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Patent Law—*Diamond v. Chakrabarty*—The U.S. Supreme Court Rules that Living Matter Is Patentable

Microbiologists can now alter the basic chemical structures of life forms¹ and genetically engineer microorganisms to perform a wide range of functions that will benefit mankind.² These microscopic creatures are valuable because of their high cost of research and development, and their limitless possibilities for utilization. Accordingly, scientists are seeking to patent newly developed microorganisms.³ There has been serious dispute, however, as to whether 35 U.S.C. § 101,⁴ which delineates the range of patentable subject matter, applies to living organisms.⁵ In *Diamond v. Chakrabarty*, the United States Supreme Court decided that live, man-made microorganisms are patentable subject matter.⁶

In 1972, Ananda Chakrabarty, a microbiologist, filed a patent application asserting thirty-six claims pertaining to his invention of a new kind of bacterium capable of degrading diverse components of crude oil.⁷ The bacterium was designed to be used in the treatment of oil spills.⁸ One of Chakrabarty's claims was for a patent on the new bacteria themselves.⁹ The patent examiner rejected this claim first on the grounds that microorganisms are "products of nature" and second because as living things they are not patentable subject matter under 35 U.S.C. § 101.¹⁰ Chakrabarty appealed the rejection to the Court of Customs and Patent Appeals (CCPA)¹¹ which reversed, stating that

1. See NAT'L GEOGRAPHIC, Sept. 1976, at 355.

2. Genetic engineering refers to the modification of the cellular structure of microorganisms by recombining the molecules that make up genes. This is referred to as recombinant DNA technique. For a brief description of this process see *Proposed Revised Guidelines, Recombinant DNA Research*, 43 Fed. Reg. 33,096, 33,101.

3. See NAT'L GEOGRAPHIC, *supra* note 1.

4. U.S.C. § 101 (1976) provides: "Whoever 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."

5. The patentability of live microorganisms also raises questions of ethics, economics, science, and religion. For a general symposium of these and other related matters, including legal questions involved see AM. PAT. L.A.Q.J. 185-319 (1979).

6. *Diamond v. Chakrabarty*, 447 U.S. 303 (1980).

7. *Id.* at 305. Chakrabarty's microorganism is described as "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." *Id.*

8. Oil is composed of several component hydrocarbon compounds. Various bacteria have the capacity to degrade various components of oil, but each strain of bacteria can only degrade a single component. When several strains were mixed in earlier attempts at biological control of oil spills, the different strains exhibited inhibiting effects on each other leaving the oil spills largely intact. Chakrabarty developed a new microorganism that is able to degrade several different components of oil, thereby eliminating the inhibition effect that was present in the use of several bacteria strains, and increasing the viability of biological control of oil spills. See Respondent's Brief in Opposition to Petition for Writ of Certiorari at 2, *Diamond v. Chakrabarty*, 447 U.S. 303 (1980).

9. 447 U.S. at 306.

10. *Id.* By ruling that Chakrabarty's microorganism was a product of nature the patent examiner rendered his second objection superfluous. See text accompanying notes 22-27 *infra*.

11. Chakrabarty in fact first appealed his rejection to the Board of Appeals of the Patent and

"the fact that microorganisms are alive is a distinction without legal significance"¹² The Supreme Court granted certiorari to decide the statutory question whether Chakrabarty's invention was a "manufacture" or a "composition of matter" and thus patentable under 35 U.S.C. § 101.¹³ The Court held that Chakrabarty's microorganism was within the range of patentable subject matter under the statute.¹⁴

In 1790, Congress, in the exercise of its constitutional power, enacted the first patent laws.¹⁵ The purpose of the patent laws is to encourage scientific and technological progress by granting inventors exclusive rights to their inventions for a limited period of time.¹⁶ The first patent enactment defined patentable subject matter by listing broad categories of possible inventions.¹⁷ These statutory categories have remained substantially intact and are intended to be expansive.¹⁸ Because Congress rarely enacts specific exceptions to these categories,¹⁹ the criteria for determining patentable subject matter are largely determined by the courts.²⁰

Until *Chakrabarty* the courts had never explicitly addressed the patent-

Trademark Office which reversed the Examiner's holding that the claims are for products of nature, but affirmed the rejection on the basis that the patent was "drawn to a live organism." *In re Chakrabarty*, 571 F.2d 40, 42 (C.C.P.A. 1978). The CCPA reversed, holding that its decision in *In re Bergy*, 563 F.2d 1031 (C.C.P.A. 1977), controlled. 571 F.2d at 42. *In re Bergy* involved a patent claim for a "biologically pure culture" of a naturally occurring microorganism; the purified organism does not occur in nature. The *Bergy* court held that claims to microorganisms are not excluded from 35 U.S.C. § 101 because they are alive. Chakrabarty's case was procedurally intertwined with *Bergy*. The United States Supreme Court granted certiorari to *Bergy* and then vacated and remanded the case for further consideration in light of its decision in *Parker v. Flook*, 437 U.S. 584 (1978). 438 U.S. 902 (1979). The Chakrabarty writ of certiorari was dismissed by stipulation after the CCPA vacated its *Chakrabarty* ruling for reconsideration with *Bergy*. *In re Bergy*, 596 F.2d 952 (C.C.P.A. 1979). The CCPA affirmed its earlier decision. *Id.* A petition for certiorari was applied for and granted in both *Bergy* and *Chakrabarty*. *Bergy* cancelled his patent claim and his case was dismissed as moot. Brief for Respondent at 10, *Diamond v. Chakrabarty*, 447 U.S. 303 (1980).

12. 596 F.2d 952, 975.

13. 447 U.S. at 307. The categories of statutory subject matter are: 1) processes; 2) machines; 3) manufactures; 4) compositions of matter; 5) designs; 6) plants. *See* 35 U.S.C. §§ 101, 161, 171 (1954); *see generally* P. ROSENBERG, *PATENT LAW FUNDAMENTALS*, ch. 6 (2d ed. 1980). "Manufactures" are those articles which have been materially transformed by the manufacturing process. *Id.* at 6-16. "Compositions of matter" refers to the substances or materials themselves (chemical compounds or physical mixtures). *Id.* at 6-17.

14. 447 U.S. at 318.

15. Act of April 10, 1790, 1 Stat. 109. The Constitution gives Congress 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." U.S. CONST. art. I, § 8, cl. 8.

16. *Grant v. Raymond*, 31 U.S. (6 Pet.) 218, 241 (1832).

17. *See generally* P. ROSENBERG, *supra* note 13.

18. The legislative history of the 1952 recodification of the patent laws indicates that Congress intended statutory subject matter to "include anything under the sun that is made by man." S. REP. NO. 1979, 82nd Cong., 2d Sess. 5, *reprinted in* [1952] U.S. CODE CONG. & AD. NEWS 2394, 2399; H.R. REP. NO. 1923, 82d Cong., 2d Sess. 6, *reprinted in* [1952] U.S. CODE CONG. & AD. NEWS 2394, 2399.

19. For example, Congress has specifically excepted atomic weapons from patentability. *See* 42 U.S.C. § 2181 (1976).

20. For a discussion of the "judicial evolution" of the patent laws see *Graham v. John Deere Co.*, 383 U.S. 1 (1966).

bility of living matter per se.²¹ Patent claims on living objects traditionally were rejected because living objects fell into a judicially created class of non-patentable subject matter designated "products of nature."²² The "products of nature" classification is designed to clarify the distinction between objects invented or contrived by man and naturally occurring phenomena discovered by man. The assumption behind this distinction is that natural phenomena, known and unknown, are public property. Because a patent grants an inventor control over his invention, a patent should only be granted when the inventor's creativity changes the character of a natural object into a new and useful item that can properly be described as "man-made." Where the patent applicant merely provides new descriptions of, or prescriptions for, natural phenomena, without changing the character of that phenomena, his invention is labeled a "product of nature" and is unpatentable subject matter.²³ Thus the products of nature distinction excludes natural phenomena from patentable subject matter for two reasons: 1) a patent may not be granted where it will deprive the public of any previously enjoyed rights—even in unknown properties of the world, and 2) a patent upon naturally occurring phenomena would block further advances in the use of that phenomena.²⁴

*Funk Brothers Seed Co. v. Kalo Inoculant Co.*²⁵ provides a good example of the Court's application of the products of nature concept to bacteria. In *Funk*, the patentee discovered a more efficient means to employ certain strains of bacteria in the inoculation of leguminous plants. The Court declared the patent claim invalid because the bacteria was only "some of the handiwork of nature."²⁶ The Court stated that "[t]he 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."²⁷

21. The Patent Office routinely grants patents for "processes" using living organisms. To illustrate, a process using sodium may be patentable, but sodium itself is not. In fact, Chakrabarty's "process" claim was originally granted by the patent examiner. 447 U.S. at 306.

22. See Dunner & Lipsey, *The Patentability of Life Forms, New Technologies and Other Flocks of Nature*, 7 AM. PAT. L.A.Q.J. 190, 203 (1979).

23. In addition to the products of nature principle, the courts have rejected patents on living objects because claimants could not meet the rigid statutory requirement of complete description of the object to be patented. 35 U.S.C. § 112 (Supp. 1980). The difficulty of descriptions of microorganisms used in processes has been solved by a recent Patent Office procedure that allows a deposit of culture for public inspection in the Patent Office. The culture is accepted in lieu of a written description. See *In re Argoudelis*, 434 F.2d 1390 (C.C.P.A. 1970).

24. P. ROSENBERG, *supra* note 13, at § 1.04.

25. 333 U.S. 127 (1948).

26. *Id.* at 131.

27. *Id.* at 130. Another relevant example of the products of nature subject matter appears in *American Fruit Growers, Inc. v. Brogdex Co.*, 283 U.S. 1 (1931), in which the court held that a borax impregnated orange was unpatentable as a product of nature, stating that,

Addition of borax to the rind of natural fruit does not produce from the raw material an article for use which possesses a new or distinctive form, quality, or property There is no change in the name, appearance, or general character of the fruit. It remains as fresh orange fit only for the same beneficial uses as theretofore.

Id. at 11-12. See also *O'Reilly v. Morse*, 56 U.S. (15 How.) 62 (1853) (patent denied on electromagnetic forces used in telegraphic communication); *DeForest Radio Co. v. General Elec. Co.*, 283 U.S. 664, *modified*, 284 U.S. 571 (1931) (patent denied on purified tungsten produced by a

The 1930 Plant Patent Act, enacted by Congress to respond to contemporary advances in plant hybridization techniques, extended patent protection to certain asexually reproducing plants that previously had been regarded as products of nature.²⁸ The legislative history of the Act indicates that Congress hoped to provide the same incentive to agricultural inventors that industrial inventors enjoyed.²⁹ In 1970, Congress enacted the Plant Variety Protection Act which extended patent-like protection to sexually reproducing plants.³⁰ Although the Plant Variety Protection Act is not actually patent law, the protection provided under the statute closely parallels patent protection.³¹

The legislative history seems to indicate that Congress intended to classify certain hybrid plants as patentable subject matter on the grounds that the human element in their development justified describing those plants as made by humans "in aid of nature."³² If this was the case, the plant patent legislation was enacted as an exception to the products of nature doctrine. Because the legislative history does not specifically refer to the products of nature doctrine, however, it can be argued that Congress, quite apart from judicial interpretations, enacted the plant patent legislation as an exception to a general Congressional understanding that living matter was unpatentable simply because it was living. From this perspective, if Congress believed living matter was patentable, the plant patent legislation was superfluous.³³ This uncer-

novel procedure). *But see* Merck & Co. v. Olin Mathieson Chem. Corp., 253 F.2d 156 (4th Cir. 1958) (purified vitamin B₁₂ held patentable despite the fact that an impure form of the substance appears in nature).

The products of nature distinction can be problematic and confusing. In the first place, the bright line between products of nature and man-made products is illusory. All inventions are products of nature in the sense that natural materials must be molded in accordance with the laws of nature to produce any item. Moreover, the justification for separating the actions of human beings from the processes of the natural world is not clear; humans are inextricably a part of nature. Finally, the products of nature test, as applied by the courts, often bears no relation to the reasons for distinguishing between patentable and unpatentable subject matter. Patents cannot be granted where they will give inventors control over objects that have been freely used and enjoyed by the public; however, when inventors produce objects that have not existed in the world and have not been used and enjoyed by the public—e.g., purified bacteria innoculants in *Funk* and the borax impregnated oranges in *American Fruit Growers*—the products of nature distinction is misused. *See generally*, Dunner & Lipsey, *supra* note 22, at 208-09.

28. Act of May 23, 1930, ch. 312, 46 Stat. 376 (1930) (codified as amended at 35 U.S.C. §§ 161-64 (1954)). In 1889 the Commissioner of Patents held that claims to a component of the pine tree were not patentable. *Ex parte* Latimer, 1889 Dec. Com. Pat. 123. The *Latimer* case is cited as general precedent for the proposition that plants are products of nature and as such were unpatentable until the 1930 Plants Patent Act. 447 U.S. at 311-12.

29. *See, e.g.*, S. REP. NO. 315, 71st Cong., 2d Sess. 4 (1930); H.R. REP. NO. 1129, 71st Cong., 2d Sess. 4 (1930); *A Bill to Provide for Plant Patents: Hearings on H.R. 11372 Before the House Comm. on Patents*, 71st Cong., 2d Sess. 4 (1930).

30. Act of Dec. 24, 1970, tits. I-III, 84 Stat. 1542 (1970) (codified at 7 U.S.C. §§ 2321-2583 (1973)).

31. The Plant Variety Protection Act is administered by the Office of Plant Variety Protection, a division on the Department of Agriculture. Grants of protection under this statute are not called patents, but rather are designated Certificates of Plant Variety Protection. The protected breeder has rights to exclude others from a variety of actions regarding his innovation. *See* P. ROSENBERG, *supra* note 13, § 6.01(6), at 6-23 & 6-24.

32. *See* S. REP. NO. 315, 71st Cong., 2d Sess. 4 (1930); H.R. REP. NO. 1129, 71st Cong., 2d Sess. 4 (1930).

33. In objecting to Chakrabarty's claim, the Government took this position. Brief for Petitioner at 23-37, *Diamond v. Chakrabarty*, 447 U.S. 303 (1980). The Government cited two cases

tainty as to legislative intent is important in *Chakrabarty* because a Congressional understanding that living matter is unpatentable subject matter would weigh heavily against Chakrabarty's claim.

The importance of Congressional intent as an aid to patent law interpretation is best understood in light of the basic national policy against monopolies. Because a patent is a grant of limited monopoly, the Supreme Court, in *Deepsouth Packing Co. v. Laitram Corp.*,³⁴ adopted a policy that the patent laws should be strictly construed by the judiciary. In *Deepsouth*, the Court maintained that "a clear and certain signal from Congress" is a prerequisite to judicial expansion of the patent laws.³⁵ In *Parker v. Flook*,³⁶ a case the Court recognized as directly bearing on *Chakrabarty*,³⁷ the Court recognized that Congress is the governmental body that is best equipped to explore and handle the complex ramifications of patent law expansion. The *Flook* opinion held that the judiciary "must proceed cautiously when . . . asked to extend patent rights into areas wholly unforeseen by Congress."³⁸ In *Flook*, the Court denied the claim to a patent on a novel algorithm used in computers on the ground that mathematical formulae are nonpatentable subject matter.³⁹ *Flook* clearly represented the Court's adherence to the principle that expansion of the patent laws must come from the legislature, not the judiciary.⁴⁰

In deciding *Chakrabarty*, however, the Supreme Court began with a different approach to the determination of the patentability of live man-made microorganisms. Chief Justice Burger, writing for the majority, stressed the language of 35 U.S.C. § 101 as an indication of the statute's scope.⁴¹ The Court reasoned that if its task was to determine whether Chakrabarty's microorganism could properly be described as a "manufacture" or a "composition of matter" within the meaning of the statute,⁴² then it should look to the "ordinary, contemporary common meanings[s]" of these words.⁴³ In fact, the Court relied on dictionary definitions culled from previous cases interpreting the meaning of the words "manufacture" and "composition of matter."⁴⁴ The

to support its contention that the case law indicated that the courts assumed the unpatentability of living organisms: *Guaranty Trust Co. v. Union Solvents Corp.*, 54 F.2d 400 (3d Cir. 1931), *aff'd per curiam*, 61 F.2d 1041 (3d Cir. 1932), *cert. denied*, 288 U.S. 614 (1933) (in dicta, the court speculated that an application for patent on bacteria per se might be analyzed differently than a claim for a process using bacteria); *In re Mancy*, 499 F.2d 1289 (C.C.P.A. 1974) (the court assumed the claimant would be unable to obtain a patent on isolated bacteria per se because such bacteria would be a "product of nature").

34. 406 U.S. 518 (1972).

35. *Id.* at 531.

36. 437 U.S. 584 (1978).

37. See note 11 *supra*.

38. 437 U.S. at 596.

39. *Id.*

40. For a thorough discussion of *Parker v. Flook*, see Comment, *Computer Program Patentability—The C.C.P.A. Refuses to Follow the Lead of the Supreme Court in Parker v. Flook*, 58 N.C.L. REV. 319 (1980).

41. 447 U.S. at 308.

42. *Id.*

43. *Id.* (quoting *Perrin v. United States*, 444 U.S. 37, 42 (1979)).

44. The Court defined "manufacture" as "the production of articles for use from raw . . . materials by giving to these materials new forms, qualities, properties, or combinations, whether

Court emphasized that these words are modified in the statute by the word "any" and concluded: "In choosing such expansive terms as 'manufacture' and 'composition of matter,' modified by the comprehensive 'any,' Congress plainly contemplated that the patent laws would be given wide scope."⁴⁵ To support this conclusion, the Court provided a brief survey of the relevant legislative history to demonstrate the expansive nature of the statute defining patentable subject matter.⁴⁶

By stressing the comprehensiveness of 35 U.S.C. § 101, the Court attempted to avoid the argument that recognizing *Chakrabarty's* claim would expand the statute. The Court's decision is underpinned by the conclusion that the statute defining patentable subject matter fundamentally and necessarily is expansive in that Congress could not and did not intend to anticipate all possible invented subject matter.⁴⁷ Because the statute is all but open-ended, it follows that limitations on 35 U.S.C. § 101, in the form of specific exclusions of subject matter, should be provided by Congress. As Congress has not specifically excluded living matter per se from the scope of 35 U.S.C. § 101, the Court would not "read into the patent laws limitations and conditions which the legislature has not expressed."⁴⁸

Though the *Chakrabarty* Court based its decision on the all-inclusive nature of 35 U.S.C. § 101, it could not ignore the fact that the judiciary had placed limitations on patentable subject matter. Chief Justice Burger noted that "laws of nature, physical phenomena, and abstract ideas" have been excluded from patentable subject matter by previous courts.⁴⁹ The Court insisted that these limitations do not apply to *Chakrabarty's* microorganism, however, because it is a "nonnaturally occurring manufacture or composition of matter."⁵⁰ To illustrate this point the Court pointed to its language in *Funk Brothers Seed Co. v. Kalo Inoculant Co.*⁵¹ describing the patentee's bacteria as only some "handiwork of nature."⁵² In *Funk*, the patentee merely had created suitable conditions in which unaltered bacteria could perform their natural

by hand-labor or by machinery." 447 U.S. at 308. This definition appeared in *American Fruit Growers, Inc. v. Brogdex Co.*, 283 U.S. 1 (1931). The Court defined "composition of matter" to include "all compositions of two or more substances and . . . all composite articles, whether they be the results of chemical union, or of mechanical mixture, or whether they be gases, fluids, powders or solids, 447 U.S. at 308 (citing *Shell Dev. Co. v. Watson*, 149 F. Supp. 279, 280 (D.D.C. 1957) (citing 1 WALKER ON PATENTS § 14, at 55 (1st ed. Deller 1937))).

45. 447 U.S. 308.

46. *Id.* at 308-09. The Court reviewed the original Patent Act of 1793 as written by Thomas Jefferson which defined patentable subject matter as "any new and useful art, machine, manufacture or composition of matter, or any new and useful improvement [thereof]. . . ." Act of Feb. 21, 1793, ch. 11, § 1, 1 Stat. 318 (codified at 35 U.S.C. § 101 (1954)). The Court noted that subsequent patent statutes retained this expansive language. 447 U.S. at 309. The Court also cited the committee reports accompanying the 1952 recodification of the patent laws as evidence that Congress intended statutory subject matter to "include anything under the sun that is made by man." *Id.* See note 18 *supra*.

47. 447 U.S. at 316.

48. *Id.* at 308 (citing *United States v. Dubilier Condenser Corp.*, 289 U.S. 178, 199 (1933)).

49. 447 U.S. at 309. See notes 22-27 and accompanying text *supra*.

50. 447 U.S. at 309.

51. 333 U.S. 127, 131 (1948). See notes 24-25 and accompanying text *supra*.

52. 447 U.S. at 310.

function more efficiently; the bacteria themselves were not materially transformed by the patentee. Chakrabarty's microorganism differed in that "the patentee [had] produced a new bacterium with markedly different characteristics from any found in nature. . . ."53 In other words, Chakrabarty's microorganism was not a product of nature but a product of man.

Having relied on the broad scope and "plain meaning" of 35 U.S.C. § 101 as the basis for its decision, the Court turned to the Government's objections to Chakrabarty's claim.⁵⁴ The Court first considered the charge that the plant patent legislation indicated a congressional assumption that living matter was nonpatentable. The Court found the legislative history concerning the 1930 Plant Patent Act inconclusive on whether Congress actually focused on the patentability of living matter per se.⁵⁵ Furthermore, the Court argued that prior to the 1930 Act plants were treated as unpatentable subject matter because they fell into the products of nature category.⁵⁶ The 1930 Plant Patent Act was a specific legislative reaction to advances in plant breeding.⁵⁷ Plant breeders were developing species of plants that nature alone could not produce. Citing relevant legislative reports, the Court insisted that the 1930 Plant Patent Act was enacted as a specific exception to the exclusion of plants as products of nature rather than an exception to a general belief that living matter was unpatentable.⁵⁸ The Court concluded: "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."⁵⁹

The Court, however, failed to discuss an important inference from its interpretation of the history of the 1930 Plant Patent Act. The ability to create hybrid plants was perhaps the first instance when humans could scientifically alter the nature of living things.⁶⁰ Regardless of the underlying rationale, this technological mastery over the structure of living matter was assimilated into the patent laws only by express congressional decree. If Congress, rather than the courts, had to act to make hybrid plants patentable because they were no longer exclusively products of nature, it follows that other life forms that are no longer exclusively products of nature should be included in the range of patentable subject matter only by statute. By this reasoning, *Chakrabarty* overreaches the proper range of the Court's power.

53. *Id.*

54. *Id.*

55. *Id.* at 310-14. The Court maintained that "[n]o Committee or Member of Congress . . . expressed the broader view . . . that the terms 'manufacture' or 'composition of matter' exclude living things." *Id.* at 312.

56. 447 U.S. at 313.

57. See notes 28-29 and accompanying text *supra*.

58. 447 U.S. at 313.

59. *Id.*

60. Of course, men have been breeding animals and plants for centuries. This involved putting two creatures together and letting them reproduce. Techniques of hybridization, however, involve selecting and matching characteristics of plants that would not have occurred in nature. It is on this basis that Congress enacted the 1930 Plants Patent Act. See note 29 *supra*.

The Court, however, could argue that because Chakrabarty's invention was so novel, it was never within the product of nature classification. Unlike hybrid plants, Chakrabarty's organism never could have existed without human intervention in natural phenomena.⁶¹ Because the product of nature category is a judicial creation, it is certainly within the Court's power to determine its scope. Moreover, an examination of the products of nature doctrine shows that a rejection of Chakrabarty's organism was not justified on those grounds. First, Chakrabarty's invention never existed in nature, thus a patent granted on the invention would not deprive the public of rights it previously had enjoyed. Second, Chakrabarty's patent would not impede further advances in microbiology any more than patents on chemical innovations impede the progress of further chemical research.⁶² As the Court noted, its decision might affect the pace of genetic engineering but research in microbiology will proceed because of the nature of the scientific mind, and will do so with little regard for the state of the patent laws.⁶³

Although the policies behind the 1930 Plant Patent Act and the 1970 Plant Variety Protection Act were ostensibly the same, four dissenters in *Chakrabarty* placed considerable emphasis on the 1970 Act as an indication of congressional rejection of bacteria as patentable subject matter.⁶⁴ Justice Brennan, dissenting, stated: "The fact is that Congress, assuming that animate objects as to which it had not specifically legislated could not be patented, excluded bacteria from the set of patentable organisms."⁶⁵ There is no legislative history to support this contention.⁶⁶ Moreover, if Congress assumed that animate objects which had not been included specifically within the subject matter of the patent laws could not be patented, then a specific exclusion of bacteria would be unnecessary. In addition, the Plant Variety Protection Act is not a patent law, and thus only peripherally related to 35 U.S.C. § 101.⁶⁷ As the majority found, the exclusion of bacteria from plant variety protection merely shows that Congress did not consider bacteria to be plants.⁶⁸ The Act

61. See Kiley, *Learning to Live with the Living Invention*, 7 AM. PAT. L.A.Q.J. 220 (1979).

62. Patents can only be granted where the inventor has filed a complete description in the Patent Office. These descriptions are a matter of public record. Thus, while an inventor is granted a limited monopoly on his invention, he has sacrificed a potential trade secret. Moreover, because all scientific advancements grow out of earlier scientific work, the public description of a patented invention provides future inventors with fertile ground for future innovations and improvements.

63. 447 U.S. at 315.

64. *Id.* at 320-21 (Brennan, J., dissenting). The C.C.P.A. had already held that bacteria were not plants for the purposes of the 1930 Plant Patent Act. See *In re Arzberger*, 112 F.2d 834 (C.C.P.A. 1940).

65. *Id.*

66. The statute states: "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 . . ." 7 U.S.C. § 2402 (1976). There is no legislative history as to why bacteria are expressly excluded, but the most obvious inference is that Congress was merely following the reasoning of the court in *Arzberger*, i.e., bacteria are not plants. See note 64 *supra*.

67. There is slight support for the contention that because the Plant Variety Protection Act is similar to the Plant Patent Act, it should be interpreted as if it were patent law. See *Northcross v. Memphis Bd. of Educ.*, 412 U.S. 427, 428 (1973) (per curiam).

68. 447 U.S. at 314.

does not indicate that Congress intended to address the patentability of man-made live microorganisms per se.

The more difficult argument against including Chakrabarty's microorganism within the range of 35 U.S.C. § 101 is that such a ruling would expand the scope of the patent laws without express congressional authorization. Since man-made organisms did not exist before the last decade it cannot be denied that *Chakrabarty* extends patent protection to an area wholly unforeseen by Congress in the enactment of 35 U.S.C. § 101. It is equally true, however, that Congress cannot anticipate the entire realm of inventive subject matter. The question, therefore, is not whether there is an expansion of the patent laws, but whether that expansion is proper. In *Parker v. Flook*,⁶⁹ the Court urged caution in expanding the patent laws.⁷⁰ In *Chakrabarty*, the Court insisted that *Flook* did not stand for the proposition that inventions which were unanticipated by Congress are per se unpatentable.⁷¹ According to the Court, *Flook* merely denied a patent to a mathematical formula based on "principles underlying the prohibition against patents for 'ideas' or phenomena of nature."⁷² To allow patents only on inventions anticipated by Congress would be inconsistent with the basic requirement that patentable objects be entirely novel, *i.e.*, unanticipated.⁷³

The Supreme Court's reasoning in *Chakrabarty* relies mainly on the observation that there is nothing in the patent laws or their legislative history to indicate that Congress intended to exclude living organisms per se from the broad language defining patentable subject matter. Coupled with this observation is the contention that the words "manufacture" and "composition of matter" are unambiguous and can be used in their "ordinary contemporary meaning" to describe Chakrabarty's microorganism. It can be argued, however, that the words "manufacture" and "composition of matter" are not ordinarily used to refer to living things. The idea that one can "manufacture" a life form is certainly novel, and though "composition of matter" can be used to describe any object whatsoever, scientists and laymen generally concur that living matter is unique matter because it is alive.⁷⁴ Thus the use of the words "manufacture" and "composition of matter" to describe a living organism stretches the meanings of those words far beyond common usage and, a fortiori, beyond congressional usage. Because the words "manufacture" and "composition of matter" must be forced into an uncustomary usage to describe live microorganisms, the Court should have focused its analysis on why Congress *intended* 35 U.S.C. § 101 to apply to living matter. Absent a showing of direct congressional intent, the prescription for judicial caution enunciated in

69. 437 U.S. 584 (1978).

70. *Id.* at 596.

71. 447 U.S. at 315.

72. *Id.*

73. *Id.* at 316.

74. See Luckern & Hesseltine, *Living Organisms Are Not Compositions or Manufactures Under 35 U.S.C. 101*, 7 AM. PAT. L.A.Q.J. 236, 250 (1979); see also Note, *The Patentability of Living Organisms Under 35 U.S.C. § 101: In re Bergy*, 91 HARV. L. REV. 1357, 1361 (1978).

Parker v. Flook should control and preclude an expansion of 35 U.S.C. § 101 to an area that undeniably was "wholly unforeseen by Congress."⁷⁵

In a broad sense, the idea of granting patents on life forms per se raises serious extra-legal questions. The Government argued that Congress is the best forum for investigating the economic, social, and scientific ramifications of extending the scope of 35 U.S.C. § 101 to man-made microorganisms.⁷⁶ Congress not only has a greater capacity for inquiry in depth than the judiciary but it also can act upon its particular findings by precisely tailoring its legislation to meet particular objectives.⁷⁷ While the Court agreed with this general proposition, it argued it was merely exercising its power to interpret a statute passed by Congress.⁷⁸ The Court saw no ambiguities in 35 U.S.C. § 101 and maintained that its broad construction of the language of the statute was commensurate with the purpose of the statute.⁷⁹ The Court also converted the Government's argument to its own use by rejecting suggestions that a grant of a patent to a live, man-made organism is contrary to public policy.⁸⁰ That, the court replied, is a matter for Congress to decide because the legislature is the proper arena for decisions of "high policy."⁸¹ Obviously, if Congress found the grant of patents to live, man-made microorganisms to be against public policy, Congress could enact specific legislation excluding living matter from the scope of patentable subject matter.⁸²

The *Chakrabarty* decision will have a positive effect on the application of microbiological techniques to the advantage of industry. Industrial investors will be more willing to commit resources to the development of useful, man-made microorganisms when their investment may result in a limited monopoly on a microorganism that is much in demand. *Chakrabarty* will also increase dissemination of scientific knowledge because the results of microbiological breakthroughs will be filed in the Patent Office as public information rather than being concealed as trade secrets. Although the *Chakrabarty* Court was correct in assuming that research into the basic structures of life would proceed regardless of the state of patent law, it was incorrect in assuming that *Chakrabarty* will affect only the pace of future research.⁸³ *Chakrabarty* will also affect genetic research qualitatively. There will be more research into man-made microorganisms which can produce a profit for investors. If there are risks inherent in genetic engineering, the risks will increase with the amount of industrial development and use of live man-made microorganisms. There will also be greater possibilities for microbiological innovations that will generally benefit mankind, as *Chakrabarty's* inven-

75. 437 U.S. 584, 596 (1978).

76. See Brief for Petitioner, at 10, *Diamond v. Chakrabarty*, 447 U.S. 303 (1980).

77. *Id.* Congress might extend protection to certain live, man-made microorganisms without extending protection to living organisms in general.

78. 447 U.S. at 315.

79. *Id.*

80. *Id.* at 317.

81. *Id.*

82. *Id.* at 318.

83. *Id.* at 316-17.

tion undoubtedly will. In a single action, *Chakrabarty* opens the door to the possible risks and benefits of industrial utilization of genetically engineered microorganisms. *Chakrabarty* could not, and did not, fully address these complex issues. A more detailed investigation of these matters should take place in Congress.

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