

THE PROVINCE AND FUNCTION OF LAW, SCIENCE AND MEDICINE: LEEWAYS OF CHOICE AND PATTERNS OF DISCOURSE

GEORGE P. SMITH II*

I. SCIENTIFIC FREEDOMS v. SOCIAL RESPONSIBILITIES

On November 20 1973 Julius Stone presented the tenth annual Mooers Lecture, entitled, "Knowledge, Survival, and The Duties of Science", at American University in Washington, D.C.¹ The central question and theses which he propounded then, could and indeed, should be raised anew today — for they form the very core of the province and function of law, science and medicine in our brave new world of today and tomorrow and they point also to the leeways of choice and patterns of discourse that exist in grappling with this central issue and possibly forging a consensus opinion for a subsequent course of action. This, then, is the task of this article; namely, to test, to probe anew and thereby critically analyse the modern significance of Julius Stone's theses regarding the social responsibility of scientific inquiry.

Quoting from an address made by Sir Gustav Nossal in 1971, before the Australian and New Zealand Association for the Advancement of Science, Stone admonished us to be aware of the "genetic revolution" where people would be created in test tubes and molecular "monsters" would be released

*B.S., J.D., Indiana University; LL.M. Columbia University. Professor of Law, The Catholic University of America, Washington, D.C. Visiting Professor of Law, Visiting Fellow, Centre for Law and Technology, Faculty of Law, University of New South Wales (July, August 1987). Professor Smith was the Fulbright Visiting Professor of Law and Medical Jurisprudence at the University of New South Wales in 1984.

The author acknowledges the personal kindnesses and friendship of Professor Ivan A. Shearer, Dean Emeritus of the Law Faculty and Dr George G. Winterton, Chairman of the Faculty, for their invaluable assistance during his recent stay at the University of New South Wales.

Parts of this article derive from the Julius and Rea Stone Lecture presented August 20 1987, at the University of New South Wales in Sydney, Australia.

1 J. Stone, "Knowledge, Survival, and The Duties of Science" (1973) 23 *Am U L Rev* 231.

into the atmosphere.² He proceeded to caution that “the liberty to extend knowledge is not absolute”, but must be limited when it is in conflict with other values.³ He posited the central question of his inquiry as being a study of the extent to which scientists

have a moral duty to consider, along with others of competent knowledge, whether a line of inquiry should be desisted from as soon as it becomes clear that it is likely to bring about a mankind endangering situation, which no one has any foreseeable capacity to handle.⁴

Although debatable whether it is totally impossible to reverse the process of discovery, Stone suggested that particular scientists might well have a moral duty “not to contribute by *his* work to the certainty or speed of its arrival.”⁵ He acknowledged that the essential role of the scientist is to advance knowledge and that compromises should not be freely undertaken that limit his inherent or fundamental freedom to so act and further, “that whether knowledge is put to good or evil use is a matter for society generally, and not for scientists.”⁶

From this, Stone shaped his thesis accordingly to state that: “scientists have a duty to exercise self-restraint in pressing further those scientific activities which manifest” a likelihood that they will result in “limit-situations” or, in other words, “dangers of cataclysmic physical or psychological proportions for mankind as a whole”; and specifically where the particular scientist in question is actually “aware of this likelihood as a proximate outcome” of his own work.⁷ He stressed the point that the scientific duty of restraint should only be imposed when the scientist is “clearly able to foresee that the particular line of work is leading to a kind and scale of dangers” that would constitute a “limit-situation”.⁸

Thus, Stone delimits the scope of scientific inquiry to a very narrow, but admittedly, crucial range.⁹ He observed that his essential inquiry is “not whether scientists should cease all activity which might lead to *any dangers*, much less that they should always be able to foresee *all consequences*.”¹⁰ Rather, it is tied to “whether they should not desist from activities likely to lead to dangers cataclysmic for mankind, *and against which no protection seems possible, from the moment at which they can already foresee these dangers*.”¹¹

Stone noted with pride that the substance of his thesis had been adopted and codified “as a basic constitutional principle” not only by “many groups

2 *Id.*, 232.

3 *Id.*, 235.

4 *Id.*, 234.

5 *Id.*, 236, 237.

6 *Id.*, 240.

7 *Ibid.*

8 *Ibid.*

9 *Id.*, 241.

10 *Id.*, 246.

11 *Ibid.*

of scientists" in Britain but one in Sydney as well under the name, "Social Responsibility in Science".¹²

He admitted that the criteria which he submitted for determining restraints on scientific inquiry lacked "precision"; but he explained that, "the indeterminacies leaned in favour of the traditional scientific freedom of investigation" and that "no duty of restraint" arose unless the scientist was able to foresee, for himself, the magnitude of the dangers of his research. He contended further that even though elements of indeterminacy were present within the criteria which he postulated, they "give guidance to all concerned" in that they not only indicate "the relevant orders of magnitude and imminence but also the nature of the substantive values threatened."¹³ More specifically, Stone was concerned with two orders of such values: one that embraces the limits of physical integrity and the sanctity of human life together with mankind's survival in general and the second one concerned as such with the dangers arising from "scientific advances to human individuality, in the sense of the autonomy of the human will and sensibilities presupposed by our notions of freedom."¹⁴

Stone expressed his grave reservation about the feasibility of *in vitro* fertilisation as well as genetic surgery and engineering.¹⁵ Although he recognised barren marriages could be resolved by the new non-coital techniques for reproduction and further, that genetic engineering could alleviate genetic-born disease and disability, he "would not admit that relief afforded for such cases (admirable in itself though it might be) could even begin to tip the scales against the formidable dangers to a liberty-based society to which test-tube birth or any analogue of this would open the way."¹⁶

12 *Id.*, 249.

13 *Id.*, 259.

14 *Ibid.*

15 *Id.*, 258.

16 *Ibid.* See generally, J. Stone, "When Politics is Harder than Physics: Sketch of a Code for Science" in D. Olroyd (ed.), *Science and Ethics* (1982) 93-117. But see, G.P. Smith, "Intimations of Life: Extracorporeality and The Law" (1986) 21 *Gonzaga L Rev* 395; G.P. Smith, "Procreational Autonomy v. State Intervention: Opportunity or Crisis for a Brave New World?" (1986) 2 *Notre Dame J L, Ethics & Pub Policy* 635; G.P. Smith, "Australia's Frozen 'Orphan' Embryos: A Medical, Legal and Ethical Dilemma" (1985) 24 *J Fam L* 27; G.P. Smith & R. Iraola, "Sexuality, Privacy and The New Biology" (1984) 67 *Marq L Rev* 263. A recent New South Wales Law Reform Commission Discussion Paper, "In Vitro Fertilization", found "no persuasive reason to restrict or prohibit total research IVF embryos — provided the research was completed within a two week period after the embryo was formed". The Law Reform Commission suggested the creation of a state advisory committee to assist physicians and scientists to grapple with the vexatious ethical questions inherent within the area and stressed the need for self-regulation within the medical community. Mr Russell Scott, the Deputy Chairman of the Law Reform Commission, summed up the medico-legal-scientific realities of the issues here by concluding, "[v]ery strict legislation is not going to have any effect on IVF or which way research goes because it is happening on a global basis". O'Neill, "Embryo IVF Research is Favoured" *Sydney Morning Herald*, July 30 1987. See New South Wales Law Reform Commission, *Artificial Conception*, Discussion Paper 2, In Vitro Fertilization (July 1987). See generally, R. Scott, *The Body as Property* (1981).

1. *Human Rights and the New Technology*

Among the sophisticated countries such as Australia, Europe and America, the pervasive attitude has been — until quite recently — quite supportive of scientific inquiry and discovery; for it was believed that this action was not only of overwhelming benefit to society, but an essential attribute of human achievement and progress in the brave new world.¹⁷ Subsequent agonising reflections on the horrors of World War I and World War II and the all too frequent limited conflicts since 1945, together sometimes with overly emotional concerns regarding the full potential for nuclear, bacteriological and chemical warfare and its very real potential for annihilating mankind, have witnessed a new and increasingly pessimistic temperament concerning scientific advancement. Indeed, it has been recognised that “not all science is good for humanity.”¹⁸

The importance of human rights and their need to be recognised in the era of the “New Biology” was underscored by initial efforts at the United Nations in the 1960s.¹⁹ But before that activity, the 1948 Universal Declaration of Human Rights guarantees of “human dignity” written in Articles 1, 5, 6 and 29(1)²⁰ established eloquent reminders of the need for the advances of biotechnology and genetic engineering to be tied to a basic understanding of and respect for fundamental human rights.²¹ Indeed, what is needed now is a new human rights debate among not only the legal community — but with scientists and technologists; a debate that would consider anew the extent to which both the traditional and the redefined rights of humanity are challenged or, as the case may be, complemented by the plethora of medical, legal, scientific and technological considerations of the brave new world that is already here. As Mr Justice Kirby has succinctly summarised the issue:

[i]f lawyers are to continue to play a relevant part in the human rights debate of the future, they must become more aware of scientific and technological advances.

17 M.D. Kirby, “Human Rights — The Challenge of the New Technology” (1986) 60 *ALJ* 170.

18 *Id.*, 171.

19 *Id.*, 179. See generally, R. Lillich, F. Newman *International Human Rights: Problems of Law and Policy* (1979).

20 G.A. Res. 217A (III), U.N. Doc A/810, 71 (1948).

21 Note 17 *supra*, 179. Mr Justice Kirby has cautioned that the increasing knowledge of human fertility and its varied and mechanical applications draw new attention to other human rights guarantees: “[c]an art. 16(1) of the Universal Declaration, with its guarantee that men and women of full age have a right to marry and ‘to found a family’ provide support for a claim to in vitro fertilisation, embryo transplantation, artificial insemination, surrogate parenting and womb leasing, transplantation and the like? Is the guarantee of special care and assistance for motherhood and childhood in art. 25(2) relevant to the new procedures available to overcome infertility? Is the guarantee of adequate health and medical care in art. 25(1) the basis for a claim of access without limitation to these expensive new techniques?” See generally, G.P. Smith, “The Razor’s Edge of Human Bonding: Artificial Fathers and Surrogate Mothers” (1982) 5 *West New Eng L Rev* 639; G.P. Smith, “The Perils and Peregrinations of Surrogate Mothers” (1982) 1 *Intl J Med & Law* 325; G.P. Smith, “Through a Test Tube Darkly: Artificial Insemination and The Law” (1968) 67 *Mich L Rev* 127.

Otherwise, they will increasingly lack understanding of the questions to be asked, let alone answers to be given.²²

Law has, all too often been found — in the words of Mr Justice Windeyer — to be “marching with medicine but in the rear and limping a little.”²³ Law, science and medicine must become full and not limited partners and march in unison as they approach the task of assuring the primary goal of society both today and tomorrow that all citizens have an equal opportunity to achieve their maximum potential within the economic marketplace, have their physical suffering minimised and spiritual tranquility assured.²⁴

II. SOCIOBIOLOGY'S CHALLENGE AND OPPORTUNITY

A new and exciting debate is beginning to focus renewed scientific interest and momentum in structuring a discipline, the study and investigation of which portends vast increases in attaining a new level of understanding of our genetic response mechanisms heretofore unrealised. It also presents a perfect example of the much needed full partnership of law, science and medicine to which I have just referred.

The sociobiology debate has been described “as the continuance of the historic conflict created in the social sciences and humanities by the mechanistic examination of human nature through the instruments of conventional biology.”²⁵ Strictly as a discipline, rather than a theory, sociobiology is defined classically as, “[t]he systematic study of the biological basis of all social behavior”²⁶ with human sociobiology being but one aspect of the whole study of the biological basis of social behavior.²⁷ Stated otherwise, sociobiology is but the study of “the evolutionary roots of social behavior.”²⁸ Evolutionary sociobiology's goal should be not only to reconstruct the history of primates and identify their course of adaption over time, but to monitor the genetic basis of current models of social behavior.²⁹

22 Note 17 *supra*, 181. In the Inaugural Glaxo Medical Association Lecture, “The Future of Medicine — From a Medico Legal Viewpoint”, which Mr Justice Kirby delivered before the Centennial Meeting of the New Zealand Medical Association in Auckland, New Zealand, May 21 1987, he urged a recognition that since the complex moral and ethical questions presented by the challenges of law, science and medicine “involve the opinions of ordinary people in the community”, they “are better dealt with frankly and openly by processes of community debate and law reform”, than in “courtrooms or hospital ethics committees”. *Id.*, 22.

23 *Mount Isa Mines Ltd v. Pusey* (1970) 125 CLR 283, 395.

24 See generally, Z. Cowen, *Reflections on Medicine, Bio-Technology and the Law* (1986). See also, H. Barnett, “Biotechnology — Can the Law Cope?” (1986) 15 *Anglo-Am L Rev* 149; M.H. Shapiro, “Introduction to the Issue: Some Dilemmas of Biotechnological Research” (1978) 51 *So Calif L Rev* 1987.

25 E. Wilson, Foreword, in A. Caplan (ed.), *The Sociobiology Debate: Readings on Ethical and Scientific Issues* (1978) xi.

26 E. Wilson, *Sociobiology: The New Synthesis* (1975) 595.

27 *Ibid.*

28 S.A. Peterson, “Sociobiology and Ideas Become Real: Case Study and Assessment” (1981) 4 *J Social & Biol Struct* 125.

29 Note 26 *supra*, 575.

As Edward O. Wilson, the modern-day progenitor of Sociobiology has stated:

[c]ontemporary general sociobiology might at best explain a tiny fraction of human social behavior in a novel manner. Its full applicability will be settled only by a great deal more imaginative research by both evolutionary biologists and social scientists. In this sense the true creative debate has just begun.³⁰

Darwin's basic evolutionary theory could be stated simply as being that, all living organisms are related by common inheritance.³¹ In 1865 Francis Galton — relying extensively on this theory — determined that his task was to encourage the use of positive eugenics or, the application of the science of genetics to man in order to improve the species in a biological sense and thereby breed the better, stronger elements of the populace and, accordingly, discourage the breeding of the lower socio-economic classes.³² The eugenic movement that was initiated by Galton and resulted in the passage of eugenic sterilisation laws in most States of the United States,³³ ended — essentially — in 1932.³⁴ Environment was determined to be a more significant force in shaping personal qualities than the transmissible genes.³⁵

Gene sovereignty or biological determinism³⁶ remains under constant challenge by environmentalists who assert that — as to sociobiology — there is no genetic variation in the transmission of culture. "Culture" noted Dobzhansky, "is not inherited through genes, it is acquired by learning from other human beings"³⁷ Boulding's theory of "Ecodynamics" builds up a non-biological process that posits that each generation of human beings learns more from the previous generation culturally rather than by the inheritance of biologically pre-determined genes.³⁸

The assertions made by sociobiologists that sociobiology allows for an opportunity to explicate heretofore inexplicable behavioral phenomena within a restructured framework of contemporary Darwinian evolutionary theory, has rekindled a strong biological interest in the sociobiology discipline.³⁹ Although there has been substantial criticism about what is perceived as the illegitimate use of biological analogy in analysing social

30 E. Wilson in A. Caplan (ed.), *The Sociobiology Debate*, note 25 *supra*, xiii, xiv.

31 G. Hardin, *Nature and Mans Fate* (1959) 4.

32 *Id.*, 214, 215. See also Ch. 13. See D. Kevles, "Annals of Eugenics" *The New Yorker Mag.*, Oct. 8 1984, 51; Oct. 15 1984, 52; Oct. 22 1984, 92; Oct. 29 1984, 51.

33 G.P. Smith, *Genetics, Ethics and the Law* (1981) 20, 21, 35; G.P. Smith, "Genetics, Eugenics and the Family: Exploring the Ying and the Yang" (1984) 8 *U Tas L Rev* 4.

34 Note 31 *supra*, 225. See also, C. Blacker, *Eugenics: Galton and After* (1952).

35 Note 31 *supra*, 224. See G.P. Smith, "Uncertainties on the Spiral Staircase: Metaethics and The New Biology" (1978) 41 *Pharos Med J* 10.

36 S.J. Gould, "Biological Potential vs. Biological Determinism" in A. Caplan (ed.), *The Sociobiology Debate* note 25 *supra*.

37 T. Dobzhansky, "Anthropology and the Natural Sciences — The Problem of Human Evolution" (1963) 4 *Current Anthropology* 138, 146.

38 K. Boulding, *Ecodynamics: A New Theory of Social Evolution* (1978). Other attacks on Darwin's principle of organic evolution have been made. See e.g., S. Stanley, *The New Evolutionary Timetable* Ch. 4 (1981).

39 Caplan, Introduction, in A. Caplan (ed.), *The Sociobiology Debate*, note 25 *supra*, 5.

systems,⁴⁰ and the inherent weakness of the non-verifiable assertion of the sociobiologists that human social structures exist because of a superior adaptive value,⁴¹ the efficacy and relevance of the theory of sociobiology for the study of both human behavior and human nature is of unique significance because of the fact that it “stands as an instance of a rarely observed intellectual phenomenon: the attempt to produce and legitimize a new scientific discipline.”⁴²

Evolution may be regarded as “a competition for survival among genes”,⁴³ with the survival depending in large part upon regeneration of the species.⁴⁴ This, in turn, will be tied to a standard of evolutionary behavior which will mandate — all things being equal — a form of altruistic conduct promotive of this regeneration.⁴⁵

The evolutionary theories of sociobiologists show that beings who considered only their own interests would leave fewer descendants than beings who also considered the interests of their kin. So there is a good reason to believe that we do not all act solely in our own interests. Genes promoting strictly selfish behavior in individual animals would be less likely to survive than genes which do not.⁴⁶

Relying upon the principle of reciprocity, sociobiologists suggest two forms of altruism are at work in the process of natural selection and propagation of the gene: kin altruism and reciprocal altruism.⁴⁷ Both forms are, in an ultimate sense, promotive of the “Selfish Gene’s” best interest of survival and propagation.⁴⁸

Kin altruism is a genetically based tendency to assist one’s relatives and should extend beyond an immediate family to include cousins, as well as nieces and nephews.⁴⁹ In the animal kingdom, kin altruism as a theory merely posits that animals may be *expected* to act *as if* they are aware of genetic relationships — with no direct knowledge of the degree of relationship being acknowledged.⁵⁰ While reciprocal altruism should be regarded ideally as the source of attitudes of moral approval and disapproval, as well as ideas of fairness, gratitude, retribution and cheating, it appears not to be altruism at all, but merely “enlightened self-interest.”⁵¹ “Concern for one’s own interests, plus the knowledge that exchanges of assistance are likely to be in the long term interests of both partners, is all that is needed.”⁵²

40 K. Boulding, “Sociobiology or Biosociology?” (1978) *Society* 28. See also, P. Singer, *The Expanding Circle: Ethics and Sociobiology* (1981) 7, 28; Frankel, *Sociobiology and its Critics, Commentary* (1979) 39.

41 Sociobiology Study Group of Science for the People, “Sociobiology — Another Biological Determinism”, in A. Caplan (ed.), *The Sociobiology Debate*, note 25 *supra*, 280, 287.

42 A. Caplan, Introduction in A. Caplan (ed.), *The Sociobiology Debate*, note 25 *supra*, 3.

43 Singer, note 40 *supra*, 11.

44 *Id.*, 12.

45 *Ibid.*

46 *Id.*, 128.

47 *Id.*, 11.

48 J. Beckstrom, *Sociobiology and the Law* (1985) 13.

49 Singer, note 40 *supra*, 14.

50 *Ibid.*

51 *Id.*, 42.

52 *Ibid.*

The effect of biological evolution upon the development of law has been both studied and evaluated for quite some time.⁵³ Indeed, it has been suggested that the legal “roots” of sociobiology are to be found in the writings of Maine, Corbin, Wigmore and Holmes⁵⁴ — and, of course one must add Stone and Pound. The very theory of legal evolution was structured by Holmes when he observed that,

[t]he life of the law has not been logic: it has been experience. The felt necessities of the time, the prevalent moral and political theories, intuitions of public policy, avowed or unconscious, even the prejudices which judges share with their fellow-men, have had a good deal more to do than the syllogism in determining the rules by which men should be governed.⁵⁵

Continuing further, he stated that,

the law is always approaching, and never reaching, consistency. It is forever adopting new principles from life at one end, and it always retains old ones from history at the other ... It will become entirely consistent only when it ceases to grow.⁵⁶

Modernly, efforts are being undertaken to postulate a theory of sociobiology for aid-giving actions that have legal consequences⁵⁷ and more especially intestate wealth transfers,⁵⁸ general property rights,⁵⁹ privacy,⁶⁰ and the doctrine of nuisance.⁶¹ Indeed, although biological theory may offer no unquestioned answers of why certain legal outcomes result from genetic alignments, important partial explanations may be proffered.⁶² Nay sayers do exist, however, and are quick to note that evolution has had little effect on the bulk of law.⁶³

1. Human Application

Considered as a theory, the core of sociobiology — applied to humans — is that simply: we have been programmed by evolutionary biology to be predisposed — either at a conscious or unconscious level of awareness — to aid other human beings in such a manner “that the genes or genetic material we each carry are likely to be ultimately benefited in the sense of being

53 E.D. Elliott, “The Evolutionary Tradition in Jurisprudence” (1985) 85 *Colum L Rev* 38.

54 *Id.*, 71.

55 O. Holmes, *The Common Law* (1963) (M. Howe, ed.) 5.

56 *Id.*, 32. See O. Holmes, “Law in Science and Science in Law” (1899) 12 *Harv L Rev* 443.

57 J. Beckstrom, “Behavioural Research in Aid-Giving That Can Assist Lawmakers While Testing Scientific Theory” (1985) 1 *J Contemp Health L & Pol’y* 25.

58 J. Beckstrom, “Sociobiology and Intestate Wealth Transfers” (1981) 76 *Nw UL Rev* 216.

59 W.H. Rodgers, “Bringing People Back: Toward A Comprehensive Theory of Taking in Natural Resources Law” (1982) 10 *Ecology L Q* 205. Professor Rodgers attempts to use sociobiology as a foundation for development of a prescriptive theory of law based on positive rights — this as a counterpoise to the more traditional reliance upon economic vectors of force; W.H. Rodgers, “Building Theories of Judicial Review in Natural Resources Law” (1982) 53 *U Colo L Rev* 213, 214-215.

60 J. Hirshleifer, “Privacy: Its Origins, Function and Future” (1980) 9 *J Legal Stud* 649.

61 Rodgers, “Bringing People Back” note 59 *supra*, 219.

62 *Id.*, 221.

63 See e.g., R.A. Epstein, “A Taste for Privacy? Evolution and the Emergence of a Naturalistic Ethic” (1980) 9 *J Legal Stud* 665, 670.

proliferated through reproduction.”⁶⁴ This theory, followed to a reasonable level of application, may be found to project varying (and sometimes startling) implications pertinent to one’s predisposition to aid either a direct offspring, a parent, niece or even a stranger.⁶⁵ Interacting with environment and culture, these predispositions vary in intensity and make the task of the behavioral scientist a truly formidable one as he seeks to predict the levels of co-operative behavior or, in other words, the “nuance of aid-giving”, likely to happen within different environments and cultures.⁶⁶

The law often finds it necessary to engage in predictions or speculations which, in actuality, involve aid-giving inclinations. The average, ordinary, reasonable person’s reactions to a given situation are tested repeatedly in order to reach a standard of fairness for judicial decision-making or legislative design.⁶⁷ The enhanced opportunities for more accurate prediction or speculation are realised when the behavioral scientists are allowed to join forces with legal decision-makers in an attempt to determine how the somewhat mythical average person with a defined set of characteristics is most likely to follow a particular behavioral pattern when an issue of aid-giving is present.⁶⁸

Even those judges or legislators who are jealous of their decision making prerogatives and suspicious of ‘mechanical’ approaches based upon scientific information should be receptive to advice from scientists regarding such questions.⁶⁹

Marked differences of opinion abound within the discipline of sociobiology thus maintaining its essential underpinning in a state of flux.⁷⁰ Basing its efficacy in genetics and evolutionary learning, sociobiology is, indeed, conceptually difficult.⁷¹ Obviously, until the theory of sociobiology becomes more settled and empirically verifiable, it cannot be used as a basis for law making. But “the potential for immediate mutually beneficial joint research projects between lawyers and scientists appears to exist; ... it is not too early for lawyers and sociobiologists to become more aware of each other.”⁷²

2. *Expectations*

If one of the most important ideals or, for that matter, tasks for a contemporary society is to devise a system of laws wherein the laws of nature are complemented by man-made laws, then sociobiology holds the hope and

64 Note 48 *supra*, 1. The sociobiologist — being a pragmatic biologist who has been trained in both psychology and evolutionary history — posits that the emotional control centres in the hypothalamus and limbic system of the brain both constrain and shape self-knowledge; and furthermore that these two centres flood the consciousness with all the emotions, including love, fear and hate. E. Wilson, note 26 *supra*, 3.

65 *Id.*, 2.

66 *Ibid.*

67 Note 64 *supra*, 3.

68 *Ibid.*

69 *Ibid.*

70 *Id.*, 4.

71 *Ibid.*

72 *Id.*, 5.

the promise of such a normative coalescence. Even though science is not capable of solving normative problems, it can serve a valuable role in assisting in the evaluation of the *means* as well as the *consequences* of reaching various goals. Thus, together with individual value judgments, these analyses can contribute directly to a final selection of goals. Surely, scientific insights into human nature are equally important to the task of formulating ethical and legal systems. Since biological evolution has, by pre-determination, imposed broad behavioral constraints on individual development, cultural evolution must endeavour to chart a course between these borders.⁷³ Perhaps the time has come when serious consideration should be given to removing ethics temporarily from the philosophers and giving them to the scientists where they in turn may be “biologised”.⁷⁴ Indeed, sociobiology should be recognised as affording a basis for a new and enhanced understanding of ethics; for it enables a fresh comprehension of ethics as “a mode of human reasoning which develops in a group context, building on more limited biologically based forms of altruism.”⁷⁵

Since the extent of biology’s gift to future law-making efforts is clouded, perhaps it is better to test or evaluate the absorptive capacities of law.⁷⁶ The extent to which law receives or at least listens to what sociobiology is revealing, depends in large part upon the willingness of lawmakers, judges, and legal scholars to welcome scientific knowledge as a bridge to present levels of ignorance and professional rigidity.⁷⁷ By endeavouring to explain norm-forming processes, sociobiology and other behavioral sciences may have an important contribution to make in forming broad legal policies⁷⁸ and more specifically, by arranging interactions in order thereby to facilitate dispute resolution and promoting norm-forming action.⁷⁹

III. THE NEW BIOLOGY IN AMERICA

Today, scientific work is less a basic expression of the “ancient aristocratic ethos of the love of knowledge” than a mere job to be done — by entrepreneurs, employees, or others who have independent funding.⁸⁰

73 B.D. Davis, “A Middle Course Between Irrelevance And Scientism”, in A. Caplan (ed.), *The Sociobiology Debate*, note 25 *supra*, 315, 316.

74 E. Wilson, note 26 *supra*, 562. See J.M. Gustafson, “Sociobiology: A Secular Theology” (1979) 9(1) *Hastings Center Rpt* 44. See generally, G.P. Smith, “Intrusions of a Parvenu: Science, Religion and the New Biology” (1982) 3 *Pace L Rev* 63.

75 P. Singer, note 40 *supra*, 149. Accordingly, the sociobiological perceptive analysis of ethics should be regarded as being on the same level as either anthropological or sociological accounts of ethics; (81 and Ch. 3.) See generally, M. Rosen, “Classical Sociology and The Law” (1985) 5 *Ox J Leg Studies* 61. A. Hyde, “The Concept of Legitimation in the Sociology of Law” [1983] *Wis L Rev* 379.

76 R.D. Schwartz, “On the Prospects of Using Sociobiology in Shaping the Law: A Cautionary Note” (1982) 5 *J Social Biol & Struct* 325.

77 *Id.*, 326.

78 *Id.*, 332.

79 *Ibid.*

80 Compton, “Science, Anti-Science and Human Values” (1980) 1 *Amicus* 33. See generally, G.P. Smith, *Genetics, Ethics and the Law* (1981).

Genentech, a San Francisco based biotechnology company, recently issued shares on the over-the-counter market. Among its products is a hormone capable of stimulating human growth, mass produced human insulin which would allow a substantial reduction in cost of the treatment of diabetes, and interferon which may prove to be the long awaited 'miracle' drug to combat cancer. The price of Genentech stock increased dramatically during the first day of trading, and some brokers even suggested that Genentech may well be the next Polaroid or Xerox.⁸¹

It has been asserted that patenting new forms of life, as sanctioned by the United States Supreme Court,⁸² will be guided by short term profit motives rather than sound philosophical principles.⁸³ However, scientific knowledge is not — in and of itself — an absolute end. The thrust and purpose of patenting new life forms is basically technological and is essentially political. Because the etiology of new life forms is political, both its costs and its benefits are, of necessity, of public interest and concern.⁸⁴

Pure scientific inquiry does not produce an economic exploitation of nature; only man's use of the truths of scientific inquiry does. With the methodological style of nature, science seeks to demonstrate causal relations among events. Thus, the laws of science state that whenever X occurs or varies in a particular way, Y will similarly occur or vary in a particular way. This phenomenon has been aptly termed "a formula for action". Its practical application awaits only an individual's decision that it might be economically advantageous to try to mobilise X's to produce Y's.⁸⁵ Science promises truth, not peace of mind.⁸⁶ Yet, liberty to extend knowledge is never to be regarded as absolute — but rather, as has been seen, undergoes limitation when it conflicts with other values.⁸⁷

I now proceed to focus the spirit of inquiry and analysis on the additional parameters of the scientific imperative to explore truth; with the scope of this inquiry being shaped in large part by the United States patent laws and administrative interpretations and, more specifically, by the United States Supreme Court in its momentous holding allowing new forms of life created in a laboratory to be patented. The ultimate purpose of this investigation is to

81 "Investors Dream of Genes" *Time Mag.*, Oct. 20 1980, 72. The potential profits derived from manipulating the genetic code — be it either to create new forms of life sufficient to clean up toxic chemical wastes or to produce anti-cancer agents on grand scale — spurred President Derek Bok of Harvard University to suggest that his University start its own genetic engineering firm. Strong faculty opposition, however, forced him to give up these plans. "A Firm No" *Time Mag.*, Dec. 1 1980, 59. See generally, I. Cooper, *Biotechnology and the Law* (1987).

82 *Diamond v. Chakrabarty* 447 US 303 (1980).

83 G.J. Annas, "Life Forms: The Law and the Profits" (1978) 8(5) *Hastings Center Rpt* 21, 22. See also, Stich, "The Rewards and Risks of Studying Genes" (1986) 16(2) *Hastings Center Rpt* 39.

84 Note 80 *supra*, 37.

85 *Ibid.*

86 See Hiltz, "'Rules' Drawn for Marketing Gene Research" *Wash Post* March 28 1982, A1, col. 3; Will, "The Spiral of Patents Pending" *Wash Post* June 22 1980, B7, col. 6.

87 Note 1 *supra*.

refute the arrogance of power theory expressed as being implicit in the current studies of the vast potential for the positive achievement of good through harnessing the “New Biology”. Thus, I intend to demonstrate that what has been dismissed as but a magnificent obsession for power, profits and immortality has — in truth — a far more intrinsic potential for good and reward for the scientific community and the greater world community.

Improvement of man’s genetic endowment by striving for positive propagation of those with a superior genetic make-up or, conversely, delimitation of those with negative genetic inheritance has always been a primary concern in the field of genetics.⁸⁸ If the quality of life in some way may be improved or advanced by use of law as it relates to genetics, then such must be undertaken. No longer does the Dostoevskian quest to give life meaning through suffering become an inescapable given. By and through new scientific advances in the field of genetics and successes with *in vitro* fertilisation, the real potential exists to prevent, in large measure, much human suffering *before* it manifests itself in or through life.

1. *Altering Human Evolution*

Today, man is in a position not only to alter the social and environmental conditions of the universe, but also to change his very essence.⁸⁹ The mythology of the Minotaur and the Centaur, half man and half animal, may well become the reality of the twenty-first century. Indeed, modern medicine is presently not only attempting to create man-animal combinations, but also man-machine combinations or cyborgs.⁹⁰ Plastic arteries, artificial hearts, electrically controlled artificial limbs, and pacemakers highlight the achievements of modern science to replace diseased or worn out parts of the human body.⁹¹

Efforts to construct or engineer biologically functional bacterial plasmids *in vitro* exemplify the relatively new technology of recombinant DNA.⁹² Regarded as the most significant step in the field of genetics since 1953, research in this technology will facilitate identification of every one of the 100 000 genes in the human cell. Armed with this information, efforts could be directed toward replacing defective genes with healthy ones. Thus, the hope is that by making such replacements, genetic diseases such as haemophilia

88 See, *Genetics, Ethics and the Law*, note 33 *supra*, 1. See also, “Genetics, Eugenics and Family Planning”, note 33 *supra*, 4.

89 J. Fletcher, *The Ethics of Genetic Control* (1979) 5. See G.P. Smith, “Manipulating the Genetic Code: Jurisprudential Conundrums” (1976) 64 *Ga L Rev* 697. See generally, “The Razor’s Edge of Human Bonding” note 21 *supra* 639.

90 C. Rivers, “Genetic Engineering Portends a Grave New World”, (April 8 1972) 55 *Sat Rev* 23. See generally, V. Goodfield, *Playing God* (1977); G.P. Smith, “Intimations of Immortality: Clones, Cryons and The Law” (1983) 6 *UNSWLJ* 119.

91 See generally, A. Toynbee, *Surviving the Future* (1971) and *The Prospects of Western Civilization* (1949).

92 DNA is the basic genetic material that transmits inherited characteristics.

and sickle-cell anemia could be conquered.⁹³ Indeed, the plenitude of new products of nature that could substantially improve the human condition is staggering to the imagination.

The National Institute of Health has taken a conservative view of the limits of safety review required by those institutions receiving Federal grant monies to experiment in DNA. In 1980, two hundred representatives from the scientific community called upon NIH to loosen the restriction on gene-splitting experiments conducted in the United States. The scientists expressed the growing agreement that DNA research carries with it fewer risks than had once been thought.⁹⁴

The central question which arises in relation to the current scientific advances, is whether genetic engineering should be promoted and encouraged as a basic recognition of the freedom of scientific inquiry and right of privacy. Significant potential dangers are present in conjunction with the almost limitless opportunity for scientific advancement within the technology of recombinant DNA, commonly referred to as genetic engineering. The fear that the proverbial 'mad scientist', working independently or with an enemy foreign power, could isolate and then proceed to duplicate a cancer organism and place it — possibly — in public water supplies is not easily dismissed. Acts of thoughtless negligence in a laboratory could result in the 'escape' of a deadly microbe which in turn could give rise to a 'parade of horrors'. Chance occurrences are always inherent in any scientific intervention.⁹⁵ When the chance of harmful accident is calculated, the primary consideration is whether the merit of the intervention justifies beginning or continuing the experiment.⁹⁶

Genetic engineering, viewed as an instrument to revolutionise, limits the effect of natural selection and replaces it with programmed decision making. Programmed decision making — in turn — serves to facilitate rational thinking rather than impede it. Is it shameful 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. Today,

93 Clark, Begley & Hager, "The Miracle of Spliced Genes" *Newsweek* March 17 1980, 62. See generally R.F. Baker & W.G. Clough, "The Technological Uses and Methodology of Recombinant DNA" (1978) 51 *So Calif L Rev* 1009; Berger, "Government Regulation of the Pursuit of Knowledge: The Recombinant DNA Controversy" (1978) 3 *Sup Ct L Rev* 83; J.P. Swazey, J.R. Sorenson & C.B. Wong, "Risks and Benefits, Rights and Responsibilities: A History of the Recombinant DNA Research Controversy" (1978) 51 *So Calif L Rev* 1019.

94 "Scientists Want Limit Dropped on Gene Splitting Experiments" *Wash Post* November 26 1980, C3, col. 5. But see, Fields, "Bizarre Circumstances Surround Chance Cloning of Banner Virus" *Chronicle of Higher Education* August 25 1980 1, col. 1 (in violation of Federal guidelines that bar genetic copying, a researcher at the University of California at San Diego cloned a virus); I.R. Holtzman, "Patenting Certain Forms of Life: A Moral Justification" (1979) 9(3) *Hastings Center Rpt* 9.

95 R. Neville, "Philosophic Perspective on Freedom of Inquiry" (1978) 51 *So Calif L Rev* 1115, 1121.

96 C. Cohen, "Restriction of Research with Recombinant DNA: The Dangers of Inquiry and The Burden of Proof" (1978) 51 *So Calif L Rev* 1081, 1082, 1099.

the quest for maximum efficient utilisation of biological and medical knowledge represents one of the tenets of the so-called 'evolutionary wisdom'.⁹⁷

A number of Post-Darwinians in the scientific community assert that there is no wisdom in evolution, only chance occurrence. Few, if any, would be willing to accept unconditionally all that nature bestows, particularly disease. Consequently, science finds itself in the 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 dangerous as dangerous ignorance.⁹⁸

The sanctity of creation and the fundamental right of privacy in procreation — an acknowledged basic or fundamental freedom — may be altered by compelling state interests.⁹⁹ Is there a more compelling state interest than the desire to stop a 'chromosomal lottery' which saddles the economy each year with four million Americans born with diabetes or fifty thousand born with discernible genetic diseases?¹⁰⁰ State interests in minimising human suffering and maximising the social good should be properly validated.¹⁰¹

Opponents of unrestricted genetic research specifically attack its proponents as being both scientifically and socially irresponsible and the ultimate promoters of a serious environmental disaster.¹⁰² They suggest that nature has developed strong barriers against genetic interchanges between species and that extreme caution ought to be used during experimentation in this area.¹⁰³ Others argue that mankind's genetic inheritance is its greatest and most indispensable treasure which must be protected and guaranteed at any cost. These opponents submit that the evolutionary wisdom of the ages must not be irreversibly threatened or abridged in order to satisfy the ambition and professional curiosity of some members of the scientific community.

Autonomy, self-determination, and a basic sense of freedom must be tempered by logic, objectivity and a disinterested search for knowledge, a

97 J. Fletcher, "Ethics and Recombinant DNA Research" (1978) 51 *So Calif L Rev* 1131, 1139. Fletcher observes that there is nothing fundamentally unnatural or intrinsically wrong, or hazardous for the species, in the ambition that drives man to develop the technology to understand himself. It would in fact seem more offensive to fail to use and develop man's natural curiosity and talent for asking questions or worse to try to suppress it. Fletcher quotes from Lewis Thomas, "[t]his is the greater danger of our species, to try to pretend that we are another kind of animal ... and that the human mind can rise above its ignorance by simply asserting that there are things it has no need to know." L. Thomas, "Notes of a Biology Watcher: The Hazards of Science" (1977) 296 *N Eng J Med* 324, 328.

98 See Toulmin, "Science and Ethics: Can They Be Reconnected" (1981) 73 *U Chi Mag* 2.

99 See *Roe v. Wade* 410 US 113 (1973). See "Procreational Autonomy v. State Intervention" and "Sexuality, Privacy and The New Biology" note 16 *supra*.

100 See J.D. Roslansky, *Genetics and the Future of Man* (1966) 46.

101 See *Genetics, Ethics and the Law* note 33 *supra*, 2.

102 See generally, R. Howard, J. Rifkin, *Who Should Play God?* (1977); Hiltz, "Genetic Scientist is Punished for Test Violations" *Wash Post* March 23 1981, A1, col. 1.

103 R.L. Sinsheimer, "Recombinant DNA — On our Own" (1976) 26 *BioScience* 599.

search that may result in the minimising of human suffering and maximising of social good.¹⁰⁴ But what *is* the social good in this question? It is suggested that the social good — within this context — could be equated with an economic policy that lessens the financial burden on citizens and supports and maintains genetically defective citizens. The wisest policy is, by consensus, that which promotes a good — social, economic or otherwise — for the greatest number. Thus, human need and well-being shape the degree of positive good resulting from one policy as opposed to another.¹⁰⁵ Alternatively, a determination could be made in order to structure what is right or wrong, good or evil, according to whether the consequences of an act or public policy add to or detract from the aggregate human well being.¹⁰⁶

Ultimately, the decision for or against a policy is going to be tied to development and maintenance of an a priori standard of ethics (where, in theory, a balancing occurred before the standard was set) or to a situation ethic by which the consequences, pro and con, equities or inequities, or each proposed action will be carefully weighed and a conclusion with an ethical posture or structure of a standard of *modus operandi*¹⁰⁷ will be reached.

2. *Encouraging Experimentation*

Recognising that a sustained level of progress for society would depend upon a continuing standard of technological evolution as well as individual technological contributions of exceptional merit and benefit, the Founding Fathers endeavoured to codify this attitude within the United States Constitution itself. By structuring a system of checks and balances within the Constitution which would promote both perspectives, contributions which were truly exceptional could be promoted by grant of a limited monopolisation as authorised by the Patent Clause.¹⁰⁸ However, the grant of limited monopolisation was intended to be consistent with the guarantees of the Fifth and the Fourteenth Amendments, which recognise the right of all citizens to develop their individual skills in pursuit of a trade or calling.¹⁰⁹

The recorded history of efforts to legitimise monopolies for patents of unworthy inventions is long. To its credit the United States Supreme Court has thwarted these efforts and has thus recognised and enforced the

104 R.L. Sinsheimer, "Potential Risks" in National Academy of Sciences (ed.), *Research with Recombinant DNA* (1977).

105 Goodfield, note 90 *supra*, 71.

106 Fletcher, note 97 *supra*, 1128-1139.

107 *Id.*, 1138.

108 See generally, T. Beauchamp & L. Walters, *Contemporary Issues in Bioethics* (1978); Smith, "Uncertainties on the Spiral Staircase" note 35 *supra*.

109 See Irons & Sears, "Patent 'Re-examination': A Case for Administrative Arrogation" [1980] *Utah L Rev* 287-288. By the Patent Clause, Congress is authorised "[t]o promote the Progress of Science and useful Arts, by securing for limited Times to ... Inventors the exclusive Right to their ... Discoveries". U.S. Const. Art. I, Sec. 8, cl. 8.

Constitutional mandate to allow the unfettered growth and natural evolution of technology.¹¹⁰

On June 16 1980, by a five to four vote, the United States Supreme Court decided that new forms of laboratory life were eligible for patents.¹¹¹ The decision may be regarded as a ratification of some of the accomplishments of the “biological revolution” which has allowed a broader understanding of life and promoted a greater ability to manipulate various forms. However, both the majority opinion and the dissent stressed that they addressed only the question of whether the current patent laws evinced a congressional intent to deny patents to those inventions determined to be alive.¹¹² More particularly, the Court chose to tie itself to the United States Code section which provides:

[w]hoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.¹¹³

Out of this statute emerged the issue of whether a manufactured microorganism constituted a “manufacture” or “composition of matter” within the meaning of the statute.¹¹⁴

Dr Ananda M. Chakrabarty, a micro-biologist employed by the General Electric Corporation, engaged in research in which he succeeded in manufacturing a new microorganism, not found in nature, which is effective in breaking up oil spills. This genetically engineered strain of *pseudomonas* is made by combining (or cross breeding) four strains of oil eating bacteria into one man-made scavenging microorganism which combines the beneficial properties of each of its four parent bacteria. Each of the four strains digests particular hydrocarbons in a mixture of oil and water — such as is found in petroleum spills. Useful by-products of water, carbon dioxide and a bacterial protein nutritious to inhabitants of the ocean, remain. Dr Chakrabarty demonstrated that this manufactured ‘superstrain’ is much more efficient in digesting oil than a mixture of the four individual bacteria. Another advantage is that this microorganism, if it ‘escaped’, would not be able to thrive in gas tanks or in the oil fields of the earth and wreak uncontrolled

110 See *Sakraid v. AgPro Inc.* 425 US 273, 279 (1976); *Graham v. John Deere Co.* 383 U.S. 1, 5-6 (1966); *Atlantic Works v. Brady* 107 US 192, 200 (1882). Interestingly, about 65-70% of litigated patents are invalidated. Beauchamp & Walters, note 108 *supra* 305.

111 Note 82 *supra*.

112 Justice Brennan, writing in dissent, surveyed the Patent Act of 1793, as re-enacted in 1952, the Plant Patent Act of 1920, and the Plant Variety Protection Act of 1970 and concluded that there existed a strong congressional limitation against patenting bacteria. “It is the role of Congress, not this Court, to broaden or narrow the reach of the patent laws. This is especially true where, as here, the composition sought to be patented uniquely implicates matters of public concern.” *Id.*, 322. For those who have followed Justice Brennan’s judicial philosophy, this position, which calls for judicial restraint, is most interesting and unusual. In the past, he has been the judicial activist and Chief Justice Burger the apostle of judicial restraint. In *Chakrabarty*, the roles were reversed.

113 35 USC 101 (1976).

114 Note 82 *supra*, 307.

environmental havoc on the ecosphere.¹¹⁵ The Chakrabarty bacterium had already been granted a patent in Britain, which had followed several European nations in recognising both plants and animals as patentable.¹¹⁶

The patent application of Chakrabarty and General Electric was for a manufactured microorganism product not found in nature as well as a process of using the microorganism, on a carrier, to digest oil spilled in water. The United States Patent Office rejected the product claim, but allowed a portion of the process claim. The rationale for rejection of the product claim was that a living organism — a naturally occurring product of nature — as this was determined to be, was not within the classes of subject matter which are patentable. The Patent Office reached this conclusion because there was no mention of such a class in the controlling statute or in the statute's legislative history. This decision was upheld by the Patent Office Board of Appeals, but the United States Court of Customs and Patent Appeals reversed, and the Patent and Trademark Office appealed to the United States Supreme Court.¹¹⁷

In the past, the Patent Office has included living things within the statutory subject matter. For example, in 1873, United States Patent No. 141,072 was issued to Louis Pasteur. Claim two of the patent application reads: “[y]east, free from organic germs of disease, as an article of manufacture”.¹¹⁸ There are other examples, in other patents, of claims having been granted for viruses and cultures.¹¹⁹

Today, there are more than one hundred patent applications related to products of genetic engineering.¹²⁰ *Chakrabarty* sets the pace for a wide variety of new man-made organisms which can facilitate socially desirable processes such as growing wheat in arid lands, leeching ores to assist mining companies in reaching remote parts of the earth, and producing a “bug” that will ferment corn starch or corn syrup into ethanol, an alcohol used in both whisky and gasohol. There is also a patent application for a bacterium that metabolises ethylene into ethylene glycol (antifreeze).¹²¹

As noted previously, the major thrust of the decision of the United States Supreme Court in *Chakrabarty* is tied to the interpretation of the term “manufacture” as it appears in the Federal patent code. Observing that

115 Gore, “The Awesome Worlds Within a Cell” (1976) 150 *Nat'l Geographic* 355, 374-375.

116 See generally, Kiley, “Common Sense and the Uncommon Bacterium — Is ‘Life’ Patentable” (1978) 60 *J Pat Off Soc'y* 468; Wegner, “The Patentability of ‘New’ Manufactures’ — The Living Invention” in BNA (ed.) *Patent Law Conference Coursebook* (1978).

117 Application of Chakrabarty, 517 F.2d 40 (C.C.P.A.) *dismissed* 439 US 801 (1978) *rev'd sub nom.* Application of Bergy, 596 F.2d 952 (C.C.P.A.), cert. granted, 444 US 924 (1979).

118 Student Papers, “Microbiological Plant Patents” (1966) 10 *Idea* 87.

119 *Ibid.* See I.P. Cooper, “Patent Protection for New Forms of Life” (1979) 38 *Fed Bar J* 34; R.F. Kip, “The Patentability of Natural Phenomena” (1952) 20 *Geo Wash L Rev* 371.

120 J.S. DeMott & E. Thomas, “Test-Tube Life: Regulating U.S. Pat. Off.” *Time Mag* June 30 1980, 52.

121 See D. Nelkin, “Threats and Promises: Negotiating the Control of Research” (1978) 107 *Daedalus* 191.

Thomas Jefferson's Patent Act of 1793 stressed its coverage to "any new and useful art, machine, manufacture, or composition of matter, or any new or useful improvement [thereof]," Chief Justice Burger, writing for the majority, defined manufacture as "the production of articles for use from raw or prepared materials prepared by giving to these materials new forms, qualities, properties, or combinations, whether by hand labor or by machinery"¹²² Citing approving precedent defining "composition of matter" as including "all compositions of two or more substances and ... all composite articles, whether they be the results of chemical union, or of mechanical mixture, or whether they be gases, fluids, powders or solids", the Chief Justice concluded that the Chakrabarty microorganism qualified as being within patentable subject matter.¹²³ The claim is particularly forceful since it is for a product of human ingenuity which is non-natural in its occurrence.¹²⁴

In response to the argument that microorganisms cannot be patentable without express congressional authorisation, the Chief Justice declared that Congress had already defined what was patentable subject matter in section 101 of the Act, and that it was for the courts to interpret that provision. Finding no ambiguity in the statutory provisions and stressing the broad constitutional and statutory goal of promoting "the Progress of Science and the useful Arts", Chief Justice Burger adhered to his position that the definition the Court gives to section 101 is consistent with the goals of the Act.¹²⁵

The Court declined to acknowledge the "grave risks" or the "gruesome parade of horrors" which the Patent Office argued that the Court should weigh in deciding whether the Chakrabarty invention is patentable.¹²⁶ Although acknowledging that "genetic research and related technological developments may spread pollution and disease, that it may result in a loss of genetic diversity, and that its practice may tend to depreciate the value of human life",¹²⁷ the Court concluded that neither the grant nor the denial of patents on microorganisms will end advance in genetic research nor "deter the scientific mind from probing into the unknown any more than Canute could command the tides."¹²⁸ The Court stated unequivocally that scientific arguments against advancements in this field are matters of "high policy" which should be considered by the legislative process which balances and places in proper perspective the various competing values and interests of all

122 Note 82 *supra*, 308.

123 *Ibid.*

124 *Id.*, 310. See generally, Delgado & Miller, "God, Galileo and Government: Toward Constitutional Protection for Scientific Inquiry" in G.P. Smith (ed.) 1 *Ethical, Legal and Social Challenges to a Brave New World* (1982) 231.

125 Note 82 *supra*, 315.

126 *Id.*, 316-317.

127 *Id.*, 316.

128 *Id.*, 317.

interested parties.¹²⁹ The Chief Justice concluded by noting that if the Court had misconstrued the provisions of section 101, all that Congress needed to do was to amend the statute so as to exclude from the protection of the patent laws organisms which are produced by genetic engineering.¹³⁰

Despite the Court's disclaimer that its action was purely constructive in nature — merely an interpretation of a statutory mandate — it did attempt to validate a new national policy. While invoking the Jeffersonian concept of ingenuity in patent creativeness, it came down four-square on a policy of encouraging experimentation into the "New Biology" despite the possible risk to mankind. Thus, while disclaiming the application of a balancing test, it — in effect — performed one. It correctly decided that the utility of the good that will flow from research and experimentation into the varied fields of the "New Biology" far outweighs the potential harm accruing as a consequence of such an undertaking. This is an eminently fair and reasonable position.

3. *A Further Innovative Application*

In May 1987 the United States Patent and Trademark Office announced that it "considers non-naturally occurring nonhuman multi-cellular living organisms, including animals, to be patentable subject matter".¹³¹ Although viewed by the Patent Office as but an effort to keep pace with the startling new advances in biotechnology, and thereby encourage innovation and not determine its ethical implications, others — such as animal rights advocates — were concerned that animals were being considered as products and not sentient beings.¹³² Some feared also that the new policy would enable a select number of biotechnology companies to dominate the livestock industry — thereby eliminating small independent breeders and seeking to eliminate genetic diversity among farm animals,¹³³ since with patents the central issue becomes who either owns or is in control of breeding livestock.¹³⁴

Theologians quarrelled with the Patent Office policy because it not only equated heavenly made creatures with manufactured goods of the market place, but took a giant step on the slippery slope that would lead to the patenting of genetically altered human beings and man's full assumption of God-like powers. The clear specification of the policy that its application was only for "nonhuman life" was of no assurance here.¹³⁵

Informed members of the scientific community saw the Patent Office as merely continuing the reasonable exploitation of nature. As a director of Ohio University's Animal Biotechnology Center in Athens, Ohio, said

129 *Ibid.*

130 *Id.*, 311.

131 *Time Mag* May 4 1987, 110.

132 *Ibid.*

133 *Ibid.*

134 *Ibid.*

135 *Ibid.*

succinctly: “[a] pig is a pig, and a cow is a cow. You merely enhance certain aspects of it.”¹³⁶

It is expected that the near future of biotechnology will give rise to work in laboratories in the United States where virus and bacteria genes will be transferred to plants in an effort to enable them to produce their own particular insecticides or fertilisers. After field testing, these “transgenic” plants will in turn be used by farmers in the place of conventional crop varieties.¹³⁷ Further successful research will be undertaken that manipulates the primordial cells producing sperm and eggs to, in turn, enable breeders to determine the sex and other preferred characteristics of their animals; routine gene transplants from one species to another will be accomplished routinely.¹³⁸

Already the Federal Department of Agriculture operating from its Research Center in Beltsville, Maryland, has produced a brown rust-coloured “transgenic” pig that was bred with the growth hormone of a cow. Engineered with the idea of achieving less fat, the pig has met this scientific purpose. But, sadly, it also suffers from severe arthritis and thus has difficulty walking and has crossed eyes as well.¹³⁹ A policy group opposing genetic engineering, the Foundation of Economic Trends, together with the Human Society, unsuccessfully maintained a legal action against the efforts of the government to halt the research that produced this particular boar’s father. The essence of their claim was that research of this nature not only was cruel and violated animal dignities, but would also have very significant social and economic repercussions in that more expensive animals would in turn cause severe market dislocations in the farm economy.¹⁴⁰

As discussed previously,¹⁴¹ these and similar concerns over patenting life were raised initially with the *Chakrabarty* decision.¹⁴² Since no catastrophic events have followed in the aftermath of *Chakrabarty*, and none are expected from this new policy of the United States Patent and Trademark Office, the on-going debates over the long range effects of genetic engineering and its ethical constraints will be of little value in halting the momentum of scientific inquiry, experimentation and advancement of biotechnology.

As the director of The Hastings Center in New York — an organisation devoted to the continuing ethical study of the effects of advances of the new biological technologies on society — stated, “[i]t’s very hard to sustain a

136 *Ibid.* Because of the economic importance for Australia of the overseas export trade of animal products, it is expected that Australia will follow the United States lead in patenting animal forms. Current Topics, “The Patenting of Animal Forms with New Traits” (1987) 61 *ALJ* 324, 326.

137 K. Schneider, “A Patent on Life Forms Gets Genes Into Business” *Int’l Herald Tribune* June 9 1987, 1, col. 7.

138 *Ibid.*

139 *Ibid.*

140 *Ibid.*

141 See notes 85-107 *supra*.

142 See P.M. Boffey, “Animal Rights, Fears of ‘Human Husbandry’ Complicate Debate on Biotechnology” *Int’l Herald Tribune* June 10 1987, 6, col. 1.

great deal of worry about these things, ... when, after 10 years of pretty constant interest and attention, there have been no untoward events."¹⁴³

IV. TOWARD A STANDARD OF REASONABLENESS

The Supreme Court's actions in *Chakrabarty* and the recent Patent and Trademark policy on the patentability of nonhuman life, give private corporations the incentive to invest in further research into the fields of bio-chemistry, genetics and eugenics. This incentive and the anticipated result therefrom satisfy the constitutional objective of early disclosure which — in turn — expands the public domain of knowledge in these fields. There can be little doubt that patentability of microorganisms and nonhuman life forms is "Progress of the Useful Arts".

Man's dehumanisation and depersonalisation will not be fostered as a consequence of the continued quest for mastery of the genetic code. Attendant on the freedom to undertake research into the exciting and fertile frontiers of the "New Biology" is a coexistent responsibility to pursue the work in a reasonable, rational manner. Pursuing the "New Biology" in such a manner requires adequate attention to the safety factor in all aspects of the experimentation.¹⁴⁴ The undesirable elements of a Brave New World can be tempered only when knowledge is pursued with the purpose of establishing the truth and integrity of the question, issue or process.¹⁴⁵ The vast potentials for advancing society and ridding it of a verisimilitude of its present ills is an obvious good which must be pursued steadily. Little sustaining harm can result from a reasonable pursuit of truth and knowledge; for, indeed, truth and knowledge are the basic interstices in any balancing test.¹⁴⁶ If actions are undertaken and performed with the goal of minimising human suffering and maximising the social good, then the noble integrity of evolution and genetic progress will be preserved.

There can be little quarrel with Stone's idea of social responsibility in scientific inquiry and investigation. I find myself, however, in respectful dissent from his concern regarding the dangers of research into the fields of the non-coital reproductive sciences. Indeed, so long as procreation continues to remain the central driving force in a marital relationship and the family the very core of a progressive society, efforts will be undertaken to expand the period of fecundity and combat infertility, itself. Genetic planning

143 *Id.*, col. 7. See generally, "Comment, The Prospect of Private Unauthorized Eugenics and Ten Feet Tall Basketball Players: A Case for Legislative Oversight?" (1985) 1 *J Contemp Health L & Policy* 135.

144 R.L. Sinsheimer, "The Right to Free Inquiry" (1975) 190 *Science* 768.

145 See G.P. Smith, "Manipulating the Genetic Code: Jurisprudential Conundrums" (1976) 64 *Ga L Rev* 697. See also *Office of Technology Assessment, Impact of Applied Genetics* (1981); Note, "Building a Better Bacterium: Genetic Engineering and the Patent Law After *Diamond v. Chakrabarty*" (1981) 81 *Colum L Rev* 159.

146 Lederberg, "Orthobiosis: The Perfection of Man" in A. Tiselius & S. Nilsson (eds) *Place of Value in a World of Facts* (1980) 29.

and eugenic programming are more rational and humane alternatives to population regulation through death by famine and war.

Man must endeavour, to be sure, to execute his investigatory and manipulative or creative powers within the scientific laboratory with a rational purpose and in a spirit of humanism. As thus, he should seek to minimise human suffering thereby contributing to the social goal of allowing all members of society an equal opportunity to achieve their maximum output within the economic market place and to maintain personal integrity and seek spiritual tranquility. Genetic engineering which contributes to the social good should be utilised fully. There can be no real doubt that genetic manipulation provides a perilous opportunity that may either threaten freedom or enhance it — depending upon the balance struck between its use for individual need satisfaction and societal good.¹⁴⁷

Restraining scientific inquiry, then, to my way of analysis, should be limited only to action taken to be *unreasonable*. Accordingly, an undertaking would be regarded as unreasonable when the long *and* short term costs of its effects would outweigh the enduring benefits that would derive from its study and implementation. Viewed, then, as being not only an aid to the tragedy of infertility in family planning, but as a tool for enhancing the health of a nation's citizens, vital scientific research must continue in the new reproductive technologies and in efforts to engineer man's genetic weaknesses out of the line of inheritance. Healthier and genetically sound individuals have a much better opportunity for pursuing and achieving the "good life" and in turn making a significant contribution to society's greater well being. This, then, is the province and function of law, science and medicine.¹⁴⁸

The "judgment of justice" has yet to be given in charting the province and function of law, science and medicine.¹⁴⁹ One matter is certain, however. The leeways of choice and patterns of discourse are not as wide as might be expected.¹⁵⁰ For, when the simple goal of any scientific inquiry is the minimisation of human suffering and the maximisation of the social good deriving therefrom, it *must* be pursued in a reasonable manner.

147 See M.D. Kirby, "Bioethical Decisions and Opportunity Costs" 2 (1986) *J Contemp Health L & Policy* 7.

148 See Scott, "Legal Implications and Law Making in Bioethics and Experimental Medicine" (1985) 1 *J Contemp Health L & Policy* 47.

149 See generally, Tay, "Julius Stone and The Concept of Justice" (Dec. 1986) 10 *Bull Australian Soc Legal Phil* 131, 135. This issue of the Bulletin presents and analyses Stone's vast professional contributions.

150 See generally, M. Krygier, "Julius Stone: Leeways of Choice, Legal Tradition and The Declaratory Theory of Law" (1986) 9 *UNSWLJ* 26. This issue of the *Journal* is dedicated to Dr Stone's memory and contains the Inaugural Julius and Reka Stone Oration delivered by Prime Minister Bob Hawke.