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Patents - Statutory Interpretation - Patentability of Living Microorganisms

Ronald M. Benrey

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Recent Decisions

PATENTS—STATUTORY INTERPRETATION—PATENTABILITY OF LIVING MICROORGANISMS—The United States Supreme Court has held that a live, human-made, genetically engineered microorganism is patentable subject matter under 35 U.S.C. § 101.

Diamond v. Chakrabarty, 100 S. Ct. 2204 (1980).

In 1972, Ananda M. Chakrabarty filed a patent application¹ asserting thirty-six claims² related to his invention of human-made, genetically engineered bacteria³ that can break down crude-oil spills on water.⁴ An examiner in the Patent and Trademark Office (PTO) allowed three claims for the method of production of the bacteria,⁵ and five claims for oil-absorbent materials (*e.g.*, straw) impregnated with the bacteria.⁶ The PTO, however, rejected ten claims drawn to the bacteria them-

1. Application for patent serial No. 260,563, dated June 7, 1962, was assigned to General Electric Company, the real party in interest. *Diamond v. Chakrabarty*, 100 S. Ct. 2204, 2205 (1980). See also *In re Bergy* and *In re Chakrabarty* (*Bergy II* and *Chakrabarty II*), 596 F.2d 952, 956 (C.C.P.A. 1979), *aff'd sub nom.* *Diamond v. Chakrabarty*, 100 S. Ct. 2204 (1980). The complete patent application is reproduced in the Appendix to Petition for Certiorari at 40-76.

2. Chakrabarty subsequently cancelled 17 of the 36 claims. Appendix to Petition for Certiorari at 78. Some of the remaining claims were modified to satisfy specific objections raised by the patent examiner. *Id.* at 78-84.

3. The Supreme Court labeled Chakrabarty's invention as a live, human-made, microorganism. 100 S. Ct. at 2205. In the words of the Court, Chakrabarty's "microorganism is the result of human ingenuity and research." *Id.* at 2210. Chakrabarty used certain genetic engineering techniques to alter the character of certain naturally occurring strains of bacteria. See Appendix to Petition for Certiorari at 40. The term genetic engineering applies to a growing number of techniques used to manipulate the structure of deoxyribonucleic acid (DNA) molecules within living cells. DNA molecules are the building-blocks of the mechanisms by which a cell contains and conveys its genetic information. See generally Boyer, *The Age of Molecular Biology*, 7 J. AM. PAT. L.A. 185 (1979).

4. Chakrabarty's bacteria are believed to have significant value in the control and treatment of oil spills on water. 100 S. Ct. at 2206. The microorganisms have been described as "superbugs [with] a gluttonous appetite for oil . . . a corps of ultrasmall scavengers that may one day devour oil spills." 150 NATIONAL GEOGRAPHIC 374 (1976).

5. Appendix to Petition for Certiorari at 87-88. The patent application contains a detailed description of the genetic engineering techniques employed to produce the microorganisms. *Id.* at 45-71.

6. *Id.* at 88. In his application, Chakrabarty stated that an *inoculum* (mass of microbes) of genetically engineered bacteria will be dispersed on an oil spill from above to effect biological control of the spill. However, no patent claims were drawn to this technique.

selves,⁷ asserting that bacteria are not patentable under 35 U.S.C. § 101.⁸

Chakrabarty appealed to the PTO Board of Appeals (Board), which found that the examiner had rejected the ten claims because the claimed bacteria are products of nature, and because living things are not patentable subject matter as defined by 35 U.S.C. § 101.⁹ The Board concluded that the bacteria were not naturally occurring, and thus not products of nature, but it upheld the examiner's rejection of the ten disputed claims on the ground that Congress did not intend 35 U.S.C. § 101 to cover living things such as laboratory-created microorganisms.¹⁰

Chakrabarty challenged the Board's ruling in the Court of Customs and Patent Appeals (Patent Court).¹¹ His appeal was heard two months after the Patent Court decided *In re Bergy*,¹² an unrelated case involving the patentability of live bacteria. In *Bergy* the court held that microorganisms are patentable subject matter because they are within the terms "manufacture" and "composition of matter" in 35 U.S.C. § 101.¹³ The Patent Court followed its decision in *Bergy* and reversed the Board's rejection of Chakrabarty's ten disputed claims.¹⁴ Approximately two months after the Patent Court's decision in *Chakrabarty*, the Supreme Court granted certiorari in *Bergy*, vacated the Patent Court's

7. *Id.* at 87.

8. Petition for Certiorari at 165a-167a. 35 U.S.C. § 101 (1976) provides that "[w]hoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title." *Id.*

9. The opinion and decision of the Board of Appeals, dated May 20, 1976, is reproduced in the Petition for Certiorari at 159a. The second ground for rejection is not readily apparent in the examiner's final letter to Chakrabarty. See Petition for Certiorari at 165a. When the Court of Patent and Customs Appeals decided Chakrabarty's second appeal, see note 19 and accompanying text *infra*, it did not find in the examiner's final rejection any rejection other than the first ground. 596 F.2d at 971.

10. Petition for Certiorari at 159a-163a. The Board agreed that Chakrabarty's genetically engineered bacteria are not naturally occurring. But it argued that a bacteria modified by genetic engineering is analogous to a human being that has been modified through an organ transplant procedure. *Id.* at 162a. The Board noted that a human being with a transplanted heart or liver is also not naturally occurring. *Id.* at 163a.

11. *In re Chakrabarty*, 571 F.2d 40, 42 n.3 (C.C.P.A.), cert. dismissed, 439 U.S. 801 (1978).

12. 563 F.2d 1031 (C.C.P.A. 1977), vacated *sub nom.* Parker v. Bergy, 438 U.S. 902 (1978).

13. *Id.* at 1038. A claim of Bergy's patent application was drawn to a biologically pure culture of a newly discovered, naturally occurring microorganism that is capable of producing an antibiotic drug. Following the PTO's rejection of the microorganism as nonstatutory subject matter, Bergy argued that a biologically pure culture of the bacteria does not exist in nature, which makes it a "manufacture" under 35 U.S.C. § 101 (1976). 563 F.2d at 1033.

14. 571 F.2d at 43.

judgment, and remanded the case for further consideration in light of its decision in *Parker v. Flook*.¹⁵

The PTO sought Supreme Court review of *Chakrabarty* and also asked the Patent Court to vacate its own judgment on the grounds that *Bergy* was no longer a valid precedent.¹⁶ The Patent Court acted first. It vacated *Chakrabarty*, restored both Bergy's and Chakrabarty's appeals to its calendar, and ordered that they be reheard together.¹⁷ The PTO's petition for certiorari in *Chakrabarty* was dismissed by the Supreme Court upon the stipulation of the parties.¹⁸

After reexamining both cases, the Patent Court found that *Flook* shed no light on the issues involved.¹⁹ The court handed down a combined decision²⁰ in which it adhered to its earlier judgments and granted the denied claims of both appellants.²¹ The Patent Court said that the sole issue raised by the PTO in both cases was whether an otherwise patentable invention is excluded from the categories of statutory subject matter in 35 U.S.C. § 101 merely because it is alive.²² The court found no legal significance to the distinction that microorganisms are alive.²³ It said that microorganisms should be treated no differently from chemical compounds under section 101.²⁴

15. 438 U.S. 902 (1978). The Supreme Court in *Parker v. Flook*, 437 U.S. 584 (1978), held that an *algorithm*—a procedure for solving a mathematical problem on a computer—is not patentable, even though the inventor has applied it to a specific end use. Writing for a 6-3 majority, Justice Stevens stated that it is the Court's duty to construe the patent statutes as they now read, in light of prior precedents. He warned that the Court must proceed cautiously when asked to extend patent rights into areas wholly unforeseen by Congress. Justice Stevens said we should not expand patent rights by overruling or modifying our prior cases construing the patent statutes, unless the argument for expansion is based on more than mere inference from ambiguous statutory language. *Id.* at 595-96 (citing *Deepsouth Packing v. Laitram Corp.*, 406 U.S. 518, 531 (1972), which construed 35 U.S.C. § 271(a) (1976)).

16. 596 F.2d at 957.

17. *See id.* The Patent Court did not formally consolidate the two appeals, although they were heard together and decided together. *Id.* at 955.

18. *Id.* at 957.

19. *Id.* at 967.

20. *Id.* at 955. Three members of the five-judge court joined in the majority decision. One judge filed a concurring opinion and one judge dissented.

21. *Id.* at 987.

22. *Id.* at 956. As the court noted, the PTO did not reject Bergy's or Chakrabarty's claims for failure to meet any of the basic statutory requirements for patentability, such as utility, *see* 35 U.S.C. § 101 (1976), novelty, *see* 35 U.S.C. § 102 (1976), and nonobviousness, *see* 35 U.S.C. § 103 (1976); or for failure to comply with any other statutory condition or requirement, such as adequacy of disclosure, *see* 35 U.S.C. § 112 (1976). The Supreme Court made a similar observation in its opinion. 100 S. Ct. at 2207 n.5.

23. 596 F.2d at 975. This echoes the original holding in *Bergy*, 563 F.2d at 1038, which the Supreme Court cited in its *Chakrabarty* opinion. *See* 100 S. Ct. at 2206.

24. 596 F.2d at 975. The Patent Court suggested that Chakrabarty's modified

Once again, the PTO appealed to the Supreme Court.²⁵ The Court granted certiorari to review both *Bergy II* and *Chakrabarty II*.²⁶ *Bergy II*, however, was dismissed as moot before the appeals were heard,²⁷ leaving only *Chakrabarty II* for decision.²⁸ In a 5-4 decision,²⁹ the Supreme Court affirmed *Chakrabarty II*, and held that Chakrabarty's microorganism is patentable subject matter under 35 U.S.C. § 101.³⁰

Chief Justice Burger, writing for the majority, said that the appeal posed the narrow statutory-interpretation question of whether a microorganism constitutes a "manufacture" or "composition of matter" within the meaning of 35 U.S.C. § 101.³¹ He set out to answer the question by restating three canons of construction that the Court had used in past interpretations of section 101. The first canon commands that the starting point of statutory construction be the language of a statute.³² The second requires that the words of a statute, unless otherwise defined, will be interpreted as taking their ordinary, contemporary, common meaning.³³ The third canon cautions the courts not to read into the patent laws limitations and conditions which have not been expressed by the legislature.³⁴

microorganisms are analogous in practical use to inanimate chemical compositions used by industry. *Id.*

25. See Appendix to Petition for Certiorari at 3.

26. 444 U.S. 924 (1979).

27. 444 U.S. 1028 (1980). Bergy cancelled the disputed claim in his patent application on December 19, 1979. See Motion to Dismiss and Vacate as to Respondents Malcolm E. Bergy, et al., *Diamond v. Chakrabarty*, 100 S. Ct. 2204 (1980).

28. 100 S. Ct. at 2206.

29. Chief Justice Burger delivered the opinion of the Court, which was joined by Justices Stewart, Blackmun, Rehnquist, and Stevens. Justice Brennan filed a dissent, which was joined by Justices White, Marshall, and Powell.

30. 100 S. Ct. at 2208.

31. *Id.* at 2207. Chief Justice Burger prefaced this statement with a brief review of the constitutional underpinnings of the patent laws. He cited U.S. CONST. art. I, § 8, cl. 8, which provides that Congress shall have the power "[t]o promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries." He then explained that the patent laws promote this progress by offering inventors exclusive rights for a limited period as an incentive for their inventiveness and research efforts. *Id.* See *Kewanee Oil Co. v. Bicron Corp.*, 416 U.S. 470, 480 (1974).

32. 100 S. Ct. at 2207 (citing *Southeastern Community College v. Davis*, 442 U.S. 397, 405 (1979), which construed the Rehabilitation Act of 1973, 29 U.S.C. § 794 (1976) (amended 1978)).

33. 100 S. Ct. at 2207 (citing *Perrin v. United States*, 444 U.S. 37, 42 (1979), which construed the Travel Act, 18 U.S.C. § 1952 (1976)).

34. 100 S. Ct. at 2207 (citing *United States v. Dubilier Condenser Corp.*, 289 U.S. 178, 199 (1933), which held that the U.S. government was not the equitable owner of a patent on an invention developed by two government employees who were acting outside the scope of their on-the-job duties).

Guided by these canons, the Chief Justice explained, the Court has construed "manufacture" in accordance with its dictionary definition,³⁵ and "composition of matter" in accordance with its common usage.³⁶ Chief Justice Burger reasoned that when Congress chose such expansive terms as "manufacture" and "composition of matter," modified by the comprehensive "any," it plainly contemplated that the patent laws would be given wide scope.³⁷ He concluded that the relevant legislative history reflects congressional intent that statutory subject matter "include anything under the sun that is made by man."³⁸

The Court cautioned, however, that 35 U.S.C. § 101 does not embrace every discovery.³⁹ The laws of nature, physical phenomena, and abstract ideas are not patentable.⁴⁰ The Court held that, judged in this light, Chakrabarty's microorganism plainly qualifies as patentable subject matter. His claim is not to hitherto unknown natural phenomenon, but to a nonnaturally occurring manufacture or composition of matter—a product of human ingenuity "having a distinctive name, character, [and] use."⁴¹ The Court distinguished Chakrabarty's appeal from

35. "Manufacture" has been defined as the production of articles for use from raw materials prepared by giving to those materials new forms, qualities, properties, or combinations whether by hand labor or machinery. *American Fruit Growers, Inc. v. Brogdex*, 283 U.S. 1, 11 (1931) (impregnating the rind of an orange to inhibit mold growth does not make the treated orange a "manufacture" under the patent laws).

36. "Composition of matter" has been defined as two or more substances and . . . all composite articles, whether they be the results of chemical union, or of mechanical mixture, or whether they be gases, fluids, powders, or solids. *Shell Development Co. v. Watson*, 149 F. Supp. 279, 280 (D.D.C. 1957), *aff'd*, 252 F.2d 861 (D.C. Cir. 1958) (publishing a chemical structure diagram of an undeveloped organic chemical is anticipation that bars a patent on the chemical when it is actually produced).

37. 100 S. Ct. at 2207.

38. *Id.* The Committee Reports accompanying the recodification of the patent laws in 1952 state: "A person may have 'invented' a machine or a manufacture, which may include anything under the sun that is made by man, but it is not necessarily patentable under section 101 unless the conditions of the title [Title 35] are fulfilled." S. REP. NO. 1979, 82d Cong., 2d Sess. 5 (1952), *reprinted in* [1952] U.S. CODE CONG. & AD. NEWS 2394, 2399.

39. 100 S. Ct. at 2208.

40. *Id.* See *Gottschalk v. Benson*, 409 U.S. 63, 67 (1972) (an algorithm for programming a computer to convert binary-coded decimal numbers into binary numbers is not patentable); *Funk Bros. Seed Co. v. Kalo Co.*, 333 U.S. 127, 130 (1948), see note 42 and accompanying text *infra*; *O'Reilly v. Morse*, 56 U.S. (15 How.) 62, 112 (1853) (upholding telegraph patents, but rejecting a broad claim to "every improvement where the motive power is the electric or galvanic current, and the result is the marking or printing [of] intelligible characters . . . at a distance"); *Le Roy v. Tatham*, 55 U.S. (14 How.) 156, 175 (1852) (inventor of novel method of making lead pipe must claim the production method itself as novel, rather than the application of a newly discovered scientific principle).

41. 100 S. Ct. at 2208 (quoting *Hartranft v. Wiegmann*, 121 U.S. 609, 615 (1887), which held that treatment of decorative sea shells with acid or other means to prepare them for sale does not make them a "manufacture" under the patent laws).

the facts in *Funk Brothers Seed Co. v. Kalo Co.*,⁴² where an inventor had sought to patent a mixed culture of naturally occurring bacteria. His claims were denied on the theory that the inventor had discovered "only some handiwork of nature."⁴³ Chakrabarty, by contrast, produced a new bacterium with markedly different characteristics from any found in nature.⁴⁴

Chief Justice Burger dismissed two contrary arguments advanced by the PTO. The PTO first argued that the Plant Patent Act of 1930⁴⁵ and the Plant Variety Protection Act of 1970⁴⁶ are evidence of congressional understanding that 35 U.S.C. § 101 does not encompass living things,⁴⁷ because if live subject matter is patentable under section 101, both statutes are unnecessary.⁴⁸ The Court rejected this assertion, explaining that prior to 1930, plants were not given patent protection for two reasons: First, plants, even if artificially bred, were considered to be products of nature. Second, plants were thought not amenable to the "written description" requirements of 35 U.S.C. § 112.⁴⁹

The Chief Justice said that Congress addressed both of these concerns when it enacted the Plant Patent Act of 1930, a statute that gave patent protection to certain asexually reproduced plants.⁵⁰ He

42. 333 U.S. 127 (1948). In *Funk Bros. Seed Co.* an inventor obtained a patent on a mixed culture of naturally occurring root nodule bacteria that would induce nitrogen fixing on clover, alfalfa, and soy bean plants, but would not inhibit each other when used together. The Supreme Court overturned the patent, finding that the bacteria perform in their natural way. Their use in combination does not improve in any way their natural function. Thus, they serve the ends nature originally provided and act quite independently of any effort of the patentee. *Id.* at 131.

43. *Id.*

44. 100 S. Ct. at 2208.

45. 35 U.S.C. § 161 (1976) provides in relevant part that "[w]hoever invents or discovers and asexually reproduces any distinct and new variety of plant, including cultivated sports, mutants, hybrids, and newly found seedlings, other than a tuber propagated plant or a plant found in an uncultivated state, may obtain a patent therefor. . . ." *Id.*

46. 7 U.S.C. § 2402(a) (1976) provides in relevant part that "[t]he 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. . . ." *Id.*

47. 100 S. Ct. at 2208.

48. *Id.* at 2209.

49. *Id.* 35 U.S.C. § 112 (1976) provides in relevant part:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor for carrying out his invention.

Id.

50. 100 S. Ct. at 2209. See note 45 *supra*.

noted that nothing in the legislative history suggests that Congress believed that the terms "manufacture" and "composition of matter" exclude living things.⁵¹ According to the Court, Congress recognized that the relevant distinction was not between living and inanimate things, but between products of nature, whether living or not, and human-made inventions.⁵²

The Plant Variety Protection Act of 1970 extended patent protection to sexually reproduced plants not encompassed by the earlier statute.⁵³ The Court noted that nothing in the statute's language or history suggests that it was enacted because 35 U.S.C. § 101 did not include living things.⁵⁴ Chief Justice Burger also found no support for the PTO's position in Congress' unexplained exclusion of bacteria from the 1970 statute.⁵⁵ He concluded that absent some clear indication that Congress focused on issues related to those before the Court,⁵⁶ there is no basis for reading into its actions an intent to modify the plain meaning of the words found in section 101.⁵⁷

The second argument advanced by the PTO was that microorganisms cannot be patentable subject matter until Congress expressly

51. 100 S. Ct. at 2209. See S. REP. NO. 317, 71st Cong., 2d Sess. 6-8 (1930), and H.R. REP. NO. 1129, 71st Cong., 2d Sess. 7-9 (1930). The Chief Justice noted, however, that a conclusory statement in a letter written by Secretary of Agriculture Hyde did support the PTO's position. 100 S. Ct. at 2209. The Chief Justice maintained that the Secretary's views were not entitled to controlling weight, because they were beyond the scope of his competence. *Id.*

52. 100 S. Ct. at 2210.

53. *Id.* See note 46 *supra*.

54. 100 S. Ct. at 2210.

55. *Id.* The Court accepted as a possible explanation for the exclusion of bacteria a theory advanced by the Patent Court in *Bergy II* and *Chakrabarty II* that the exclusion represented congressional agreement with *In re Arzberger*, 112 F.2d 834 (C.C.P.A. 1940), which held that the Plant Patent Act of 1930 encompassed only those items understood to be plants by laymen. Thus, bacteria are not protected. See 596 F.2d at 984. The Chief Justice also observed that prior to 1970, the PTO had in fact issued patents on bacteria under § 101. 100 S. Ct. at 2210 n.9. This point was urged by the Patent Court in *Chakrabarty II*, 596 F.2d at 985-86, and by Chakrabarty in the Supreme Court, Brief for the Respondent at 18-25. The PTO objected vigorously to this argument. See Reply Brief for the Petitioner. The PTO admitted that at least 17 patents may have been drawn to living organisms. It asserted, however, that this "handful" of patents was issued without review by the Board of Appeals or the Commissioner, thus making these patents "particularly poor proof of agency practice." Reply Brief for the Petitioner at 3 & n.2.

56. 100 S. Ct. at 2210 (citing *SEC v. Sloan*, 436 U.S. 103, 120-121 (1978), which construed the Securities Exchange Act of 1934, § 12(k), 15 U.S.C. § 78l(k) (1976)).

57. 100 S. Ct. at 2210, citing *TVA v. Hill*, 437 U.S. 153, 189-93 (1978) (Endangered Species Act of 1973, 16 U.S.C. § 1531 (1976) (amended 1979), precluded the TVA from completing the partially built Tellico dam across the Little Tennessee River because the dam might cause the extinction of a species of fish).

authorizes such protection.⁵⁸ The PTO argued that the technology of genetic engineering was unforeseen by Congress when it enacted 35 U.S.C. § 101. Therefore, Congress, not the courts, must resolve the question of patentability after weighing the competing economic, social, and scientific issues.⁵⁹ Chief Justice Burger disagreed. He explained that Congress performed its constitutional role by defining patentable subject matter in section 101,⁶⁰ while the Supreme court performs its role by construing the language Congress has employed. The Court is obliged to take statutes as it finds them, guided, if ambiguity appears, by their legislative history and statutory purpose.⁶¹ The Chief Justice concluded that the patent laws are not ambiguous, but have been cast in broad terms to fulfill the constitutional and statutory goal of promoting "the Progress of Science and useful Arts."⁶²

The Chief Justice found nothing in *Flook* to the contrary. The Court in *Flook* scrutinized a patent claim to determine if it was barred by the underlying prohibition against patents for ideas or phenomena of nature.⁶³ The Chief Justice maintained that the decision did not announce a new principle that inventions in areas not contemplated by Congress when the patent laws were enacted are unpatentable per se.⁶⁴ He said that a rule holding unforeseen inventions unpatentable would conflict with the core concept of the patent law that anticipation undermines patentability.⁶⁵ Congress employed broad, general language in drafting section 101 precisely because inventions that push back the frontiers of science are often unforeseeable.⁶⁶

To strengthen its position, the PTO warned of the possible risks of

58. 100 S. Ct. at 2210.

59. *Id.* The PTO invoked a statement in *Parker v. Flook*, 437 U.S. at 596, that the judiciary must proceed cautiously when asked to extend patent rights to areas wholly unforeseen by Congress. 100 S. Ct. at 2210. *See* note 15 *supra*.

60. 100 S. Ct. at 2210-11. The Chief Justice prefaced his statement by noting that Congress, not the courts, must define the limits of patentability. But, he added, once Congress has spoken it is "the province and duty of the judicial department to say what the law is." *Id.* *See* *Marbury v. Madison*, 5 U.S. (1 Cranch) 137, 177 (1803).

61. 100 S. Ct. at 2211.

62. *Id.* *See* U.S. CONST. art. I, § 8, cl. 8.

63. 437 U.S. 584 (1978). *See* note 15 *supra*.

64. 100 S. Ct. at 2211.

65. *Id.* The Chief Justice noted that the Supreme Court has often observed that a statute is not to be confined to particular applications contemplated by the legislatures. *Id.* (citing *Barr v. United States*, 324 U.S. 83, 90 (1945), which construed the Tariff Act of 1930, § 522, 31 U.S.C. § 372(c) (1976)).

66. 100 S. Ct. at 2211. The Chief Justice observed that the inventions most benefiting mankind are those that push back the frontiers of science. *Id.* (citing *Great Atlantic & Pacific Tea Co. v. Supermarket Equip. Corp.*, 340 U.S. 147, 154-55 (1950) (Douglas, J., concurring) (a patent will not be granted on a trifling invention)).

genetic engineering research.⁶⁷ Although acknowledging the force and passion of these arguments, the Chief Justice refused to consider them.⁶⁸ He maintained that the denial of patents on microorganisms is not likely to deter future genetic engineering research. Much work has been done to date without the sure knowledge that patent protection would be available.⁶⁹ Chief Justice Burger also noted that the choice of whether a potentially hazardous invention should be patentable is a matter of high policy that must be resolved by the legislature after investigation, examination, and study.⁷⁰

Congress is free, the Chief Justice concluded, to exclude genetically engineered microorganisms from patent protection, as it has excluded inventions related to nuclear weapons technology.⁷¹ But until Congress acts, the language of 35 U.S.C. § 101 fairly embraces Chakrabarty's invention.⁷²

Justice Brennan dissented,⁷³ and rejected the contention that Congress intended bacteria to be patentable. He maintained that the 1930 and 1970 plant patent statutes⁷⁴ demonstrate that Congress purpose-

67. 100 S. Ct. at 2211. The PTO's position was strongly supported by an *amicus* brief filed on behalf of the People's Business Commission. The brief speaks almost totally to issues of risk and social policy. See Brief on Behalf of the People's Business Commission, *Amicus Curiae* at 5-6. Jeremy Rifkin, director of the association, has subsequently stated: [I]n 10 or 20 years, *Diamond [v. Chakrabarty]* will be looked back on as the biggest decision a court has ever made. [It is] the patent decision of the century because it is the biggest opening. It says that any item manufactured by humans that performs a function is patentable; in other words, that anything is patentable.

Patent Decision Fuels Genetic Research Debate, 66 A.B.A.J. at 943 (1980). See note 91 and accompanying text *infra*.

68. 100 S. Ct. at 2211.

69. *Id.* at 2211-12.

70. *Id.* at 2212. The Chief Justice observed that the courts should not appraise the wisdom or unwisdom of a statute when construing it. See *TVA v. Hill*, 437 U.S. 153, 194 (1978); note 57 *supra*.

71. 100 S. Ct. at 2212. 42 U.S.C. § 2181(a) (1976) provides that: "No patent shall hereafter be granted for any invention or discovery which is useful solely in the utilization of special nuclear material or atomic energy in an atomic weapon. Any patent granted for any such invention or discovery is revoked, and just compensation shall be made therefor." *Id.*

72. 100 S. Ct. at 2212.

73. Justices White, Marshall, and Powell joined in the dissenting opinion.

74. 100 S. Ct. at 2213 (Brennan, J., dissenting). See notes 45-46 and accompanying text *supra*. Justice Brennan prefaced his dissent by noting that the patent laws attempt to reconcile this nation's deep-seated antipathy to monopolies with the need to encourage progress. See *Deepsouth Packing Co. v. Laitram Corp.*, 406 U.S. 518, 530 (1972) (expansion of the patent privilege by the courts must be based on more than mere inference from ambiguous statutory language; the courts require a clear and certain signal from Congress before acting). Justice Brennan maintained that the courts should leave to Congress the decision of whether and how far to extend the patent privilege into areas where the com-

fully addressed the general problem of patenting animate inventions, but give no affirmative indication of congressional intent that bacteria be patentable.⁷⁵ Justice Brennan argued against the extension of the "patent monopoly" in the face of uncertainty as to congressional intent.⁷⁶ He insisted that the caveat in *Flook*⁷⁷ was pertinent here, because the need for caution becomes much greater when the Court is asked to extend patent rights into areas Congress has foreseen and considered but not resolved.⁷⁸

Justice Brennan also reframed the PTO's argument that both plant patent statutes are unnecessary if 35 U.S.C. § 101, which encompasses the sweeping language of the Patent Act of 1793,⁷⁹ includes newly developed living organisms that are not naturally occurring. He observed that the plants covered by the plant patent statutes, and the bacteria involved in this case, are both new varieties, not naturally occurring. He refused to believe that Congress engaged in idle exercises when it enacted the 1930 and 1970 statutes, or that it was concerned with solving the technical problem of description.⁸⁰ The expansive prose in the congressional committee reports, he argued, is evidence that Congress thought it was providing previously unavailable benefits.⁸¹ He reasoned that because Congress thought it necessary to enact limited legislation to make human-made agricultural inventions patentable, it never intended for living organisms outside the scope of these statutes to be patentable.⁸²

mon understanding has been that patents are not available. 100 S. Ct. at 2213 (Brennan, J., dissenting).

75. 100 S. Ct. at 2213 & n.2. (Brennan, J., dissenting).

76. *Id.*

77. 437 U.S. at 596. *See* note 15 *supra*.

78. 100 S. Ct. at 2213 n.2 (Brennan, J., dissenting).

79. Section 1 of the Patent Act of 1793 provided in relevant part:

That when any person or persons, being a citizen or citizens of the United States, shall allege that he or they have invented any new and useful art, machine, manufacture or composition of matter, or any new and useful improvement on any art, machine, manufacture or composition of matter, not known or used before the application . . . it shall and may be lawful for the . . . Secretary of State, to cause letters patent to be made out . . . thereupon granting to such petitioner, or petitioners . . . for a term not exceeding fourteen years, the full and exclusive right and liberty of making, constructing, using, and vending to others to be used, the said invention or discovery. . . .

Patent Act of 1793, ch. XI, § 1, 1 Stat. 318 (1793).

80. 100 S. Ct. at 2213 (Brennan, J., dissenting). By "technical problems," Justice Brennan meant the reasons given in the majority opinion to explain why plants were not accorded patent protection prior to 1930. *Id.* at 2213 n.4 (Brennan, J., dissenting).

81. *Id.* at 2214 (Brennan, J., dissenting). *See* S. REP. NO. 317, 71st Cong., 2d Sess. 6-8 (1930), and H.R. REP. NO. 1129, 71st Cong., 2d Sess. 7-9 (1930).

82. 100 S. Ct. at 2214 (Brennan, J., dissenting).

Justice Brennan also noted that Congress included bacteria within the focus of its legislative concern when it specifically excluded bacteria from the coverage of the Plant Variety Protection Act of 1970. In his view, Congress assumed that animate objects could not be patented unless covered by specific legislation. Based on this assumption, Congress excluded bacteria from the set of patentable organisms.⁸³

Diamond v. Chakrabarty is one of a small group of modern Supreme Court decisions⁸⁴ that construes the scope of 35 U.S.C. § 101. Although the case raised an issue of first impression in the Supreme Court,⁸⁵ the granting of Chakrabarty's ten disputed claims does not represent a dramatic expansion of patentable subject matter under section 101. As the Court noted, the PTO has occasionally issued patents on living microorganisms.⁸⁶

The most significant aspect of *Chakrabarty* may well be the Court's implicit holding that the broad language of 35 U.S.C. § 101 should be read to define the outer boundaries of patentable inventions, rather than to provide a list of patentable items. The Court observed that 35 U.S.C. § 101 was drawn in broad terms to encompass unforeseeable inventions.⁸⁷ But it refused to fit "microorganism" into any one broadly interpreted category of "manufacture" or "composition of matter." It held, instead, that the language of section 101 "fairly embraces" a live, human-made microorganism.⁸⁸

Chakrabarty can be read as Supreme Court authority for the proposition that "anything under the sun that is made by man" is patentable subject matter if not specifically *excluded* by Congress.⁸⁹ This is an apparent departure from the orthodox strict-construction view, a view echoed in Justice Brennan's dissent, that the patent monopoly can only

83. *Id.*

84. The following Supreme Court opinions have construed 35 U.S.C. § 101 (1976) since its enactment in 1952: *Parker v. Flook*, 437 U.S. 584, 588-89 (1978) (construing the term "process"), *see note 15 supra*; *Kewanee Oil Co. v. Bicron Corp.*, 416 U.S. 470, 476 (1974) ("the subject matter of a patent is limited to a 'process, machine, manufacture, or composition of matter, or . . . improvements thereof'"); *Gottschalk v. Benson*, 409 U.S. 63, 64 & n.2 (1972) (construing the term "process"), *see note 40 supra*; *Brenner v. Manson*, 383 U.S. 519, 529 & n.14 (1967) (construing the utility provision); *Graham v. John Deere Co.*, 383 U.S. 1, 12 (1966) (construing the novelty and utility provisions).

85. Although the Supreme Court did not denote the case as one of first impression, the lack of applicable precedent indicates that it is. The Patent Court expressly stated that *Bergy II* and *Chakrabarty II* were cases of first impression. 596 F.2d at 955.

86. 100 S. Ct. at 2210 n.9. *See note 55 supra*.

87. 100 S. Ct. at 2211. The Patent Court made a similar argument in *Chakrabarty II*. 596 F.2d at 974.

88. 100 S. Ct. at 2212.

89. *See text accompanying notes 38 & 72 supra*.

be granted to inventions *included* within the specific statutory subjects and classes set forth in the patent laws.⁹⁰ *Chakrabarty* thus seems to transform section 101 into a preamble to the patent laws that makes any invention short of a law of nature, a physical phenomenon, or an abstract idea patentable if it meets the other statutory requirements. It is difficult to conceive of any "thing" or "act" that will not fit within a loosely construed 35 U.S.C. § 101.⁹¹

A caveat, however, is necessary. Early in *Chakrabarty*, the Court expressed its intention to determine whether a microorganism constitutes a "manufacture" or "composition of matter" within the meaning of 35 U.S.C. § 101.⁹² This implies a strict-construction approach that does not comport with the eventual holding. Later on, the majority used authority in its statutory interpretation analysis that also supports a strict reading of section 101. Chief Justice Burger cited *American Fruit Growers, Inc. v. Brogdex Co.*⁹³ and *Shell Development Co. v. Watson*⁹⁴ as illustrative of how the canons of statutory interpretation he presented have been used to construe 35 U.S.C. § 101.⁹⁵ Both of the cases seem to support a strict, rather than broad, construction of section 101.

The *Brogdex* Court invoked a dictionary definition of "manufacture"—an article prepared by giving "raw . . . materials new forms, qualities, properties, or combinations whether by hand-labor or by machinery"⁹⁶—to determine if an orange treated with borax to retard mold formation can be considered a "manufacture." The Court held that the treated orange did not fit the dictionary definition of "manufacture," and rejected the patent claim.⁹⁷ The *Brogdex* Court

90. 100 S. Ct. at 2213 (Brennan, J., dissenting). One treatise on patent law states:

In view of the fact that patent grants are authorized by statute . . . only those subjects or classes of inventions which are *specifically enumerated* by the patent statutes can be given patent protection. Patentable subject matter . . . embraces certain classes of inventions, including processes, machines, manufactures, compositions of matter, or any new and useful improvements thereof.

A. DELLER, 1 WALKER ON PATENTS § 14 (1964) (emphasis added) [hereinafter cited as WALKER]. The PTO invoked this rule when it dealt with *Chakrabarty*'s initial patent application, thereby rejecting the 10 disputed claims as not within the classes of subject matter patentable under 35 U.S.C. § 101 (1976). See note 9 and accompanying text *supra*.

91. The Court cautioned that 35 U.S.C. § 101 (1976) does not embrace all new discoveries. 100 S. Ct. at 2208. However, its enumerated list of non-patentable discoveries does not include any tangible "things." *Id.* See note 67 *supra*.

92. 100 S. Ct. at 2207.

93. 283 U.S. 1 (1931). See note 35 *supra*.

94. 149 F. Supp. 279 (D.D.C. 1957), *aff'd*, 252 F.2d 861 (D.C. Cir. 1958). See note 36 *supra*.

95. 100 S. Ct. 2207.

96. 283 U.S. at 11.

97. *Id.*

made no attempt to construe section 101 broadly.

Although *Watson* did not involve a 35 U.S.C. § 101 question, the court defined "composition of matter" in the first paragraph of its opinion to establish that the chemical compound involved in the litigation fit squarely within one of the section 101 categories. The *Watson* court used a patent treatise's definition of "composition of matter" as "all compositions of two or more substances and . . . all composite articles, whether they be results of chemical union, or of mechanical mixture, or whether they be gases, fluids, powders, or solids."⁹⁸ The treatise text preceding the definition explains that the "class [composition of matter] is a very broad one and embraces chemical compounds, mechanical or physical mixtures, alloys, and a great variety of things."⁹⁹ Application of *ejusdem generis*¹⁰⁰ to this list suggests that the treatise authors intended their definition to encompass only conventional chemical and metallurgical "compositions of matter." Thus, the *Chakrabarty* Court incorrectly read *Watson* as providing a broad definition of "composition of matter."

Chief Justice Burger's use of *Brogdex* and *Watson* to support the majority holding in *Chakrabarty* thus displays a tension between the orthodox and liberal constructions of 35 U.S.C. § 101 that may require resolution in future patent litigation. In a practical sense, however, the decision is a sound accommodation of the patent laws to the realities of modern technology. Genetic engineering is a rapidly emerging technology of manufacture;¹⁰¹ its products have application in health care, agriculture, pollution control, and alternative fuel production. *Chakrabarty's* invention deserved the patent protection it received.

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98. 149 F. Supp. at 280. See WALKER, *supra* note 90 § 18.

99. WALKER, *supra* note 90 § 18.

100. *Ejusdem generis*, a rule of construction, requires that words associated together in a phrase or sentence take "color" from each other. Thus, words of general meaning are limited by the specific words they follow or are associated with. See *Gooch v. United States*, 297 U.S. 124, 128 (1936).

101. See generally Gilbert & Villa-Komaroff, *Useful Proteins from Recombinant Bacteria*, SCIENTIFIC AM., April 1980, at 74.

