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Diamond v. Chakrabarty: Oil Eaters: Alive and Patentable

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Diamond v. Chakrabarty: Oil Eaters: Alive and Patentable

Congress is empowered, under article I, section 8 of the United States Constitution, to create patent laws that encourage the promotion of arts and sciences. In the congressional fulfilment of this task, the courts have been confused as to what products are worthy of patent protection under the patent statutes. One illustration of this confusion is the recent controversy of whether living organisms fit into the statutory patentable classification of section 101 of the 1952 Patent Act. The recent United States Supreme Court decision of Diamond v. Chakrabarty has ended this confusion by holding that living microbacteria is patentable as a "manufacture" or "composition of matter" under section 101. The author makes an exhaustive survey of the areas of confusion surrounding interpretation of the patent statutes and analyzes the Chakrabarty decision from the perspective of resolving these areas of confusion. The author ultimately agrees with the decision, but notes that although the confusion in this area is abated, the controversy still remains.

I. INTRODUCTION

As the scope of man's industrial and scientific technologies broaden, so must the law which protects the endeavors of those responsible for attaining these advancements. Nowhere has this been more evident than in the recent Supreme Court case of *Diamond v. Chakrabarty*,[1] where the Court, in a five-to-four decision, held that living, man-made microbacteria is statutorily protected subject matter under the United States Patent Act.[2] This case comment will examine both the facts and procedural background of the *Chakrabarty* decision. The historical background of relevant case law and statutes will also be examined in an effort to show the propriety of the Supreme Court's opinion. Finally, the *Chakrabarty* decision will be analyzed from the perspectives of adherence to precedent and future benefits to the scientific and business communities.

II. FACTS OF THE CASE

In 1972, Ananda M. Chakrabarty, a microbiologist, filed for a pat-

1. 100 S. Ct. 2204 (1980).
2. 35 U.S.C. § 101 (1976) states: "Whoever invents or discovers any new or useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefore, subject to the conditions and requirements of this title."

ent application assigned to the General Electric Company. This application asserted thirty-six claims related to Chakrabarty's invention, genetically engineered bacteria capable of breaking down multiple components of crude oil.[3] Such properties are not possessed by any naturally existing bacteria.[4]

Chakrabarty filed three types of patent claims. The first type included process claims relating to the method of producing the bacteria.[5] The second type included claims for an inoculum comprised of a carrier material, such as floating straw, combined with the new bacteria.[6] The third type included claims for the bacteria itself.[7] The patent examiner allowed the first two claims involving the process and the carrier material, but rejected the third claim for patentability of the bacteria on the ground that there was no coverage for the bacteria within section 101 of the patent law.[8] The examiner reasoned that the claimed microorganisms were "products of nature" and thus not patentable because living things, generally, were not patentable subject matter.

The Patent Office Board of Appeals rejected the examiner's

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3. This is accomplished by decomposing the oil into simpler substances which can then serve as food for aquatic life.

4. Crude oil varies in the amount of hydrocarbons it contains. Chakrabarty invented a bacterium from the genus Pseudomonas capable of breaking down four different hydrocarbons by means of four different plasmids, *i.e.*, hereditary units physically separate from the chromosomes. 100 S. Ct. at 2205 n.1. At present, naturally occurring bacteria are capable of breaking down different components of oil; however, they do not degrade with equal speeds because only a portion of any such mixed culture survives. By breaking down multiple components, Chakrabarty's invention promises more rapid and efficient oil spill control. 100 S. Ct. at 2204, 2206 n.2.

5. "A bacterium from the genus Pseudomonas containing therein at least two stable energy-generating plasmids, each of said plasmids providing a separate hydrocarbon degradative pathway." *In re* Bergy, 596 F.2d 952, 970 (C.C.P.A. 1979).

6. "An inoculum for the degradation of a pre-selected substrate comprising a complex or mixture of hydrocarbons, said inoculum consisting essentially of bacteria of the genus Pseudomonas at least some of which contain at least two stable energy-generating plasmids, each of said plasmids providing a separate hydrocarbon degradative pathway." *Id.* at 970. The two groups of claims, above, were rejected by the Patent Office as not being "manufactures" or "compositions of matter" within the meaning of § 101.

7. The third group consisted of claims 27 through 29 directed to a process or improvement in a process of transferring plasmids from a donor to a recipient bacterium. The fourth group consisted of claims 30 through 32, 35 and 36, directed to an inoculated medium. The only independent claim was claim 30, which read:

> An inoculated medium for the degradation of liquid hydrocarbon substrate material floating on water, said inoculated medium comprising a carrier material able to float on water and bacteria from the genus Pseudomonas carried thereby, at least some of said bacteria each containing at least two stable energy-generating plasmids, each of the said plasmids providing a separate hydrocarbon degradative pathway and said carrier material being able to absorb said hydrocarbon material.

Id. at 970-71.

8. *See* note 2 *supra*.

"product of nature" argument but sustained the decision that the living microorganisms were not patentable under section 101 because Congress had enacted other laws, *e.g.*, the Plant Patent Act of 1930[9] and the Plant Act of 1970,[10] which expressly provided protection only for living plants. Since live plants were not included under section 101, but were included under other statutory provisions, the Board reasoned that no living organism would qualify as subject matter under section 101. The Board, therefore, based its denial of the patent on what it perceived as congressional intent to exclusively protect living things under the Plant Acts and not under the patent laws.[11]

III. PROCEDURAL BACKGROUND

A similar case to *Chakrabarty, In re Bergy*[12] (*Bergy I*), decided earlier by the Court of Customs and Patent Appeals on October 6, 1977, reversed a Board decision against the granting of patent protection for living organisms. The same appellate court on March 2, 1978, also reversed the Board decision[13] against granting patent protection for living organisms in *In re Chakrabarty*.[14] The appellate court based its decision solely on its earlier holding in *Bergy I*.[15] A petition for writ of certiorari for the *Bergy I* case was

9. 35 U.S.C. § 161 (1976) states:

> Whoever invents or discovers and asexually reproduces any distinct and new variety of plant, including cultivated spores, mutants, hybrids, and newly found seedlings, other than a tuberprogated plant or a plant found in an uncultivated state, may obtain a patent therefor, subject to the conditions and requirements of this title.

10. 7 U.S.C. § 2402 (1976) states in relevant part: "The breeder of any novel variety of sexually reproduced plant (other than fungi, bacteria, or first generation hybrids) who has so reproduced the variety, or his successor in interest, shall be entitled to plant variety protection therefor . . . ."

11. *In re* Bergy, 596 F.2d 952, 971 (C.C.P.A. 1979) [*Bergy II*]. Consequently, the Board had extreme difficulty in approving the claim because the subject matter was alive. The Board reasoned that if Chakrabarty's organisms were covered by § 101, then all living things, including human beings, would be patentable. *Id.* at 971.

12. 563 F.2d 1031 (C.C.P.A. 1977) [*Bergy I*]. The court found a living organism to be patentable subject matter under § 101. The microbiological process in *Bergy I* was a "Streptomyces vellosus", which was specified in ten pages of text, including descriptions of its production. This culture could produce an antibiotic called Lincomycin in a recoverable quantity through a fermentation process. *Id.*

13. The Board held that Chakrabarty's claims were invalid and not statutory subject matter under § 101.

14. 571 F.2d 40 (C.C.P.A. 1978). This was the appellate court opinion for *Diamond v. Chakrabarty*, 100 S. Ct. 2204, which is the subject of this case comment.

15. *Bergy I* was first decided by the appellate court in October, 1977. That

granted by the Supreme Court. However, the case was later remanded to the Court of Customs and Patent Appeals to be reexamined in light of the Supreme Court's decision of *Parker v. Flook*,[16] which had been decided four days earlier. The Commissioner of Patents and Trademarks then petitioned the appellate court to vacate its *Chakrabarty* decision, in light of *Parker v. Flook* and the Supreme Court's remand of *Bergy I*.

Perceiving a single issue[17] in both cases, the Court of Custom and Patent Appeals consolidated the *Bergy I* and *Chakrabarty* decisions, "wiped the slate clean" on both cases,[18] and reaffirmed the two earlier decisions by stating that *Flook* had no bearing on either case.[19] Certiorari was, again, granted in both cases.[20] However, the Supreme Court only reviewed *Chakrabarty* as the *Bergy* case had become moot.[21] The Supreme Court affirmed the appellate court's *Chakrabarty* decision, and accordingly, patents for Chakrabarty's bacteria and process were granted.[22]

IV. Historical Background

An understanding of the *Chakrabarty* decision demands familiarity with the statutory provisions and case law upon which the decision was based. Accordingly, an analysis of the relevant patent statutes and accompanying cases is presented.

A. *Patent Statutes*

Federal patent law has its roots in a specific constitutional provision which authorizes the Congress to "promote the Progress of

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same court was presented with the identical question in December, 1977, in *In re Chakrabarty*, 571 F.2d 40, *see* note 14 *supra*, and held that the claim was valid on the basis of the *Bergy I* decision.

On the second review of both cases, the appellate court was acutely aware of the nature of Bergy's and Chakrabarty's claims; but, nonetheless, recognized that both cases involved the single issue of whether living things qualified as patentable subject matter under § 101. 596 F.2d at 956-57.

16. 437 U.S. 584 (1978). Flook invented a method for updating alarm limits during catalytic conversion processes. His novel contribution to this field was a mathematical formula, which was held to be incapable of being patented under § 101.

17. The single issue was whether the subject matter of *Bergy* and *Chakrabarty* was patentable subject matter under § 101.

18. 596 F.2d at 957.

19. *Id.* at 967.

20. Since the Court of Customs and Patent Appeals found *Flook* not to be controlling in either *Bergy* or *Chakrabarty*, the Supreme Court was forced to decide the same issue.

21. Diamond v. Chakrabarty, 444 U.S. 1028 (1980). The Supreme Court gave no explanation why the *Bergy* case was moot.

22. 100 S.Ct. at 2204.

Science and useful Arts,[23] by securing for limited Times, to . . . Inventors, the exclusive Right to their . . . Discoveries; . . . [and] to make all Laws which shall be necessary and proper for carrying into Execution the foregoing Powers."[24] Congress may provide, pursuant to this authority, the proper guidelines for inventors.[25] The problem in this area has been congressional interpretation of the framers' intent. It is necessary to examine this interpretation problem from its inception; only then may one perceive the confusion and inconsistency of the courts, and understand the complexity of decisions in the patent law field.[26]

The Patent Clause is both a grant and a limitation of power.[27] The patent right granted by Congress is the reward given to the inventor in exchange for the public benefit derived after the patent expires.[28] The inventor's right is a creature of statute and is, therefore, subject to certain conditions and limitations imposed by the Congress.[29] In *Graham v. John Deere*,[30] the Supreme Court explained that congressional exercise of the patent power must adhere to the restraints imposed by the stated constitutional purpose of promotion of science and the useful arts. The *Graham* Court indicated that it would check any overreaching by Congress in this area.

> Congress may not authorize the issuance of patents whose effects are to remove existent knowledge from the public domain or to restrict free access to materials already available. Innovation, advancement, and things which add to the sum of useful knowledge are inherent requisites in a patent system which by constitutional command must, 'promote the Progress of useful Arts.' This is a standard expressed in the Constitution and it may not be ignored.[31]

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23. Included are those inventions or discoveries which give advantage to the public from exertions of individuals. Grant v. Raymond, 31 U.S. 218 (1832).

24. U.S. CONST., art. I, § 8.

25. 596 F.2d at 958.

26. *Id.*

27. 1 A.W. DELLER, DELLER'S WALKER ON PATENTS 90 (2d ed. 1964) [hereinafter cited as A.W. DELLER]. This characterization typifies the process by which Congress must select policies which are suited to effectuate the constitutional aim of promoting of the useful arts and sciences. Beidler v. United States, 253 U.S. 447 (1920).

28. A.W. DELLER, *supra* note 27, at 92.

29. *Id.*

30. 383 U.S. 1 (1966). This case involved a question of patent infringement and a question of whether a shock absorbing device for plows used for rocky soil was patentable under § 103 of the patent act. *See* note 65 *infra*. The Court held that the device did not meet the § 103 requirement. 383 U.S. at 37.

31. 383 U.S. at 6. *See also* Great A.&P. Tea Co. v. Supermarket Equip. Corp., 340 U.S. 147 (1950), where Justice Douglas pointed out the constitutional restraint

The Court further stated that Congress could implement policies that it believed were consistent with the framers' intent and constitutional purpose.[32]

The first Congress did not hesitate to use its patent power. Requests for a patent law abounded and Congress quickly responded by adopting the 1790 Patent Act on recommendation from George Washington.[33] This original patent law stated that a patent could be issued to any applicant who "hath . . . invented or discovered any useful art,[34] manufacture,[35] . . . or device, or any improvement therein not before known or used[36] . . . [as long as] the invention or discovery [was] sufficiently useful and important."[37] However, under the subsequent 1793 Patent Act, a patent would be issued for the invention of any "machine,[38] manufacture,[39] or composition of matter[40] [which was] new and useful."[41] The 1793 Act's double requirement of new and useful as opposed to the 1790 Act's "either/or" test, presented what is presently referred to as the "novelty and ultility test."[42]

For several years following the 1793 statute, there were two problems in patent law. The first was that American patent law

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on Congress. "The Congress does not have free reign, for example, to decide that patents should be easily or freely given." *Id.* at 154.

32. 383 U.S. at 6.

33. A.W. DELLER, *supra* note 27, at 93.

34. *See* note 23 *supra* and accompanying text.

35. "Manufacture" is one of the subjects or classes of inventions which may be patented by the inventor. Manufactures may be new in the commercial sense, but to meet this requirement in patent law, the new article must involve an invention or discovery beyond what is necessary to construct the apparatus for its manufacture or production. A.W. DELLER, *supra* note 27, at 123-24.

36. The "non-obviousness" test requires that a patent not be granted for an innovation unless it would not likely have developed absent the prospect of a patent. The test is whether the achievement of the invention requires a greater degree of skill than the level of ordinary skill in the art. *See* Kitch, *Graham v. John Deere Co.: New Standards for Patents*, 1966 SUP. CT. REV. 293, 301.

37. 383 U.S. at 7. *But see* A.W. DELLER, *supra* note 27, at 94, for an examination of Jefferson's philosophy behind issuing patents.

38. The test for patentability of a machine under the patent laws is threefold: (1) what is the novel structure or device of the patentee; (2) what type of operation is employed by this novel structure or device; and (3) what new result was attained by means of this mode of operation. A.W. DELLER, *supra* note 27, at 122.

39. *See* note 35 *supra*.

40. The phrase "composition of matter" covers all compositions of two or more substances. It includes all composite products whether they are the result of chemical union, mechanical functions, or whether they be gases, fluids, powders, or solids. A.W. DELLER, *supra* note 27, at 127.

41. 1 Stat. 318-319 (1793). New and useful improvements are those which incorporate some addition or change in an existing machine, manufacture, or composition of matter. It may be an addition, simplification, or variance. *See* A.W. DELLER, *supra* note 27, at 131.

42. Kitch, *supra* note 36, at 303. It was at this point in patent law that claims were also required by the courts to be both new and useful to be patentable.

attempted to define the concept of novelty. The purpose in defining the concept of novelty was to design rules that would prevent any inconsequential advancements from receiving patent protection.[43] The second problem was whether an invention was a "change in form" or "change in substance."[44] A mere change in the form of a prior invention was not held to be novel, hence, it was not patentable, while a change in substance was held to be novel and hence, was patentable. The courts had problems interpreting the statute, given the state of technology at that stage in American history, and given the fact that the novelty requirement was construed to by synonymous with the term "new".[45]

The 1836 Patent Act imposed further criteria for patentability. After 1836, any person who " 'discovered or invented' . . . was eligible for a patent."[46] Thus, the *necessity* of invention was introduced into the patent law.[47] The 1836 Act presently serves as the basis for our modern patent system.[48]

In 1850, the Supreme Court formed a general test for patentability in *Hotchkiss v. Greenwood*.[49] In *Hotchkiss*, the Court construed the invention requirement, which was previously thought to be a patent-limiting device, as a liberalization of the "new and useful" standard.[50] The *Hotchkiss* "non-obvious test"[51] distin-

43. 383 U.S. at 11. In Thompson v. Haight, 23 F. Cas. 1040-41 (C.C.S.D.N.Y. 1826) (No. 13,957), the court explained the difficulties of interpreting a statute with the term "new." This term called for much ingenuity and competition. There were so many innovators attempting to patent similar products that the courts found the need to raise the standard for patentability to prevent every common product from becoming the subject of a patent monopoly.

44. Kitch, *supra* note 36, at 303.

45. The 1793 Act only required that the patentee "invent" something. Modernly, mere "invention" will not entitle one to a patent. 383 U.S. at 116.

46. Act of July 4, 1836, ch. 357, 5 Stat. 117 (1836). Kitch, *supra* note 36, at 320.

47. *Id.* Hotchkiss v. Greenwood, 52 U.S. (11 How.) 248 (1850), stood for the proposition that nothing short of an invention would support a patent. Thus, invention became a third requirement for patentability. *See* note 49 *infra* and accompanying text.

48. A.W. DELLER, *supra* note 27, at 96. Section 101 of the present Patent Act is very similar to the 1836 Act. All the requirements of "new," "useful," and "invention" are also part of § 101.

49. 52 U.S. (11 How.) 248 (1850). The patent involved a substitution of materials. Porcelain or clay was being substituted for wood or metal in doorknobs. The Supreme Court noted that the only "new" quality about this substitute was that it cost less to make. This was, of course, not sufficient for the granting of the patent.

50. Kitch, *supra* note 36, at 312.

51. *See* note 36 *supra*. Non-obviousness is the modern term which has replaced the word "invention." For further insight, *see In re* Bergy, 533 F.2d 1031, 1034-39 (C.C.P.A. 1977).

guished between new and useful inventions that were capable of sustaining a patent and those inventions which were not.[52]

> Unless more ingenuity and skill were . . . required . . . than were possessed by an ordinary mechanic acquainted with the business, there was an absence of that degree of skill and ingenuity which constitute essential elements of every invention. In other words, the improvement is the work of the skillful mechanic, not that of the inventor.[53]

This language gave birth to the term "invention" as a word of legal art signifying a patentable item.[54]

Justice Nelson, in *Hotchkiss* admitted that a patent might be issuable even without novelty if there was the essential degree of skill required for an invention.[55] The rule of *Hotchkiss* was that a change of materials would not itself be patentable, even if it resulted in an improvement, unless the application of the materials to the use required more than mechanical skill.[56] Thus, the *Hotchkiss* rule has been interpreted to mean that the end effect or result must be new; however, if an invention has been previously used but later attains a different result or purpose, then there may be patent protection. The *Hotchkiss* "non-obvious" test laid the cornerstone of judicial evolution in patent law by making the term "invention" a legal word of art in reviewing patentable inventions.[57] The test can be characterized as a functional approach to questions of patentability where a comparison between the function of the item sought to be patented and the skill involved in its production is mandatory.[58]

In 1870, Congress brought all the patent statutes into one act. In 1874, Congress consolidated most of the conditions for patentability into a single act.[59] This Act remained the basic law of patents for eight decades until 1952. In that year, Congress divided the 1874 statute into its logical components of novelty and utility and added the "non-obvious" test, which the courts had previously been using to apply the invention requirement. The 1952

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52. 383 U.S. at 11.

53. Hotchkiss v. Greenwood, 52 U.S. (11 How.) at 267.

54. 383 U.S. at 11. It appeared that the *Hotchkiss* decision finally enabled the courts to make subtle distinctions upon which a patent would be granted or denied. By imposing the "invention" requirement, the number of frivolous cases was reduced.

55. This means that more ingenuity and skill in applying an old method to a new product would be required than that possessed by someone skilled in that field.

56. Kitch, *supra* note 36, at 313.

57. *See* 383 U.S. at 11. Making "invention" a term of art and leaving it to the scrutiny of the courts was the suggestion of Thomas Jefferson. *Id.*

58. *Id.* at 12. *Hotchkiss* required a comparison between patent application and the background skill of the calling. This comparison is the basis from which each case would be determined.

59. 596 F.2d at 959.

Patent Act set out, in three sections, the conditions for patentability.[60] Section 101[61] enumerated the subject matter of the Patent Act. Section 102[62] set forth the general conditions for patentability. Section 103[63] expressed further conditions for patentability. If any of the enumerated conditions for patentabilitly were not satisfied, patent protection would be denied.[64]

Regardless of congressional attempts to further enumerate patent protection under the 1952 Act, the courts were still faced with a number of problems. The first problem was interpreting the words "invention" or "discovery." The second problem was the difficulty in defining the identifiable subject matter covered by section 101.[65] Such subject matter included machines,[66]

60. A.W. DELLER, *supra* note 27, at 97-100.

61. 35 U.S.C. § 101 (1976). This section and § 102 were clarifications of the earlier statutes. *See* 383 U.S. at 12-14 for a brief discussion on the impact of §§ 101, 102, and 103.

62. 35 U.S.C. § 102 (1976) states:

A person shall be entitled to a patent unless—
a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for patent, or
b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of the application for patent in the United States, or
c) he has abandoned the invention, or
d) the invention was first patented or caused to be patented by the applicant or his legal representatives or assigns in a foreign country prior to the date of the application for patent in this country on an application filed more than twelve months before the filing of the application in the United States, or
e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or
f) he did not himself invent the subject matter sought to be patented, or
g) before the applicant's invention thereof the invention was made in this country by another who had not abandoned, suppressed, or concealed it . . . .

63. 35 U.S.C. § 103 (1976) states:

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

64. Bird Provision Co. v. Owens Country Sausage, Inc., 568 F.2d 369, 372 (5th Cir. 1978). This case involved an alleged infringement of a method of processing and packing pork sausage. The method was found unpatentable because it failed to meet the non-obviousness requirement of § 103.

65. 596 F.2d at 958-59. The *Bergy II* court was cognizant of the interpretive

processes,[67] manufactures,[68] and composition of matter;[69] living plants were covered by separate statutory provisions.[70] Finally, the third problem was the needed resolution of the conflict between the broad intent of the constitutional promotion of the arts and sciences and the restrictive intent of the Patent Act.

In *Bergy II*, the court provided a clever analogy for the operation of sections 101, 102, and 103 in order to successfully obtain a patent.[71] The analogy stated that success of a patent claim is predicated on the acquisition of three separate "keys" to open the three successive "doors" of sections 101, 102, and 103. The court stated that "the first door which must be opened on the difficult path to patentability is § 101."[72] The person opening it must be an inventor who has invented or discovered something. The object invented or discovered is defined in general language by section 101. If an invention falls within the "key" categories of section 101, the first "door" will be opened. The next "door" is section 102, where claims are examined for novelty[73] in comparison with the prior art. The final "door" of section 103 requires that the new object be sufficiently different from the prior art or predecessor objects before a patent may be awarded. The "key" of section 103 relates the new object with the "prior art;" if the object, invented or discovered, would have been, at the time of its invention or discovery, obvious to a person skilled in the particular art, then it may not be patented.[74] In this respect, the two "doors" of sections 102 and 103 guard the public interest by not taking away that

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problems surrounding the terms "invention," "inventive," and "invent". The court was quick to caution that the meanings of these terms prior to passage of the 1952 Patent Act were vastly different from their meanings after passage of the Act. "Statements in the older cases must be handled with care lest the terms used in their reasoning clash with the reformed technology of the present statute; lack of meticulous care may lead to distorted legal conclusions." *Id.* at 959.

66. *See* General Tire and Rubber Co. v. Fisk Rubber Corp., 104 F.2d 740 (6th Cir. 1939), which discusses the four classes of machines as inventions. These classes are 1) embracement of the entire machine; 2) embracement of one or more elements of the machine; 3) embracement of both a new element and a new combination of elements; and 4) where all elements of the machine are old and where the invention involves a new combination of these elements. *Id.*

67. A process is a mode of treatment of certain materials to a given result. Cochrane v. Deener, 94 U.S. 780, 786 (1877).

68. For usage of the term "manufacture" in the context of § 101, *see* Riter-Conley Mfg. Co. v. Aiken, 203 F. 699 (3d Cir. 1913), *cert. denied*, 229 U.S. 617 (1913). A new article of manufacture which does not differ from the prior art is not patentable. *See* Risdon Iron and Locomotive Works v. Medart, 158 U.S. 68 (1895).

69. For application of "composition of matter" based on a new use, *see In re* Craige, 188 F.2d 505 (C.C.P.A. 1951).

70. *See* notes 9 and 10 *supra*. *See* A.W. DELLER, *supra* note 27, at 100.

71. A.W. DELLER, *supra* note 27, at 960.

72. *Id.*

73. *See* note 62 *supra*.

74. 596 F.2d at 962.

which already is in the public domain, or potentially limiting knowledge the public has already acquired. Thus, as concerning the problem with the term "invention," the essential point to be made is that an invention remains an invention regardless of patentability. The *real* issue the courts should address is whether an invention is patentable and thus, deserving of protection under the patent law.[75]

The term "discovery," in the context of the patent law, does not have the broadest significance.[76] The Act defines "invention" as "invention or discovery."[77] Discovery is seen as an effect derived from the production of something that did not exist before, thus, satisfying the "new and useful" requirements.[78] This definition of discovery, as applied to natural phenomenon and the laws of nature, illustrates the dilemma facing the courts as "[d]iscovery can be made of a law of nature . . . , but it can never be invented."[79] The Supreme Court, in *O'Reilly v. Morse*,[80] explained further that the "mere discovery of a new element, or law, or principle of nature, without any valuable application of it to the arts, is not the subject of a patent."[81] The *Morse* Court noted that one who applies such a discovery to the perfecting of a new and useful art,[82] or in improving an art already known,[83] "is the benefactor to whom the patent law tenders its protection."[84] It is provided, however, that this principle must be applied to any special purpose to effectuate a practical result and benefit not previously attained.[85] This distinction, between discovery of a natural law and discovery *and* utilization of a natural law, has been an unavoida-

75. *Id.*

76. In its primary and ordinary sense, discovery is not synonymous with invent and invention. Webster distinguished the word "discover" from "invent." "Invention is applied to the contrivance and production of something that did not exist before. Discovery brings to light that which existed before, but which was not known." A.W. DELLER, *supra* note 27, at 101.

77. *See* 35 U.S.C. § 100(a) (1976).

78. A.W. DELLER, *supra* note 27, at 101.

79. *Id.* at 103.

80. 56 U.S. (15 How.) 62 (1853). This case involved the question of patentability of Samuel Morse's invention of the electromagnetic telegraph.

81. *Id.* at 132.

82. This would include inventions relating to patentable subjects, processes, manufactures, machines or compositions of matter.

83. An example of a discovery to the perfection of a new and useful art was the process of separating fats and oils. *See* note 99 *infra*.

84. 56 U.S. (15 How.) at 133.

85. *Id.*

ble dilemma with which the courts have had to reckon throughout the history of patent law.[86]

B. *Case Law History*

The courts had taken progressive steps in attempting to protect patents involving the concept or phenomenon of nature. An analysis of case law evidences the courts' realization that a broader interpretation of the patent statutes, rather than mere deliniation of their terms, was necessary to meet this protective goal.

1. Early Judicial Decisions

One of the first Supreme Court opinions to consider the concept or phenomena of nature and patentability was *LeRoy v. Tathum*.[87] The *Tathum* Court stated that a principle or law of nature, *i.e.*, a fundamental truth, motive, or original cause[88] could not be patented. When an inventor succeeds in concentrating or harnessing a natural agency,[89] the process used is the invention, the application of the process, and not the discovery itself is patentable.[90] The *Tathum* Court stated that a patent will be forthcoming even though the subject matter involves a comprehensive principle in science or law of nature;[91] however, the principle must be applied to a special purpose and so as to give rise to a practical result and a benefit not previously attained.[92] Although the *Tathum* Court recognized that the plaintiff had a newly discovered, but naturally occurring phenomenon, a patent was denied, despite there being no direct or indirect monopolization of the phenomenon, because the apparatus was wholly predicated on a natural phenomenon.[93]

Following the *Tathum* decision, the Supreme Court decided

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86. Although a discovery may add to human knowledge and be of a great benefit to mankind, it is still possible that it may not be patentable. The courts have had the task of attempting to delineate invention utilizing laws of nature and natural phenomena along this line of reasoning. *See* The Telephone Cases, 126 U.S. 1 (1888) (involving the valid patenting of Alexander Graham Bell's telephone); Wall v. Leck, 66 F. 552, 555 (9th Cir. 1895) (where an old process for fumigating plants and trees by hydrocyanic acid gas at night or without sunlight was an insufficient discovery for a patent).

87. 55 U.S. (14 How.) 156 (1852). The invention reviewed here concerned the manufacture of lead pipes by a new process of mixing the alloys together.

88. *Id.* at 175. The Court was addressing what a principle encompassed. The fact that a motive or an original cause of a principle is discovered or proven by an inventor cannot give him exclusive rights over them.

89. *See* note 90 *infra*.

90. 55 U.S. (14 How.) at 175. *See also In re* Bergy, 596 F.2d at 990, for a recent interpretation of the *LeRoy* case.

91. *See id.* at 175.

92. *Id.*

93. 596 F.2d at 991. The court believed that LeRoy's manufacture of lead was

O'Reilly v. Morse.[94] It was in *Morse* that the Court first carved out an exception to the general rule of nonpatentability for any claim connected with laws of nature or natural phenomena. In a lengthy opinion, the *Morse* Court clearly explained the relationship between the laws of nature, their use for a process or claim, and patent protection.

> He who first discovers that an element or law of nature can be made operative for the production of some valuable result, some new art, or the improvement of some known art, who has devised the machinery or process to make it operative, and introduced it in a practical form to the knowledge of mankind, is a discoverer and inventor of the highest class . . . . The mere discovery of a new element, or law, or principle of nature, without any valuable application of it to the arts, is not the subject of a patent. But he who takes this new element or power, as yet useless, from the laboratory of the philosopher, and makes it the servant of man, who applies it to the perfecting of new and useful art, or to the improvement of one already known, is the benefactor to whom the patent law tenders its protection.[95]

The *Morse* Court stated further that when an unknown product or effect is influenced by a new application or element of nature, one can not deny that a new and useful art results.[96] In interpreting the congressional intent, the Court believed it made no difference whether the effect was produced by chemical agency, chemical combination, or principles in nature, either known or unknown. If the manner and process involved and the end accomplished[97] the use of a law of nature or natural phenomenon, patent protection of the process or claim could be granted but not solely for the law of nature or phenomenon involved.[98]

In *Tilghman v. Proctor*,[99] the Court applied the principle of *Morse* toward allowing patent protection of natural phenomena. After reviewing the *Morse* decision,[100] where the claim for a prin-

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expressly limited to his apparatus alone and thus, there was no reason to allow a patentable claim because of his usage of a natural phenomenon.

94. 56 U.S. (15 How.) 62 (1853).

95. *Id.* at 133. This statement evidences the requirement that the law of nature or natural phenomenon must be used in a discovery before a valid patent will result.

96. *Id.* at 132-33.

97. *Id.* at 119.

98. *Id.*

99. 102 U.S. 707 (1880). This was a patent infringement case involving a process separating fats and oils into their component parts. Tilghman discovered a process of mixing fats and oils with water under high pressure and temperature which accomplished the desired separation.

100. *Id.* at 725-29.

ciple was held invalid,[101] the *Tilghman* Court stated that the chemical fact upon which Tilghman's claim was founded was not his discovery. The point, which made *Tilghman* an exceptional case, was that Tilghman only claimed to invent a particular mode of a desired process, but did not claim every mode of accomplishing the result. Therefore, since his claim did not monopolize natural phenomena, the claim was found valid.[102]

With technological advancement came the need to expand patent protection. The courts soon realized that the usage of the laws of nature and natural phenomenon could aid a claim or process while not disqualifying this claim or process from patent protection. With this in mind, the Supreme Court began to expand the *Tilghman* exception.[103] In *Eibel Process Co. v. Minnesota & Ontario Paper Co.*,[104] the Court viewed an improved process using the natural phenomenon of gravity. In *Eibel Process*, the Court decided there was a proper use of a natural phenomenon to produce a new and useful end result.[105] The Court then took a bold step forward in *Dick v. Lederle Antitoxin Laboratories*,[106] where it found that a scarlet fever toxin and the processes for its production and injection were both patentable.[107] In addressing the issue of natural phenomena and discovery, the *Dick* Court believed it should take into account the fact that the processes involved were beyond the experimental stage. However, there was still a dispute whether an invention, as opposed to a discovery, had taken place. The Court believed that although Dick's claim involved a natural phenomenon, it nonetheless constituted an in-

101. The *Tilghman* Court used the rationale of *Morse* and *LeRoy* and reemphasized the invalidity of a patent for anything that was merely a discovery of a naturally occuring phenomenon. *Id.* at 729.

102. *Id.* The Court further agreed with the *Morse* and *LeRoy* decisions by recognizing that Tilghman's claim used a natural phenomenon for a new and useful end. This distinction, not merely doing that which nature does already, made Tilghman's claim patentable.

103. *See* note 102 *supra*.

104. 261 U.S. 45 (1923). This case involved the patentability of an improvement in papermaking machines by the elevation of one end of a moving screen. The elevated liquid stock acquired, by the effects of gravity, additional speed which avoided injurious disturbances of the stock during rapid paper movement.

105. *Id.* at 66-67. The *Eibel Process* Court found that increased elevation was not a matter of mere degree but it amounted to an invention when applied successfully to remedy an old defect (injurious disturbances of the stock during rapid paper movement) in connection with the discovery of the cause of this defect, which was the low elevation of the liquid stock. *Id.* at 68-69.

106. 43 F.2d 628 (S.D.N.Y. 1930). Dick's application for a patent for the process of making a scarlet fever toxin and antitoxin, as well as for a patent on these two items themselves, was approved by the court.

107. It should be noted that this was the first time this toxin was produced in a laboratory. The court found that both Dick's process and product constituted inventions although he used a natural phenomenon which did not naturally exist in such a form.

vention and the enforcement of his patent claim was valid.[108]

The patentable use of laws of nature and natural phenomena was also found in *MacKay Radio & Telegraph Co. v. Radio Corp. of America*.[109] This case involved the phenomenon of standing waves that produced a new and useful result by means of a mathematical formula. The Court held that while a scientific truth, or the mathematical expression of it is not a patentable invention, a novel and useful structure created with the aid of knowledge of scientific truth may be patentable.[110] Accordingly, the Court found the claim valid.[111]

2. The Bacteria Cases

The novel question concerning the patentability of a process using bacteria arose in *Guaranty Trust Co. of New York v. Union Solvents Corp.*,[112] where a Dr. Weizmann discovered a particular species of new bacteria and invented a process for successfully using them.[113] The district court held that the process was patentable if it was sufficient to enable others to make use of the bacteria.

In dicta, the *Guaranty Trust* court touched on what later became a very sensitive and confusing area of patent law, namely, whether life processes of living organisms and their creation were patentable subject matter. In addressing the patentability of a life process of a living organism, the court was hesitant: "[w]ere the patent for bacteria per se, a different situation would be presented. As before stated, the patent is not for bacteria per se. It is for a fermentation process employing bacteria . . . [and] undoubtedly there is patentable subject-matter in the invention."[114]

108. 43 F.2d at 631.
109. 306 U.S. 86 (1939).
110. *Id.* at 94.
111. The phenomenon involved an antenna system which utilized principles of electromagnetic and standing waves. The court held the patent valid because a novel and useful structure created with the aid of nature may be patentable. *Id.*
112. 54 F. Supp. 400 (D. Del. 1931).
113. The court held that Dr. Weizmann's claim was sufficiently stated so that others could produce it, and therefore, it could not be infringed. The court rejected the defendant's arguments that the patent processes were vague.
114. 54 F. Supp. at 410. *See also* City of Milwaukee v. Activated Sludge Inc., 69 F.2d 577 (7th Cir. 1934) (an infringement of a valid patent on a process of purification of sewage); Cameron Septic Tank Co. v. Village of Saratoa Springs, 159 F. 453 (2d Cir. 1908) (an infringement of a patented apparatus for sewage treatment).
In *Bergy I*, the court thought this statement was "a trite observation of minimal magnitude as precedent." 563 F.2d at 1031. The court did find it pertinent that the

In *Dennis v. Pitner*,[115] the seventh circuit agreed with the *Guaranty Trust* decision by stating that the discovery of a natural phenomenon may be entitled to patent protection. The *Dennis* court agreed that there are laws of nature which are not patentable,[116] but held that phrases such as "laws of nature" and "fundamental truth" are words "of broad and elastic meaning . . . without . . . refined distinctions."[117]

The Supreme Court seemed to narrow the term "laws of nature" in *Funk Bros. Seed. Co. v. Kalo Inoculant Co.*,[118] where it held a patent claim for a strain of bacteria invalid because it sought protection for qualities that were solely the work of nature,[119] "free to all men and reserved exclusively to none."[120] The Court held that the strain was acting in its natural way and had always served nature's end in that fashion.[121]

Another problem arose concerning products of nature. In response, the courts have held that where a product can be produced from a man-made source, but is also found as a product of nature, a patent claim is valid.[122] Although the patented product is not a newly created compound per se, but rather a purified form of a product of nature, the law is satisfied and and a patent

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Guaranty Trust court rejected the defendant's argument that the patent was invalid because it involved a living organism. *Id.* at 1036.

115. 106 F.2d 142 (7th Cir. 1939). This case concerned an infringement action involving a powerful insecticide, in extract or powdered form, derived from the root of a South American cube plant.

116. The *Dennis* court held that any natural phenomenon which is free to the public and not the discovery of anyone is such a law of nature. *Id.*

117. 106 F.2d at 145. Unlike the *Funk* court, the *Dennis* court believed that the patent statutes did not put limitations on discoveries applying laws of nature for a new and useful result.

118. 333 U.S. 127 (1948). This case involved the infringement of a patented method of isolating certain strains of seed inoculants. The patent holder provided a mixed culture capable of inoculating plant seeds of different cross-inoculation groups. This method had previously been presumed to be a non-natural occurrence.

119. *Id.* The bacteria were also created in the same manner without the aid of man.

120. 333 U.S. at 130.

121. If the seeds in *Funk* had created a new and useful result, the patent may have been held valid. Funk was attempting to patent a natural process and not to use it for a new result; therefore, a patent was not proper. For an affirmation of this doctrine of pheonomenon of nature, *see* Gottschalk v. Benson, 409 U.S. 63 (1972), which involved a data processing invention for the programmed conversion of numerical information in general purpose digital computers.

122. Merck & Co. v. Chase Chem. Co., 273 F. Supp. 68 (D.N.J. 1967) (an infringement suit where a new vitamin, B-12, which was not formed in nature, was produced and had marked effects in the treatment of anemia). *But see* General Elec. Co. v. DeForest Radio Co., 28 F.2d 641 (3d Cir. 1928) (an inventor's method of producing tungsten for use as filaments for incandescent lamps was found so similar to a process and chemical element found in nature that a patent was denied).

may be granted.[123]

3. Modern Holdings

In viewing some of the modern holdings concerning microorganisms as products of nature, the court of appeals, in *In re Mancy*,[124] held a process for producing a known antibiotic using a new strain of microorganism to be unpatentable.[125] The *Mancy* court, in its determination that Mancy's claim was invalid because it lacked novelty, unnecessarily inserted dicta, based on the case of *In re Kuehl*,[126] which stated that there would be a presumption against patentability of living organisms and that Mancy would also be unable to obtain a patent, because as the court understood it, his claim was for a living product of nature.[127] The court of appeals in *Bergy I* explained that the *Mancy* dicta had been relied on by the patent examiner as supporting the proposition that living organisms were not statutory subject matter under section 101. The *Bergy I* court explained that this was an ill-considered piece of dictum. "We were thinking of something plucked from the earth as such, a far cry from a biologically pure culture produced by great labor in the laboratory."[128] This was reiterated by the *Bergy II* court.[129]

While focusing on microorganisms as statutory subject matter, the *Bergy I* court gave a brief historical analysis of judicial review in this area and concluded:

> It seems illogical to us to insist that the existence of life in a manufacture or composition of matter in the form of a biologically pure culture of a microorganism removes it from the category of subject matter which can be

123. 273 F. Supp. at 82-83. In *Merck*, the new vitamin had completely eliminated the harmful side effects of the old liver oil product. Thus, the court found this a significant distinction to warrant patent protection. *Id.* at 83.

124. 499 F.2d 1289 (C.C.P.A. 1974). In this case the patentee claimed a process for producing an antibiotic found and isolated from a soil sample. However, the court determined that the antibiotic sufficiently met the non-obvious test of § 103 without directly determining the patent validity. *Id.*

125. *Id.*

126. 475 F.2d 658 (C.C.P.A. 1973) (discussion of the non-obviousness requirement of § 103 in the context of a process or use of a novel material).

127. 499 F.2d at 1294.

128. 596 F.2d at 976. The *Bergy II* court appeared to dismiss any inference that could be drawn from the dicta of the *Guaranty Trust* or *Mancy* cases. *See* notes 114 and 124 *supra* and accompanying text. The *Bergy II* court also used its greater familiarity with the subject matter at issue by stating that "had we known [in *Bergy I*] what we know now, we would likely have abjured the stated presumption [of *Mancy*]." 596 F.2d at 976.

129. 596 F.2d at 976.

> patented while the functioning of a living organism and the utilization of its life functions in processes does not affect their status under § 101 . . . . [I]t is clear . . . there is nothing in the words of § 101 which excludes patents for living organisms.[130]

The *Bergy I* court also stated that processes had long been held patentable and uniformly considered to be statutory subject matter, regardless of the fact that such processes involved use of living organisms and their life processes.[131] In attacking the rationale of *Funk*, the *Bergy I* court rejected the view that any process created which simulates a naturally occurring event is not patentable. The *Bergy I* court urged that if the *Funk* view was accepted, it would be extremely difficult to grant a patent on any chemical process. Further, the *Funk* proposition would be the mistaken acceptance of a deceiving similarity between a chemical reaction and the complex chemical procedure resulting in life processes of organisms.[132] Finally, the *Bergy I* court stated that it believed the public interest dictated that microorganisms should be included within the terms "manufacture and composition of matter" in section 101 and their status as living organisms was without legal significance.[133] If the microorganisms met the requirements of patentability, *i.e.*, novelty, utility, and non-obviousness, the *Bergy I* court believed that the characteristic of being a living thing did not take the organism outside the realm of statutory subject matter.[134]

It appeared that up to this point, that the courts had been consistently drawing to the logical conclusion that products of nature were patentable under section 101. However, in *Parker v. Flook*,[135] the Supreme Court took a step backward by restoring the validity of the *Funk* case. The Court stated that even though a phenomenon of nature may be well known, an inventive application of such a phenomenon would not fall under the statutory subject matter in secton 101 unless the discovery was clearly an invention.[136] The Court stated that it should be cautious about

130. 563 F.2d at 1037.

131. *Id.* at 1035-36.

132. The *Bergy II* court apparently noted the difference that the chemical process itself is not a direct assimilation of a naturally occurring phenomenon. As in *Chakrabarty*, the invention was man-made and not capable of ever occurring naturally. This is a vital distinction which was overlooked by the *Funk* court.

133. 563 F.2d at 1038. It appeared that the *Bergy I* court was attempting to pave the way for Supreme Court affirmation of the patent award. By stating that "living things" were not a significant problem in granting patent protection, the *Bergy I* court removed the Board's sole ground for rejection and in the process cleared up the past inconsistencies in prior cases.

134. *Id.*

135. *See* note 16 *supra*.

136. *See* note 36 *supra*.

going into an area wholly unforeseen by Congress.[137] In citing *Deepsouth Packing Co. v. Laitram Corp.*,[138] the *Flook* Court believed it should have a clear signal from Congress before changing well established law.[139] Therefore, in light of the *Flook* decision, it appeared the Supreme Court had totally retracted the "laws of nature" expansion of patentable subject matter. It was on the premise that *Flook* was controlling law that the Supreme Court remanded the *Bergy* case to the Court of Customs and Patent Appeals for reconsideration.[140]

The *Bergy II* court, reconsidering Bergy's and Chakrabarty's claims in light of *Flook*, again had to decide whether their claimed organisms were statutorily protected subject matter under section 101. In the *Bergy II* court's discussion of the patent statutes, it pointed out that the *Flook* Court erroneously commingled distinct statutory subject matter under section 101 with conditions for patentability under section 103 because these concepts were conceptually unrelated.[141] The *Bergy II* court also, noted that section 103 enumerated, for the first time in statutory form, a judicial requirement for the past 100 years;[142] namely, that the "non-obvious" test had replaced the "invention" requirement.

Finally, the *Bergy II* court addressed the issue the *Flook* Court thought was so important *i.e.*, that a clear signal from Congress was needed before patents could be granted for living things. The court quickly brushed this argument aside by stating that the claims of Bergy and Chakrabarty were of first impression, and since no change in the law had taken place,[143] no signal from Congress was needed.

The appellate court distinguished the *Flook* decision, in that *Flook* involved a computer process amenable to patent protec-

137. 437 U.S. at 596.

138. 406 U.S. 518 (1972). This case involved judicial interpretation of the breadth of language in a statute.

139. *Id.* at 531. The *Deepsouth* case stood for the proposition where there is a basis for substantial doubt as to congressional intent, the court should await a clear and certain signal from Congress.

140. 596 F.2d at 956. It is interesting to note the confusion surrounding the *Flook* decision. When the Supreme Court remanded *Bergy* to the lower court it was implied that *Flook* was controlling law on both the *Bergy* and *Chakrabarty* cases. However, when *Chakrabarty* was brought before the Supreme Court, it accepted the lower court's rejection of *Flook* as controlling law.

141. *Id.* at 959.

142. 596 F.2d at 962.

143. *Id.* at 964.

tion, while "[n]o such issue [was] presented in either [*Bergy* or *Chakrabarty*]."[144] Hence, it appeared that the *Bergy II* court distinguished *Flook* on its facts since a mathematical formula was not at issue in either of the two claims before it.[145]

Further, the court commented that the *Flook* decision seemed to place an unjustifiable barrier on cases involving laws of nature and natural phenomenon. The *Bergy II* court believed that such a barrier would do great harm to the incentives of the patent system.[146]

V. THE *CHAKRABARTY* DECISION

The Supreme Court's analysis of *Chakrabarty* was based on two considerations. The first was the statutory interpretation of section 101 and the second was the patentability of products of nature. The Court's determination of these issues, as well as the Government's contention that congressional intent never envisioned that a living thing would be patentable, will be examined. Since the decision was closely divided, an analysis of the dissent's arguments against patentability of living things will also be analyzed.

A. Statutory Interpretation

The *Chakrabarty* Court believed the question before it to be a very narrow one, the statutory interpretation of section 101 of the 1952 Patent Act. More specifically, the Court had to determine whether Chakrabarty's microorganism constituted a "manufacture" or "composition of matter" within the meaning of the section.[147] This characterization of the issue by the Court indicated an almost immediate affirmation of the appellate court ruling in *Bergy II* because novelty, use, or invention were not in issue.[148]

Chief Justice Burger, speaking for the majority, began the opinion by defining the terms "manufacture" and "composition of matter." The Chief Justice showed that the use of "manufacture" as employed by the courts had come to mean "the production of articles for use from raw materials prepared by giving to these mater-

144. 596 F.2d at 965.

145. The court stated that cases dealing with mathematical formulas are dealt with differently and they should be decided in accord with Gottschalk v. Benson, 409 U.S. 63 (1972). 596 F.2d at 995.

146. 596 F.2d at 966. By discarding the barriers imposed by the *Flook* decision, the court properly reversed the inflexible stance of prior case law and brought judicial interpretation of the patent acts more in line with constitutional intent.

147. 100 S. Ct. at 2207. *See* note 22 *supra*.

148. The court stated that § 101 did not involve either a process, use, or novelty. 596 F.2d at 962-63.

ials new forms, quality, properties, or combinations, whether by hand, labor, or machinery."[149] Anything within that definition was to be considered patentable. However, the term "manufacture" is a wholly different concept from section 101's enumeration of "processes, machines, and composition of matter."[150] Further, the Court's definition does not indicate that every manufacture will be immediately eligible for patent protection. "Manufacture implies a change, but every change is not manufacture, and yet every change in an article is the result of treatment of labor, and manipulation."[151] When a claim is for an improved process or manufacture, it is patentable.[152] The Court's definition of "manufacture" reflected the degree to which the term had been liberally interpreted over the years.[153]

The Court's definition of "composition of matter" was subject to similar treatment. Common usage of the term included "all composite articles whether they be the result of chemical union, or of mechanical mixture, or whether they be gases, fluids, powders, or solids."[154] Indeed, this class is very broad and embraces a great variety of things.[155] The term used in the patent statutes, covers all compositions of two or more substances. However, a "composition of matter," as well as a "manufacturer," must meet all requirements of novelty, utility, and non-obviousness before a patent will be issued.[156]

149. 100 S. Ct. at 2207, (citing American Fruit Growers Inc. v. Brodgex Co., 283 U.S. 1, 11 (1931)) (a case involving a claim for a new process, which used a chemical solution for preparing fresh fruit for market).) The Oxford Dictionary gives a more concise definition of "manufacture": "an article or material produced by the application of physical labour or mechanical power." IV OXFORD ENGLISH DICTIONARY 143 (1933).

150. *See* A.W. DELLER, *supra* note 27, at 126 and notes 71, 72, 74 *supra*.

151. A.W. DELLER, *supra* note 27, at 125.

152. 158 U.S. at 79.

153. The term "manufacture" has been held to include building structures, roof structures, a stadium, a paper pulp process and pellets of carbon black. *See* A.W. DELLER, *supra* note 27, at 125, 126.

154. 100 S. Ct. at 2207, (citing Shell Dev. Co. v. Watson, 149 F. Supp. 279, 280 (D.D.C. 1957)) (involved an organic compound, generally denominated as a hydrocarbon)).

155. An example of this class is a chemical compound made from super-saturated solution derived by dissolving acetylene gas. Commercial Acetylene Co. v. Avery Portable Lighting Co., 166 F. 907 (E.D. Wis. 1909) (a composition of matter can be derived from the discovery of the qualities of a purely natural element). *See also* Libbey-Owens—Ford Glass Co. v. Celanese Corp. of America, 135 F.2d 138 (6th Cir. 1943).

156. *See* notes 35-40 *supra* and accompanying text. Chakrabarty's claim only needed to be classified as a "manufacture" or a "composition of matter." The pat-

The Court emphasized that Congress plainly contemplated that the patent laws would be given wide scope because the terms "manufacture" and "composition of matter" were preceded by the comprehensive modifier "any" in the statute's wording.[157] The Court stated that legislative history, as evidenced by the fact that the 1793 Act embodied the philosophy that "ingenuity should receive a liberal encouragement,"[158] supported a broad construction of these terms. The Court also relied on a statement contained in reports accompanying the 1952 Act, that "Congress intended statutory subject matter to include everything under the sun by man,"[159] and that "[i]t is a fundamental principle of patent law that a claim may not be narrowly construed to avoid invalidity."[160] Given this rationale and the legislative history, it appears that the Supreme Court's liberal construction of statutory subject matter under section 101 is valid.[161]

In *Bergy II*, the court refused to agree with the decision of the Patent Board of Appeals that section 101 must be strictly construed.

> Indeed, in light of what the courts have done over the past seventy years in holding [manufacture or composition of matter] claims valid . . . . we have never heard of a case holding that the categories of patentable subject matter, as enumerated in Section 101 or any of its predecessor statutes, should be strictly construed and the Board has cited none.[162]

The *Bergy II* court also stated that there was considerable overlap between manufacture and composition of matter and that if a claim fell into either of these broadly interpreted categories, then it was within protected subject matter.

The Supreme Court, in regards to Chakrabarty's claim, ap-

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ent for composition of matter is distinct from the patent for the process by which the product is produced. Both must individually meet the novelty, utility, and non-obviousness requirements. The Supreme Court was faced with the problem of deciding whether a live organism could be classified as a "manufacture" or a "composition of matter." However, the Court's answer was ambiguous in that its decision in *Chakrabarty* did not state which classification typified Chakrabarty's claim. 100 S. Ct. at 2207.

157. *Id.*

158. *Id. See also* 383 U.S. at 7-10.

159. 100 S. Ct. at 2207 (quoting the Committee Report accompanying the 1952 Act, S. REP. NO. 1979, 82d Cong., 2d Sess. 5 (1952); H.R. REP. NO. 1923, 82d Cong., 2d Sess., 6 (1952)).

160. Arshal v. United States, 621 F.2d 421, 428 (C.C.P.A. 1980). This case involved the question whether a mathematical expression of an equation was patentable subject matter.

161. The Court did not specify whether Chakrabarty's claim was a "manufacture" or "composition of matter." *See* note 156 *supra*.

162. 563 F.2d at 1037. The analysis by the court appears to be valid. The courts had been willing to expand the areas of patent protection in an attempt to keep up with technological advancement. However, it could also be argued that the courts' liberal construction has been within certain boundaries. In this context, the "laws of nature" restriction can be viewed as one such boundary.

proved the *Bergy II* court's analysis of statutory interpretation. Chief Justice Burger recognized that section 101 had its limits and that it did not embrace every discovery. He agreed with Judge Baldwin's concurring opinion in *Bergy II* which noted that although the wording of the patent acts was not as sweeping as the wording in the constitutional grant of patent power, the protection of the promotion of the arts and sciences demanded a broad interpretation of the patent law. In viewing the House and Senate reports on patents, Judge Baldwin stated that the Patent Act of 1952 evidenced an adherence to the liberal construction of terms.[163] The Chief Justice stated, however, that the laws of nature, physical phenomena, and abstract ideas have traditionally been held to be not patentable.[164] The *Chakrabarty* majority concluded on this point that although Chakrabarty's bacteria was not an unknown phenomenon of nature, it was a non-naturally occurring result,[165] *i.e.*, a product of human ingenuity. By contrasting Chakrabarty's invention with the purported invention in *Funk*,[166] the Court found Chakrabarty's claims within patentable subject matter under section 101.[167]

B. Products of Nature and Natural Phenomena

After deciding that living things could be proper subject matter under section 101, the Supreme Court then discussed whether natural phenomena and laws of nature were a limitation on that subject matter under section 101. The Court again affirmed the lower court rulings by distinguishing a man-made product, relying partially upon nature, from one merely taken wholly from nature.[168] The Court stated that there was no valid reason to deny patentability simply because the discovery was made through the combination of existing elements producing a new and unknown result.[169] In order to be a patentable invention, a discovery in-

163. 596 F.2d at 988. *See* note 159 *supra*

164. 100 S. Ct. at 2208. *See* Le Roy v. Tatham, 55 U.S. (14 How.) 156, 174 (1852). *See* note 90 *supra*.

165. This result was one which would never occur in nature unless brought together under man-made conditions.

166. In *Funk*, the result sought to be patented could occur without the aid of man. *See* notes 118 and 121 *supra*.

167. 100 S. Ct. at 2208.

168. *Id.*

169. Dennis v. Pitner, 106 F.2d 142, 144 (7th Cir. 1939). As has been previously discussed, the courts have become increasingly permissive in granting a patent for a discovery using a law of nature. If this was not the posture of the courts, many

volving a law of nature or a natural phenomenon must have the requisite aid of a man-made process so as to arrive at a new and useful result.[170] In the present case, Chakrabarty combined elements of nature, which would never have been combined without the help of man. By combining four different microorganisms to make an entirely new bacteria capable of far more efficient and rapid degradation of oil spills than organisms found in nature, Chakrabarty used nature to achieve a new and useful result.[171]

The Court also determined that *Funk* was not controlling in Chakrabarty's case. The *Funk* Court specifically stated that there was no invention or discovery in that case because Funk had only discovered a handiwork of nature. Unlike Chakrabarty's claim, Funk's discovery in no way differed from an effect that already occurred in nature, producing no new and useful result. Justice Douglas, speaking for the *Funk* Court majority, explained that the lack of a man-made process or use of nature for a new and useful result was the reason for denying patentability.

> The qualities of these bacteria, like the heat of the sun, electricity, or the qualities of metals, are part of the storehouse of knowledge of all men. They are manifestations of laws of nature, free to all men and reserved exclusively to none. He who discovers a hitherto unknown phenomenon of nature has no claim to a monopoly of it which the law recognizes. If there is to be invention from such a discovery, it must come from the application of the law of nature to a new and useful result.[172]

Justice Douglas's rationale for denying Funk's claim conversely would require Chakrabarty's claim to be patentable. Chakrabarty produced a new bacteria which neither served an end that nature already provided, nor was accomplished independent of any act of Chakrabarty.[173]

C. *Government Argument*

The Government attempted to reverse the lower court ruling by

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products would be denied patents, and thus, inventors would not be encouraged to "promote the arts and sciences." Even with this permissiveness, the requirements under §§ 101, 102, and 103 must still be satisfied.

170. 621 F.2d at 427-28.

171. In *Bergy II* the court found that the claim was not found in nature but was only possible through man-made laboratory conditions. Courts have found that when products of nature are extracted and concentrated in a purified form they are patentable. 563 F.2d at 1034-35.

172. 333 U.S. at 130. The *Funk* Court appears to reestablish the statements of the *Morse* Court. *See* note 95 *supra*.

173. Initially, it only appears that the two cases are distinguishable on the facts. However, upon closer examination of the results of the decisions, the differing impact in light of the purpose of the patent laws is revealed. Funk's claim did not aid the progress of the respective areas of science and added no efficiency to the natural process. 333 U.S. at 131-32. Chakrabarty's claim, however, accomplished a new and useful, as well as a more efficient result, and should be rewarded. 100 S. Ct. at 2206.

arguing that Congress never intended a living organism to be patentable subject matter and that the passage by Congress of two separate acts for the patenting of plants precluded living organisms from falling under the purview of section 101.[174]

1. Congressional Intent Argument

The Government's first argument appears to have been one of considerable importance to the decision of this case. The Government contended that genetic technology was unforeseen by Congress when enacting section 101 and that the legislative process was best equipped to weigh the competing economic, social, and scientific considerations involved in the determination whether living organisms should receive patent protection.[175] The Court agreed with the Government that Congress must define the limits of patentability, but the Court held that once Congress had spoken, it was the province of the judicial department to interpret and apply the law. Since Congress had defined what patentable subject matter was, the Court reasoned that it was left to the Court to construe the language Congress had employed.

The Court stated, in reference to the Government's contention that *Flook*[176] was controlling, noted that it had not announced a new principle that inventions in areas not contemplated by Congress would be patentable per se.[177] The Court also pointed out that *Flook* concerned the patentability of a computer program. The only channel for patentability of this type of claim was under the "process" provision of section 101.[178] However, Chakrabarty's claim involved patentability under the "manufacture"[179] and "composition of matter" provisions.[180] The *Flook* Court limited its holding by saying that "very simply our holding today is that a claim for an improved method of calculation even when tied to a specific end use, is unpatentable subject matter under section

174. 100 S. Ct. at 2208-12. *See* notes 9 and 10 *supra*.
175. *Id*. at 2210.
176. *See* note 16 *supra*.
177. 100 S. Ct. at 2211. The Court attempted to show that there were areas which the Congress knew could not be foreseen. Therefore, the creation of a broad statute, such as § 101, could satisfy both the constitutional intent and still secure a procedure for protection.
178. *See* note 72 *supra*.
179. *See* note 35 *supra*.
180. *See* note 40 *supra*.

101."[181] Since the Chakrabarty's claim did not involve a "method," *Flook* was not controlling law in this case. The only commonality between *Chakrabarty* and *Flook* was that they both involved patentability under section 101. The difference, stated by the lower court in its "door and key" analogy, was that *Chakrabarty* dealt with claims involving sections 102 and 103, which were all held valid, while *Flook* only involved an unsuccessful claim under section 101.[182]

The *Chakrabarty* majority went on to state that a statute is not to be confined only to the specific applications considered by Congress at the time it was adopted, and that "a rule that unanticipated inventions are without protection would conflict with the core concept of the patent law that anticipation undermines patentability."[183] The Court reasoned that congressional intent evidenced a desire that the statutory language be used broadly precisely because certain inventions would be unforeseeable.[184] In *Kendall v. Winsor*,[185] the Supreme Court stated that the policy of the patent laws was, "to promote the progress of science and the useful arts, contemplating and necessarily implying their extension, and increasing adaptation to the uses of society."[186]

The *Bergy II* court believed that section 101 and its precedessor statutes were broadly drawn to encompass unforeseeable future developments.[187] Additionally, the intent, as well as the wording of the statutes negate limitations, so long as there was a new and useful result.[188] The *Bergy II* court believed that the language Congress chose to use clearly brought both claims in *Bergy* and *Chakrabarty* within the statute, and to insist on specific congressional foresight in subject matter under section 101 would be the very antithesis of the constitutional and congressional purpose of stimulating newly created technology.[189] However, the dissent in the *Bergy II* agreed with the Government's arguments that *Deepsouth* and *Flook* were controlling and that where there was substantial doubt that the courts were to wait for a clear and certain

181. 437 U.S. at 595 n.18.
182. 596 F.2d at 965.
183. 100 S. Ct. at 2211. *See also* Graham v. John Deere Co., 383 U.S. 1, 12-17 (1965).
184. *Id.*
185. 62 U.S. (21 How.) 322, 328 (1859).
186. *Id.*
187. 596 F.2d at 974.
188. *See* Dennis v. Pitner, 106 F.2d 142, 144 (7th Cir. 1939), *cert. denied*, 308 U.S. 606 (1939). *But see* Hobbs v. United States, 451 F.2d 849. (5th Cir. 1971) (patent construction is seldom a matter of pure liberalism, but involves inquiry into the means, operation, and result).
189. 596 F.2d at 973.

signal from Congress on the subject.[190] Still, the *Bergy II* majority asserted that the correct interpretation of *Deepsouth* was evident from the *Deepsouth* opinion, which frowned upon expanding patent rights by overruling or modifying prior case law construing the patent statutes.[191] Since *Bergy* and *Chakrabarty* were cases of first impression, they were not at odds with established precedent.

Because the *Bergy* decision would not change the existing law or any right conferred by Congress, the court believed that further signals from Congress were not needed.[192] The Supreme Court agreed with this conclusion, stating that the Court had "frequently observed that a statute is not confined to the particular application . . . contemplated by legislators."[193]

The Court, in denying the Government's argument, noted that there was vigorous support for patentability of living things preceding the *Chakrabarty* decision. In *Guaranty Trust Co. of New York v. Union Solvents Co.*,[194] the court stated that if the patent was solely for bacteria, a different result would be reached. However, in the course of its opinion, the *Guaranty Trust* court rejected the defendant's argument that the claims were unpatentable because they simply involved a life process of a living organism.[195] The facts of the *Guaranty Trust* case are strikingly similar to the facts in *Chakrabarty* in that the inventor was producing a particular species of bacteria that would produce butyl alcohol and acetone in commercial quantities better than any known bacteria, while also inventing the process of successfully using the bacteria. Furthermore, there have been several bacterial sewerage treatment cases which held that the use of living bacteria can give rise to a valid process patent.[196] It seemed irrational to suggest that the existence of life in a "manufacture" claim removed the claim from section 101 while the use of life in a "process" was patentable subject matter. There was nothing in

190. *Id.* at 999. *See* note 140 *supra* and accompanying text.
191. 596 F.2d at 966.
192. *Id.* at 967. The Government believed that since Congress saw the need to pass separate Plant Patent Acts, this implied that Congress did not intend living things to be statutory subject matter under § 101.
193. 100 S. Ct. at 2211.
194. 54 F.2d 400 (1931).
195. *Id.* at 410. This holding typified the growing attitudes of the courts. It seemed to be only a matter of time before the granting patents for living organisms under §§ 102 and 103 would occur.
196. *See* note 114 *supra* and accompanying text.

the wording of section 101 which excluded patents for living organisms.[197] The *Chakrabarty* Court noted that microorganisms had long been important tools in the chemical industry and, as long as the claim complied with conditions for patentability, there was no reason to deprive its inventor patent protection simply because the claim was alive. Since the law already recognized the patentability of products of microbiological processes,[198] there seemed to be no sound reason why microorganisms could not qualify for protection.

Finally, in addressing the public benefit rationale for including microorganisms under section 101,[199] the *Bergy I* dissent stated that this rationale may be of interest to an appropriate congressional committee, but it had no relevance to the court's determination of congressional intent.[200] However, the *Chakrabarty* Court squarely disagreed with this argument. Citing *Marbury v. Madison*,[201] the Court noted that once Congress had spoken, it was the province and the duty of the judiciary to interpret the law.[202] Hence, the Court found that the patent statutes were broad enough in their terms to fulfill both the statutory and constitutional goals[203] of the promotion of the arts and sciences.

2. The Plant Patent Acts Argument

The final argument of the Government rested on the enactment of the 1930 Plant Patent Act[204] and the 1970 Plant Variety Protection Act.[205] The Government claimed that passage of these acts was evidence that Congress never intended living things to be included under the "manufacture" and "composition of matter" categories of section 101.[206] The Supreme Court rejected the Government's argument. The Court found the Government's contention, that Congress intended living things not be included as section 101 subject matter, unsupportable because Congress recognized there were only distinctions between products of nature

197. 563 F.2d at 1038-39. *But see In re* Mancy, 499 F.2d 1289 (C.C.P.A. 1974).
198. *See* note 114 *supra*.
199. 563 F.2d at 1041.
200. *Id.*
201. 5 U.S. (1 Cranch) 137, 177 (1803).
202. 100 S. Ct. at 2210.
203. *Id.* at 2211.
204. *See* 100 S. Ct. at 2208-09 n.7 and note 9 *supra*.
205. *See* 100 S. Ct. at 2208-9 n.7 and note 10 *supra*.
206. Congress explained that the Acts assisted the work of a plant breeder "in aid of nature." Also, the Plant Act relaxed a written requirement of description in favor of a reasonably possible description. The Government's basis for exclusion under § 101 was formed from a statement by the Secretary of Agriculture to the effect that patent laws at that time were understood to include only inventions and discoveries in the field of inanimate nature.

and man-made inventions,[207] but no such distinction existed between living and inanimate objects. The Plant Variety Protection Act of 1970 did not support the Government's position because the Act merely extended the protection of the 1930 Plant Patent Act and nothing in the 1970 Act's language precluded living things from coverage in section 101.[208]

VI. THE DISSENT

The *Chakrabarty* dissent[209] noted strong congressional intent that favored exclusion of bacteria from patentability under section 101. The dissent believed the majority had misread the applicable legislation. The dissent viewed the patent laws as an attempt to harmonize the antipathy towards monopolies with the need to encourage progress.[210]

In quoting *Deepsouth*, the dissent was partial to the view that absent any explicit legislative direction, the courts should leave the privilege of expanding patent protection to Congress.[211] The dissent further stated that in the area of patent law there was not the degree of legislative vacuum that the majority would liked to have believed existed. Congress had enacted two statutes involving patent protection for plants. The dissent strongly believed that these acts evidenced a congressional limitation on patents which included bacteria.[212] If nothing more, the dissent believed these acts were clear signals that Congress was aware of the problem of patenting living organisms,[213] and that Congress did not intend to exclude living organisms from coverage under section 101.[214]

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207. *See* S. REP. NO. 315, 71st Cong., 2d Sess. 6 (1930).
208. 100 S. Ct. at 2210.
209. The dissent was authored by Justice Brennen who was joined by Justices White, Marshall, and Powell.
210. 100 S. Ct. at 2213. This observation seems incongruous with the remainder of the dissent's opinion because the dissent was attempting to show disharmony between the constitutional and statutory mandates and the treatment of these mandates by the courts.
211. 100 S. Ct. at 2214. *See* notes 135 and 138 *supra* and accompanying text.
212. 100 S. Ct. at 2214. *See* note 190 *supra* and accompanying text.
213. 100 S. Ct. at 2214 n.2.
214. *Id.* at 2214. The dissent, in their persistence to point out the controlling influence of the Plant Acts, never cited strong authority for this proposition. Apparently the dissent assumed the Plant Acts controlled since bacteria could be characterized more closely as a plant than as a "manufacture" or a "composition of matter." *See* notes 35 and 40 *supra* and accompanying text.

This also was the basic assertion of the *Bergy II* dissent, which believed that the 1970 Plant Patent Act specifically excluded bacteria from its coverage.[215] On this point, the *Chakrabarty* dissent noted, "It is true there is no legislative history of the exclusion, but that does not give us license to invent reasons."[216] Therefore, both the *Chakrabarty* and *Bergy* dissents believed that Congress never intended that plants or other organisms be within the scope of section 101, and unless this was the case, the dissents believed the 1930 Plant Patent Act would be superfluous.[217]

The Court majority rejected these views by stating that the plant acts were passed exclusively for the benefit of agriculture. Specifically, the 1930 and 1970 Plant Patent Acts[218] applied to assexually reproduced plants.[219] A leading case interpreting the Plant Patent Act of 1930 is *In re Anzeberger*,[220] where the Court of Appeals for the Third Circuit was asked to decide whether Congress intended to include in the term "plant" all organic matter, specifically bacteria. The term bacteria was not in any of the reports in the Plant Acts. It was held that the purpose of the Plant Act was "to afford agriculture, so far as practicable, the same opportunity to participate in the benefits of the patent system as has been given industry. . . . The bill will remove the existing discrimination between plant developers and industrial inventor."[221]

The court noted that, according to the Committee on Patents Report,[222] the Plant Acts enabled young agriculturists to take advantage of an opportunity for profitable invention while farmers and the general public would be able to obtain improved plants at a moderate cost.[223] The *Arzeberger* court also, in reference to the report, asserted that it was clear that Congress wished to extend the patent system to a nonindustrial area.[224]

Finally, the *Anzeberger* court believed that the word "plant" was being used in its popular sense and not in its scientific sense

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215. *See* note 9 *supra*.
216. 100 S. Ct. at 2214.
217. 596 F.2d at 1000. The *Bergy* II dissent's usage of the "superfluous" argument was unsound because there was no evidence that the Plant Acts were designed to cover bacteria.
218. *See* notes 9 and 10 *supra*.
219. 596 F.2d at 981.
220. 112 F.2d 834 (C.C.P.A. 1940) (involved the application of a patent for a species of bacteria useful for producing butyl alcohol, acetone, and ethyl alcohol when grown in a suitable medium).
221. *Id.* at 836; *See also* Yoder Bros. v. California-Florida Plant Corp., 537 F.2d 1347 (5th Cir. 1976).
222. *See* H.R. REP. NO. 1127, 71st Cong., 2d Sess. 138 (1930); 596 F.2d at 982.
223. *See* 112 F.2d at 836-38 for a purview of the House Committee Reports.
224. *Id.* at 837.

within the Act.[225] The court indulged in a clever analogy:

> A drop of water may contain thousands of bacteria, but outside of scientific circles a drop of water would not be regarded as containing thousands of plants. . . . So here we think that Congress in the use of the word 'plant' was speaking in the common language of the people and did not use the word in its strict, scientific, sense.[226]

The *Arzeberger* court, therefore, believed that Congress intended that an award of patent protection in this area would benefit the agricultural community and that the Act's reference to the term "plants" was restricted so that it would not encompass other forms of living matter such as bacteria.[227]

VI. IMPACT

A. *Areas for Concern*

In analyzing the possible effects of this case on the scientific and legal community, the *Bergy II* court characterized the Government's overreaction to a valid patent of microbacteria as "chicken little" telling everyone that the sky is falling. The Government's petition for certiorari stated that a favorable decision for the patentee would open an "enormous range of subject matter to patentability . . . , [and] unless [the decision was] reversed, the policy problems of genetic engineering already controversial, [would] be further complicated by crystalized patent considerations."[228] There also was a concern over the impact that the decision would prematurely unleash relatively unexplored technology. The People's Business Commission[229] envisoned deadly bacteria and contaminated gene pools. They believe genetic engineering could lead to dangers of an irreversible nature once engineered organisms were out of the laboratory and beyond recall.[230]

The *Chakrabarty* decision may be viewed by environmentalists as seriously lacking forethought. One commentator put it this way: "It is not the court's business to thrash out the broader

225. "Popular sense" refers to how an ordinary person would use the word and not to the different scientific definitions.
226. 112 F.2d at 838.
227. *Id.* The majority properly assessed the rationale for the passage of the Plant Acts. The encouragement given to inventors, through the Patent Acts, was similarly conferred to agriculturists through the passage of the Plant Acts.
228. 596 F.2d at 985.
229. This organization is presently a consumer-lobby group in Washington, D.C.
230. Washington Post, June 17, 1980, § A, at 5, col. 1.

questions raised by critics of genetic engineering such as the dangers of new organisms escaping control and creating environmental hazards."[231] This area for concern will be an ever present argument against patenting living organisms. The possibility of these organisms reacting, in an unknown and untested manner, with other organisms could be substantially detrimental to the environment.[232] This may well be the best argument against the *Chakrabarty* decision. However, the gains appear to outweigh this speculation. An oil spill is a very costly hazard in terms of permanent damage to the environment and in terms of dollars. By encouraging the science of controlling these oil spills by means of patent protection, a very real benefit to the environment will result.

There is always concern that this decision occurred too early in light of what is known about genetic research, and that the dangers are too substantial to presently protect this type of research.[233] However, this view has presented no evidence that confirms such fears.[234]

B. Benefits for Patent Protection

The advantages of this patent protection are numerous. It will obviously give a helpful boost to the fledgling genetic engineering industry.[235] It will offer the prospect of advances in many areas, such as medicine, food production, and alternative energy forms.[236] It certainly increases the likelihood that DNA research will become a high-growth industry.[237] It is possible a new industrial revolution will result.[238] Large corporations, such as General Electric and Standard Oil, have been joined by a new array of organizations such as Bidgen, Genex, and Gene-Tech.[239]

The greatest impact arising from this decision could be in the future. Recent discoveries in DNA have opened up the possibility of producing numerous genetically engineered substances of great value.[240] Patenting living matter could mean that companies will find it faster and easier to market new foods.[241] It could even mean less dependence on oil in the manufacture of plastics

231. Washington Post, July 29, 1980, § H, at 1, col. 3.
232. *Id.*
233. Wall St. J., June 17, 1980, at 15, col. 2.
234. SCIENCE, April 4, 1980, at 32.
235. SCIENCE, June 27, 1980, at 1445.
236. TIME, June 30, 1980, at 52.
237. Washington Post, June 22, 1980, § H, at 1, col. 4.
238. Washington Post, July 18, 1980, § A, at 22, col. 1 and 2.
239. Washington Post, July 7, 1980, § A, at 5, col. 3.
240. Washington Post, June 17, 1980, § A, at 5, col. 4.
241. Washington Post, July 18, 1980, § A, at 1, col. 2.

and antifreeze.[242]

There were over 100 patent applications awaiting the outcome of this decision.[243] Such applications involved, for example, insulin, and hormones that prevent dwarfism.[244] Mining companies had organisms that would eat metals or that would eat away the salt in ore.[245] Some laboratories are researching genes in wheat that will need less water to grow.[246] In the medicine field, research is close to production of interferon, an antyiral protein that could be effective against several types of cancer.[247]

The business community can also benefit from the *Chakrabarty* decision. More companies are sure to invest their money into biotechnology with the assurance of patent protection.[248] There are, of course, the possible dangers to commercial exploitation. Too rapid commercial application of new techniques might lead to tragic mistakes.[249] Scientists may be cautious about sharing information, or keep their discoveries out of circulation until they obtain a patent for it.[250]

There has been some comment that this decision will have little affect on the industry.[251] This may be due to the ease with which genetic engineers will be able to circumvent patents by using similar but not identical processes. This argument also notes that the speed with which a technical art would change would give little value to patent protection.[252] Some biotechnologists think the decision will only be a psychological boost for the field.[253]

There will be, of course, certain legal implications from this decision. The Chairman of Genex Corporation summed it up best. "One thing is sure: our legal fees wil be going up."[254] To state that the patent law field might expand and become more lucrative

242. *Id.*
243. *Id.* at 8, col. 1.
244. *Id.*
245. *Id.* at col. 2.
246. Washington Post, June 17, 1980, § A, at 5, col. 1.
247. TIME, June 30, 1980, at 52.
248. BUSINESS WEEK, June 30, 1980, at 48. Nelson M. Schneider, Vice President at E.F. Hutton and Co., estimates that private capital in this area will reach $200 million this year and $1.9 billion by 1985.
249. Washington Post, July 18, 1980, § A, at 22, col. 2.
250. TIME, June 30, 1980, at 53.
251. Washington Post, June 30, 1980, § H, at 3, col. 1.
252. *Id.*
253. BUSINESS WEEK, June 30, 1980, at 48.
254. Washington Post, June 30, 1980, § H, at 1, col. 4.

for patent lawyers would be an understatement. Some lawyers in the field believe this ruling clears away some ambiguity in the law, and that a contrary decision could have set back development in new technologies.[255] Certainly there will be efforts to circumvent the patents held by others. It would be difficult to show the uniqueness of one microbe as opposed to another. Some have called this decision the "Patent Lawyers Employment Act of 1980."[256] There certainly will be overlapping claims that will be fiercely litigated. A question the *Chakrabarty* decision has left open concerns the classification of the progeny of these man-made organisms. Are they to be considered man-made and patentable or natural and unpatentable?[257] Questions, such as these will presumably be answered by Congress, the federal Patent Offices, or the courts.[258]

VII. CONCLUSION

Policy decisions concerning patent laws in new fields of technology are not the province of the courts, but, rather, of Congress.[259] This case, however, required an interpretation of an existing but ambiguous policy. The *Chakrabarty* Court was performing a valid judicial function in deciding that living organisms were patentable. The decision was congruent with the constitutional mandate to promote the arts and sciences and if Congress is so fearful of organisms produced by genetic engineering, then section 101 should be amended to exclude such organisms.[260]

Our founding fathers could not have possibly foreseen that we would walk on the moon or develop computer circuits not visible to the naked eye. Advances in microorganism technology are recent developments whereby man has created a new and useful art. With this in mind, the Supreme Court properly did not limit the patent laws with conditions which the Congress had not expressed.

Some will be pessimistic about this decision, emphasizing that the dangers outweigh the promises. In contrast, optimists will agree with Shakespeare that "we know what we are, but know not what we may be." This could become the epitaph of the modern world if present biological achievements become future scientific, legal, and political problems.[261] However, instead of viewing the

255. Wall St. J., June 17, 1980, at 15, col. 2.
256. TIME, June 30, 1980, at 53.
257. BUSINESS WEEK, June 30, 1980, at 48.
258. *Id.*
259. 596 F.2d at 987.
260. 596 F.2d at 975.
261. Washington Post, June 22, 1980, § D, at 7, col. 6.

possible consequences of the *Chakrabarty* decision from a biased perspective, one should be mindful that science promises truth, not peace of mind.[262] Thus, opinions, whether scientific, legal, or commercial, should be reserved until the truth has, in fact, been ascertained.

DENNIS J. WALSH

262. *Id.*