See Capron and Kass, note 66 *supra*.

79 "International Comments, Declaration of Sydney: News Item" (1968) 206 *J.A.M.A.* 657.

80 Minutes of Meeting XI of the Presidents Commission for the Study of Ethical Problems in Medical and Biomedical and Behavioural Research (9 July, 1981) 3.

81 *Restatement of Law of Property* (Tent. Draft No. 2, 1979), 73.

82 *Ibid.*

medicine as that state where, under medical supervision, body temperature is lowered to such a degree that a condition of temporary cessation of vital processes is achieved.⁸³

Modifying the basic tenets of the rule against perpetuities, one could rather arbitrarily determine that one could remain in a state of cryonic suspension twenty-one years without fear of being pronounced dead. At the conclusion of this period a court would determine whether such a possibility or feasibility of a scientific breakthrough existed for a cure of the disease which affected the person in suspension. If the state of the art had advanced to such a level that a successful cure for the suspended person's illness existed, then the court could exercise its broad equitable powers of supervision to allow continued suspension for a period not to exceed ten additional years, at which time a final determination would be made regarding that status of the cryonically suspended person. On the contrary, if at the end of the initial twenty-one year period a judicial determination was made that no immediate or scientific advances promised the realistic hope of a cure and there was no real chance of revival, then a decision could be made to thaw the suspended individual and thereby recognise that death occurred and the estate could be settled.

Obviously, in order to encourage or allow physician-scientists or lay persons to participate in the preparation of an individual for cryonic suspension before death, an exculpatory clause would have to be inserted in the contract for suspension. This would confer on doctors, scientists and others an immunity from civil and criminal liability for either failing to find a cure for the illness or participating in a medical intervention (for example, the initial suspension itself) subsequently determined by a court to be life ending. It would also be wise to have either a judicial recognition of the immunity from a criminal prosecution for murder in connection with the acts of cryonic suspension undertaken by a physician on a living individual or a statute which would admit the acts undertaken to initiate the suspension as an absolute bar or total defence to the prosecution.

In those cases where one seeks to have his or her remains cryonically preserved *after* a determination of death is made, the law should be less flexible than in the cases where the suspension has been undertaken *before* death. Failure to recognise death as death would play havoc not only with the law of property and succession, but act to destabilise the very social and religious fabric of society. It is astounding to conceive of a society where there is no ending. As one commentator has observed, "[d]eath is the source of meaning. If you could live forever, life would be meaningless. Death is the source of man. There is no self without death".⁸⁴

The approach postulated here for legally and medically recognising a state of cryonic suspension has several advantages. It does not allow an estate to go unsettled for any

83 From a medical standpoint, suspension is defined as a condition of temporary cessation of any vital process. See C. Thomas (ed.), *Taber's Cyclopedic Medical Dictionary* (14th ed., 1981) 1396. The term "suspended death" was coined by Ettinger and defined as "the condition of a biologically dead body which has been frozen and stored at a very low temperature, so that degeneration is arrested and not progressive. The body can be thought of as dead, but not very dead; it cannot be revived by present methods, but the condition of most cells may not differ too greatly from that in life." See note 56 *supra*, 3. Such a definition does not resolve the problems discussed. Indeed the definition highlights the need for a working legal-medical concept of cryonic suspension. See also, Ettinger, "Cryonic Suspension and the Law" (1968) 15 *U.C.L.A. L. Rev.* 414.

84 O. Segerberg, note 3 *supra*, 266 quoting James Carse, the then Chairman of the History of Religion Department of New York University.

period of time longer than the original mandate of the rule against perpetuities. Indeed, in most cases the period of determinable suspension would be much less than that which the rule allows. It provides hope for those few individuals who believe in cryonic suspension and revival. Finally, it recognises an objective form of societal power in a judge, much akin to that power which society places in physicians in determining whether to stop life sustaining processes of comatose or terminally ill individuals.⁸⁵ A judge given a power of this nature would of course be expected to rely upon scientific judgment regarding the particular investigation of the suspended individual's medical problem and the possibilities of it being resolved.⁸⁶

Currently it is estimated that there are some thirty-four bodies cryonically interred in cryotoriums, most of them in California. Trans Time, a Californian corporation which offers a full range of cryonic suspension services from planning to subsequent suspension, is holding nine bodies for what is believed to be ultimate revivication. Another one hundred individuals have already completed arrangements for their cryonic suspension upon death.⁸⁷

Recent adverse publicity surrounding a jury award of \$928,594.00 for breach of contract and fraud regarding a bankrupt cryotorium's failure to provide the continuous suspension of two individuals has perhaps all but doomed the future of the cryonics movement.⁸⁸ Yet, the President of Trans Time in Berkeley, California, claiming to be the head of the only surviving cryonic suspension firm (with nine frozen cadavers to substantiate his claim), stubbornly asserted that regardless of the recent judicial setback, cryonics had a "great future".⁸⁹

V. CONCLUSIONS

Few insurmountable problems will arise for law, science and medicine in charting the legal aspects of cryonics if a simple recognition is made of the actual state of cryogenic suspension. Legal mechanisms are already in place to deal effectively with the consequences of such action. The broad equitable decision-making powers of a

85 See generally, K. Schuyter, "The New Biology and the Rule Against Perpetuities" (1968) 15 *U.C.L.A. L. Rev.* 420; Haber "Cryonic Supervision — The Rule Against Perpetuities and Related Rules" *The Proceedings of the First Annual Cryonic Conference* (2 March, 1968). For an intriguing fictional account of a cryonic suspension and the myriad of legal problems associated with it see L. Tushnet "In Re Glover" in P. Sargent (ed.) *Bio-Futures: Science Fiction and Stories about Biological Metamorphosis* (1976) 39.

86 Ettinger has argued that if cryonic suspension were to be recognised as a heroic measure designed to sustain life, then the concept of "mercy freezing" might have some legal validity and would thus be defined, "freezing a terminally ill patient before clinical death": See Ettinger, note 7 *supra*, 260. However "mercy freezing" is more likely to be viewed as "mercy killing" by both the legal and medical profession.

87 (1980) July 7 *Newsweek* 9.

88 *Time*, note 62 *supra*. Cryonics Interment of California accepted varying amounts of money from \$15,000-\$31,294 from individuals who wished to assure cryonic suspension for relatives. Two plaintiffs, Dennis and Terry Harris, made a down payment in 1970 of \$15,000 to the Cryonics Society of California in order to allow their mother and father opportunity to be "alive together in the future". When Cryonics Interment went bankrupt five years later, liquid nitrogen used to preserve the cadavers was stopped and thereupon they were thawed and became decomposed.

89 *Ibid.*

court assure a measured approach to problem-solving and forestall the need for vigorous and often misguided law making.

For law, science and medicine to be overcome by a state of lassitude and ineptitude and thereby neither anticipate nor structure a response to the ramifications of the cryogenic suspension of humans would be a serious mistake of considerable dimension.⁹⁰ Clearly, scientific actions which hold the promise, no matter how remote, of increasing the quality of purposeful living and minimising suffering must be pursued.⁹¹

As man begins to induce and manipulate life, he must also begin to question the limits of free will and determination. The powers of genetic creation and engineering must be executed with a rational and enlightened purpose and in a spirit of humanitarianism. Human suffering, both present and future, must be minimised whenever possible. Genetic engineering which contributes to the social good should be utilised fully. Obviously under this ethical imperative, society must carefully define the social good.⁹² Thus the enhanced quality of life which genetic manipulation promises must be evaluated and weighed against sanctity of life and personal autonomy or self-representation.⁹³ Genetic engineering provides a perilous opportunity that may either threaten freedom or enhance it. The ultimate result depends on the balance struck between its use for individual need and satisfaction, and societal good.

90 Tribe, "Technology and the Fourth Discontinuity: The Limits of Instrumental Rationality" (1973) 46 *So. Cal. L. Rev.* 6.

91 Note 18 *supra*, 2, 10.

92 G. Smith, "The Promise of Abundant Life: Patenting a Magnificent Obsession" [1982] *Utah J. Contemp. L.* 8; G. Smith "Uncertainties in the Spiral Staircase" (1978) 41 *The Pharos Med. J.* 10.

93 G. Smith, note 91 *supra*.