447 U.S. 303, 65 L.Ed.2d 144

Sidney A. DIAMOND, Commissioner of Patents and Trademarks, Petitioner,

v.

Ananda M. CHAKRABARTY et al.

No. 79-136.

Argued March 17, 1980.

Decided June 16, 1980.

The United States Court of Customs and Patent Appeals, Rich, J., 571 F.2d 40, ruled that claims were not outside the scope of patentable inventions merely because they were drawn to "live organisms." On reconsideration, the United States Court of Customs and Patent Appeals, Rich, J., 596 F.2d 952, reaffirmed its earlier judgment. On certiorari, the Supreme Court, Mr. Chief Justice Burger, held that a live, human-made microorganism is patentable subject matter under statute providing for issuance of patent to a person who invents or discovers "any" new or useful "manufacture" or "composition of matter."

Affirmed.

Mr. Justice Brennan dissented and filed opinion in which Mr. Justice White, Mr. Justice Marshall and Mr. Justice Powell joined.

1. Patents ⇐6

Laws of nature, physical phenomena, and abstract ideas are not patentable. 35 U.S.C.A. § 101.

2. Patents ⇐5

A new mineral discovered in the earth or a new plant found in the wild is not patentable subject matter. 35 U.S.C.A. § 101.

3. Patents ⇐14

A live, human-made microorganism is patentable subject matter under statute providing for issuance of patent to a person who invents or discovers "any" new and useful "manufacture" or "composition of matter." 35 U.S.C.A. § 101.

4. Patents ⇐14

Human-made, genetically engineered bacterium capable of breaking down multiple components of crude oil constituted a new and useful "manufacture" or "composition of matter" within meaning of patent statute. 35 U.S.C.A. § 101.

See publication Words and Phrases for other judicial constructions and definitions.

5. Patents ⇐14

Enactment of 1930 Plant Patent Act, which afforded patent protection to certain asexually reproduced plants, and 1970 Plant Variety Plant Protection Act, which authorized patents for certain sexually reproduced plants but excluded bacteria from its protection, did not preclude patentability of live, human-made microorganism. 35 U.S.C.A. §§ 101, 161; Plant Variety Protection Act, § 42(a), 7 U.S.C.A. § 2402(a).

6. Constitutional Law ⇐70.1(7)

Congress, not the courts, must define the limits of patentability.

7. Constitutional Law ⇐70.1(2)

Once Congress has spoken it is the province and duty of the judicial department to say what the law is.

8. Statutes ⇐190

Broad general language of statute is not necessarily ambiguous where congressional objectives require broad terms.

9. Patents ⇐3

Congress is free to amend patent statute so as to exclude from patent protection organisms produced by genetic engineering. 35 U.S.C.A. § 101.

Syllabus *

Title 35 U.S.C. § 101 provides for the issuance of a patent to a person who in-

* The syllabus constitutes no part of the opinion of the Court but has been prepared by the Reporter of Decisions for the convenience of the reader. See *United States v. Detroit Lum-*

vents or discovers "any" new and useful "manufacture" or "composition of matter." Respondent filed a patent application relating to his invention of a human-made, genetically engineered bacterium capable of breaking down crude oil, a property which is possessed by no naturally occurring bacteria. A patent examiner's rejection of the patent application's claims for the new bacteria was affirmed by the Patent Office Board of Appeals on the ground that living things are not patentable subject matter under § 101. The Court of Customs and Patent Appeals reversed, concluding that the fact that micro-organisms are alive is without legal significance for purposes of the patent law.

Held: A live, human-made micro-organism is patentable subject matter under § 101. Respondent's micro-organism constitutes a "manufacture" or "composition of matter" within that statute. Pp. 2207–2212.

(a) In choosing such expansive terms as "manufacture" and "composition of matter," modified by the comprehensive "any," Congress contemplated that the patent laws should be given wide scope, and the relevant legislative history also supports a broad construction. While laws of nature, physical phenomena, and abstract ideas are not patentable, respondent's claim is not to a 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." *Hartranft v. Wiegmann*, 121 U.S. 609, 615, 7 S.Ct. 1240, 1243, 30 L.Ed. 1012; *Funk Brothers Seed Co. v. Kalo Inoculant Co.*, 333 U.S. 127, 68 S.Ct. 440, 92 L.Ed. 588, distinguished. Pp. 2207–2208.

(b) The passage of the 1930 Plant Patent Act, which afforded patent protection to certain asexually reproduced plants, and the 1970 Plant Variety Protection Act, which authorized protection for certain sexually reproduced plants but excluded bacteria from its protection, does not evidence congressional understanding that the terms "manufacture" or "composition of matter" in § 101 do not include living things. Pp. 2208–2210.

1304 (c) Nor does the fact that genetic technology was unforeseen when Congress enacted § 101 require the conclusion that micro-organisms cannot qualify as patentable subject matter until Congress expressly authorizes such protection. The unambiguous language of § 101 fairly embraces respondent's invention. Arguments against patentability under § 101, based on potential hazards that may be generated by genetic research, should be addressed to the Congress and the Executive, not to the Judiciary. Pp. 2210–2212.

596 F.2d 952, affirmed.

Lawrence G. Wallace, Washington, D. C., for petitioner.

Edward F. McKie, Jr., Washington, D. C., for respondent.

1305 Mr. Chief Justice BURGER delivered the opinion of the Court.

We granted certiorari to determine whether a live, human-made micro-organism is patentable subject matter under 35 U.S.C. § 101.

I

In 1972, respondent Chakrabarty, a microbiologist, filed a patent application, assigned to the General Electric Co. The application asserted 36 claims related to Chakrabarty's invention of "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." [1] This human-made, genetically

ber Co., 200 U.S. 321, 337, 26 S.Ct. 282, 287, 50 L.Ed. 499.

1. Plasmids are hereditary units physically separate from the chromosomes of the cell. In prior research, Chakrabarty and an associate discovered that plasmids control the oil degra-

engineered bacterium is capable of breaking down multiple components of crude oil. Because of this property, which is possessed by no naturally occurring bacteria, Chakrabarty's invention is believed to have significant value for the treatment of oil spills.[2]

Chakrabarty's patent claims were of three types: first, process claims for the [306] method of producing the bacteria; second, claims for an inoculum comprised of a carrier material floating on water, such as straw, and the new bacteria; and third, claims to the bacteria themselves. The patent examiner allowed the claims falling into the first two categories, but rejected claims for the bacteria. His decision rested on two grounds: (1) that micro-organisms are "products of nature," and (2) that as living things they are not patentable subject matter under 35 U.S.C. § 101.

Chakrabarty appealed the rejection of these claims to the Patent Office Board of Appeals, and the Board affirmed the Examiner on the second ground.[3] Relying on the legislative history of the 1930 Plant Patent Act, in which Congress extended patent protection to certain asexually reproduced plants, the Board concluded that § 101 was not intended to cover living things such as these laboratory created micro-organisms.

The Court of Customs and Patent Appeals, by a divided vote, reversed on the authority of its prior decision in *In re Bergy*, 563 F.2d 1031, 1038 (1977), which held that "the fact that microorganisms . . . are alive . . . [is] without legal significance" for purposes of the patent law.[4] Subsequently, we granted the Acting Commissioner of Patents and Trademarks' petition for certiorari in *Bergy*, vacated the judgment, and remanded the case "for further consideration in light of *Parker v. Flook*, 437 U.S. 584, [98 S.Ct. 2522, 57 L.Ed.2d 451] (1978)." 438 U.S. 902, 98 S.Ct. 3119, 57 L.Ed.2d 1145 (1978). The Court of Customs and Patent Appeals then vacated its judgment in *Chakrabarty* and consolidated the case with *Bergy* for reconsideration. After re-examining both cases in the light of our holding in *Flook*, that court, with one dissent, reaffirmed its earlier judgments. 596 F.2d 952 (1979).

[307] The Commissioner of Patents and Trademarks again sought certiorari, and we granted the writ as to both *Bergy* and *Chakrabarty*. 444 U.S. 924, 100 S.Ct. 261, 62 L.Ed.2d 180 (1979). Since then, *Bergy* has been dismissed as moot, 444 U.S. 1028, 100 S.Ct. 696, 62 L.Ed.2d 664 (1980), leaving only *Chakrabarty* for decision.

II

The Constitution grants Congress broad power to legislate to "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." Art. I, § 8, cl. 8. The patent laws promote this progress by offering inventors exclusive rights for a limited period as an incentive for their inventive-

dation abilities of certain bacteria. In particular, the two researchers discovered plasmids capable of degrading camphor and octane, two components of crude oil. In the work represented by the patent application at issue here, Chakrabarty discovered a process by which four different plasmids, capable of degrading four different oil components, could be transferred to and maintained stably in a single *Pseudomonas* bacterium, which itself has no capacity for degrading oil.

2. At present, biological control of oil spills requires the use of a mixture of naturally occurring bacteria, each capable of degrading one component of the oil complex. In this way, oil is decomposed into simpler substances which can serve as food for aquatic life. However, for various reasons, only a portion of any such mixed culture survives to attack the oil spill. By breaking down multiple components of oil, Chakrabarty's micro-organism promises more efficient and rapid oil-spill control.

3. The Board concluded that the new bacteria were not "products of nature," because *Pseudomonas* bacteria containing two or more different energy-generating plasmids are not naturally occurring.

4. *Bergy* involved a patent application for a pure culture of the micro-organism *Streptomyces vellosus* found to be useful in the production of lincomycin, an antibiotic.

ness and research efforts. *Kewanee Oil Co. v. Bicron Corp.*, 416 U.S. 470, 480–481, 94 S.Ct. 1879, 1885–1886, 40 L.Ed.2d 315 (1974); *Universal Oil Co. v. Globe Co.*, 322 U.S. 471, 484, 64 S.Ct. 1110, 1116, 88 L.Ed. 1399 (1944). The authority of Congress is exercised in the hope that "[t]he productive effort thereby fostered will have a positive effect on society through the introduction of new products and processes of manufacture into the economy, and the emanations by way of increased employment and better lives for our citizens." *Kewanee, supra*, 416 U.S., at 480, 94 S.Ct., at 1885–86.

The question before us in this case is a narrow one of statutory interpretation requiring us to construe 35 U.S.C. § 101, which 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."

Specifically, we must determine whether respondent's micro-organism constitutes a "manufacture" or "composition of matter" within the meaning of the statute.[5]

[308] III

In cases of statutory construction we begin, of course, with the language of the statute. *Southeastern Community College v. Davis*, 442 U.S. 397, 405, 99 S.Ct. 2361, 2366, 60 L.Ed.2d 980 (1979). And "unless otherwise defined, words will be interpreted as taking their ordinary, contemporary common meaning." *Perrin v. United States*, 444 U.S. 37, 42, 100 S.Ct. 311, 314, 62 L.Ed.2d 199 (1979). We have also cautioned that courts "should not read into the patent laws limitations and conditions which the legislature has not expressed." *United States v. Dubilier Condenser Corp.*, 289 U.S. 178, 199, 53 S.Ct. 554, 561, 77 L.Ed. 1114 (1933).

Guided by these canons of construction, this Court has read the term "manufacture" in § 101 in accordance with its dictionary definition to mean "the production of articles for use from raw or prepared materials by giving to these materials new forms, qualities, properties, or combinations, whether by hand-labor or by machinery." *American Fruit Growers, Inc. v. Brogdex Co.*, 283 U.S. 1, 11, 51 S.Ct. 328, 330, 75 L.Ed. 801 (1931). Similarly, "composition of matter" has been construed consistent with its common usage 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." *Shell Development Co. v. Watson*, 149 F.Supp. 279, 280 (D.C.1957) (citing 1 A. Deller, Walker on Patents § 14, p. 55 (1st ed. 1937)). 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.

The relevant legislative history also supports a broad construction. The Patent Act of 1793, authored by Thomas Jefferson, defined statutory subject matter as "any new and useful art, machine, manufacture, or composition of matter, or any new or useful improvement [thereof]." Act of Feb. 21, 1793, § 1, 1 Stat. 319. The Act embodied Jefferson's philosophy that "ingenuity should receive a liberal encouragement." [5] [309] Writings of Thomas Jefferson 75–76 (Washington ed. 1871). See *Graham v. John Deere Co.*, 383 U.S. 1, 7–10, 86 S.Ct. 684, 688–690, 15 L.Ed.2d 545 (1966). Subsequent patent statutes in 1836, 1870, and 1874 employed this same broad language. In 1952, when the patent laws were recodified, Congress replaced the word "art" with "process," but otherwise left Jefferson's language intact. The Committee Reports accompanying the 1952 Act inform us that Congress intended statutory subject matter

5. This case does not involve the other "conditions and requirements" of the patent laws, such as novelty and nonobviousness. 35 U.S.C. §§ 102, 103.

to "include anything under the sun that is made by man." S.Rep.No.1979, 82d Cong., 2d Sess., 5 (1952); H.R.Rep.No.1923, 82d Cong., 2d Sess., 6 (1952).[6]

[1, 2] This is not to suggest that § 101 has no limits or that it embraces every discovery. The laws of nature, physical phenomena, and abstract ideas have been held not patentable. See *Parker v. Flook*, 437 U.S. 584, 98 S.Ct. 2522, 57 L.Ed.2d 451 (1978); *Gottschalk v. Benson*, 409 U.S. 63, 67, 93 S.Ct. 253, 255, 34 L.Ed.2d 273 (1972); *Funk Brothers Seed Co. v. Kalo Inoculant Co.*, 333 U.S. 127, 130, 68 S.Ct. 440, 441, 92 L.Ed. 588 (1948); *O'Reilly v. Morse*, 15 How. 62, 112–121, 14 L.Ed. 601 (1854); *Le Roy v. Tatham*, 14 How. 156, 175, 14 L.Ed. 367 (1853). Thus, a new mineral discovered in the earth or a new plant found in the wild is not patentable subject matter. Likewise, Einstein could not patent his celebrated law that $E=mc^2$; nor could Newton have patented the law of gravity. Such discoveries are "manifestations of . . . nature, free to all men and reserved exclusively to none." *Funk, supra*, 333 U.S., at 130, 68 S.Ct., at 441.

[3, 4] Judged in this light, respondent's micro-organism plainly qualifies as patentable subject matter. His claim is not to a 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." *Hartranft v. Wiegmann*, 121 U.S. 609, 615, 7 S.Ct. 1240, 1243, 30 L.Ed. 1012 (1887). The point is underscored dramatically by comparison of the invention here with that in *Funk*. There, the patentee had discovered that there existed in nature certain species of root-nodule bacteria which did not exert a mutually inhibitive effect on each other. He used that discovery to produce a mixed culture capable of inoculating the seeds of leguminous plants. Concluding that the patentee had discovered "only some of the handiwork of nature," the Court ruled the product nonpatentable:

> "Each of the species of root-nodule bacteria contained in the package infects the same group of leguminous plants which it always infected. No species acquires a different use. The combination of species produces no new bacteria, no change in the six species of bacteria, and no enlargement of the range of their utility. Each species has the same effect it always had. The bacteria perform in their natural way. Their use in combination does not improve in any way their natural functioning. They serve the ends nature originally provided and act quite independently of any effort of the patentee." 333 U.S., at 131, 68 S.Ct., at 442.

Here, by contrast, the patentee has produced a new bacterium with markedly different characteristics from any found in nature and one having the potential for significant utility. His discovery is not nature's handiwork, but his own; accordingly it is patentable subject matter under § 101.

IV

Two contrary arguments are advanced, neither of which we find persuasive.

(A)

The petitioner's first argument rests on the enactment of the 1930 Plant Patent Act, which afforded patent protection to certain asexually reproduced plants, and the 1970 Plant Variety Protection Act, which authorized protection for certain sexually reproduced plants but excluded bacteria from its protection.[7] In the petitioner's

6. This same language was employed by P. J. Federico, a principal draftsman of the 1952 recodification, in his testimony regarding that legislation: "[U]nder section 101 a person may have invented a machine or a manufacture, which may include anything under the sun that is made by man. . . . " Hearings on H.R. 3760 before Subcommittee No. 3 of the House Committee on the Judiciary, 82d Cong., 1st Sess., 37 (1951).

7. The Plant Patent Act of 1930, 35 U.S.C. § 161, provides in relevant part:

> "Whoever invents or discovers and asexually reproduces any distinct and new variety of plant, including cultivated sports, mutants, hy-

view, the passage of these Acts evidences congressional understanding that the terms "manufacture" or "composition of matter" do not include living things; if they did, the petitioner argues, neither Act would have been necessary.

We reject this argument. Prior to 1930, two factors were thought to remove plants from patent protection. The first was the belief that plants, even those artificially bred, were products of nature for purposes of the patent law. This position appears to have derived from the decision of the patent office in *Ex parte Latimer*, 1889 Dec. Com.Pat. 123, in which a patent claim for fiber found in the needle of the *Pinus australis* was rejected. The Commissioner reasoned that a contrary result would permit "patents [to] be obtained upon the trees of the forest and the plants of the earth, which of course would be unreasonable and impossible." *Id.*, at 126. The *Latimer* case, it seems, came to "se[t] forth the general stand taken in these matters" that plants were natural products not subject to patent protection. Thorne, Relation of Patent Law to Natural Products, 6 J. Pat.Off.Soc. [312] 23, 24 (1923).[8] The second obstacle to patent protection for plants was the fact that plants were thought not amenable to the "written description" requirement of the patent law. See 35 U.S.C. § 112. Because new plants may differ from old only in color or perfume, differentiation by written description was often impossible. See Hearings on H.R.11372 before the House Committee on Patents, 71st Cong., 2d Sess. 7 (1930) (memorandum of Patent Commissioner Robertson).

In enacting the Plant Patent Act, Congress addressed both of these concerns. It explained at length its belief that the work of the plant breeder "in aid of nature" was patentable invention. S.Rep.No.315, 71st Cong., 2d Sess., 6–8 (1930); H.R.Rep.No. 1129, 71st Cong., 2d Sess., 7–9 (1930). And it relaxed the written description requirement in favor of "a description . . . as complete as is reasonably possible." 35 U.S.C. § 162. No Committee or Member of Congress, however, expressed the broader view, now urged by the petitioner, that the terms "manufacture" or "composition of matter" exclude living things. The sole support for that position in the legislative history of the 1930 Act is found in the conclusory statement of Secretary of Agriculture Hyde, in a letter to the Chairmen of the House and Senate Committees considering the 1930 Act, that "the patent laws . . . at the present time are understood to cover only inventions or discoveries in the field of inanimate nature." See S.Rep.No.315, *supra*, at Appendix A; H.R. Rep.No.1129, *supra*, at Appendix A. Secretary Hyde's opinion, however, is not entitled to controlling weight. His views were solicited on the administration of the new law and not on the scope of patentable [313] subject matter—an area beyond his competence. Moreover, there is language in the House and Senate Committee Reports suggesting that to the extent Congress considered the matter it found the Secretary's dichotomy unpersuasive. The Reports observe:

brids, and newly found seedlings, other than a tuber propogated plant or a plant found in an uncultivated state, may obtain a patent therefor . . . ."

The Plant Variety Protection Act of 1970, provides 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 . . . ." 84 Stat. 1547, 7 U.S.C. § 2402(a).

See generally, 3 A. Deller, Walker on Patents, ch. IX (2d ed. 1964); R. Allyn, The First Plant Patents (1934).

8. Writing three years after the passage of the 1930 Act, R. Cook, Editor of the Journal of Heredity, commented: "It is a little hard for plant men to understand why [Art. I, § 8] of the Constitution should not have been earlier construed to include the promotion of the art of plant breeding. The reason for this is probably to be found in the principle that natural products are not patentable." Florists Exchange and Horticultural Trade World, July 15, 1933, p. 9.

"There is a clear and logical distinction *between the discovery of a new variety of plant and of certain inanimate things*, such, for example, as a new and useful natural mineral. The mineral is created wholly by nature unassisted by man. . . . On the other hand, a plant discovery resulting from cultivation is unique, isolated, and is not repeated by nature, nor can it be reproduced by nature unaided by man. . . . " S.Rep.No.315, *supra*, at 6; H.R.Rep.No.1129, *supra*, at 7 (emphasis added).

Congress thus 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. Here, respondent's micro-organism is the result of human ingenuity and research. Hence, the passage of the Plant Patent Act affords the Government no support.

Nor does the passage of the 1970 Plant Variety Protection Act support the Government's position. As the Government acknowledges, sexually reproduced plants were not included under the 1930 Act because new varieties could not be reproduced true-to-type through seedlings. Brief for Petitioner 27, n. 31. By 1970, however, it was generally recognized that true-to-type reproduction was possible and that plant patent protection was therefore appropriate. The 1970 Act extended that protection. There is nothing in its language or history to suggest that it was enacted because § 101 did not include living things.

[5] In particular, we find nothing in the exclusion of bacteria from plant variety protection to support the petitioner's position. See n. 7, *supra*. The legislative history gives no reason for this exclusion. As
314 the Court of Customs and Patent Appeals suggested, it may simply reflect congressional agreement with the result reached by that court in deciding *In re Arzberger*, 27 C.C.P.A. (Pat.) 1315, 112 F.2d 834 (1940), which held that bacteria were not plants for the purposes of the 1930 Act. Or it may reflect the fact that prior to 1970 the Patent Office had issued patents for bacteria under § 101.[9] In any event, absent some clear indication that Congress "focused on [the] issues . . . directly related to the one presently before the Court," *SEC v. Sloan*, 436 U.S. 103, 120–121, 98 S.Ct. 1702, 1713, 56 L.Ed.2d 148 (1978), there is no basis for reading into its actions an intent to modify the plain meaning of the words found in § 101. See *TVA v. Hill*, 437 U.S. 153, 189–193, 98 S.Ct. 2279, 2299–2301, 57 L.Ed.2d 117 (1978); *United States v. Price*, 361 U.S. 304, 313, 80 S.Ct. 326, 331, 4 L.Ed.2d 334 (1960).

(B)

The petitioner's second argument is that micro-organisms cannot qualify as patentable subject matter until Congress expressly authorizes such protection. His position rests on the fact that genetic technology was unforeseen when Congress enacted § 101. From this it is argued that resolution of the patentability of inventions such as respondent's should be left to Congress. The legislative process, the petitioner argues, is best equipped to weigh the competing economic, social, and scientific considerations involved, and to determine whether living organisms produced by genetic engineering should receive patent protection. In support of this position, the petitioner relies on our recent holding in *Parker v. Flook*, 437 U.S. 584, 98 S.Ct. 2522, 57 L.Ed.2d 451 (1978), and the statement that the judiciary "must proceed cautiously when . . . asked to extend patent 315 rights into areas wholly unforeseen by Congress." *Id.*, at 596, 98 S.Ct. at 2529.

9. In 1873, the Patent Office granted Louis Pasteur a patent on "yeast, free from organic germs of disease, as an article of manufacture." And in 1967 and 1968, immediately prior to the passage of the Plant Variety Protection Act, that Office granted two patents which, as the petitioner concedes, state claims for living micro-organisms. See Reply Brief for Petitioner 3, and n. 2.

[6–8] It is, of course, correct that Congress, not the courts, must define the limits of patentability; but it is equally true that once Congress has spoken it is "the province and duty of the judicial department to say what the law is." *Marbury v. Madison*, 1 Cranch 137, 177, 2 L.Ed. 60 (1803). Congress has performed its constitutional role in defining patentable subject matter in § 101; we perform ours in construing the language Congress has employed. In so doing, our obligation is to take statutes as we find them, guided, if ambiguity appears, by the legislative history and statutory purpose. Here, we perceive no ambiguity. The subject-matter provisions of the patent law have been cast in broad terms to fulfill the constitutional and statutory goal of promoting "the Progress of Science and the useful Arts" with all that means for the social and economic benefits envisioned by Jefferson. Broad general language is not necessarily ambiguous when congressional objectives require broad terms.

Nothing in *Flook* is to the contrary. That case applied our prior precedents to determine that a "claim for an improved method of calculation, even when tied to a specific end use, is unpatentable subject matter under § 101." 437 U.S., at 595, n. 18, 98 S.Ct., at 2528, n. 18. The Court carefully scrutinized the claim at issue to determine whether it was precluded from patent protection under "the principles underlying the prohibition against patents for 'ideas' or phenomena of nature." *Id.*, at 593, 98 S.Ct. at 2527. We have done that here. *Flook* did not announce a new principle that inventions in areas not contemplated by Congress when the patent laws were enacted are unpatentable *per se*.

To read that concept into *Flook* would frustrate the purposes of the patent law. This Court frequently has observed that a statute is not to be confined to the "particular application[s] . . . contemplated by the legislators." *Barr v. United States*, 324 U.S. 83, 90, 65 S.Ct. 522, 525, 89 L.Ed. 765 (1945). Accord, *Browder v. United States*, 312 U.S. 335, 339, 61 S.Ct. 599, 601, 85 L.Ed. 862 (1941); *Puerto Rico v. Shell Co.*, 302 U.S. 253, 257, 58 S.Ct. 167, 169, 82 L.Ed. 235 (1937). This is especially true in the field of patent law. A rule that unanticipated inventions are without protection would conflict with the core concept of the patent law that anticipation undermines patentability. See *Graham v. John Deere Co.*, 383 U.S., at 12–17, 86 S.Ct., at 691–693. Mr. Justice Douglas reminded that the inventions most benefiting mankind are those that "push back the frontiers of chemistry, physics, and the like." *Great A. & P. Tea Co. v. Supermarket Corp.*, 340 U.S. 147, 154, 71 S.Ct. 127, 131, 95 L.Ed. 162 (1950) (concurring opinion). Congress employed broad general language in drafting § 101 precisely because such inventions are often unforeseeable.[10]

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To buttress his argument, the petitioner, with the support of *amicus*, points to grave risks that may be generated by research endeavors such as respondent's. The briefs present a gruesome parade of horribles. Scientists, among them Nobel laureates, are quoted suggesting that genetic research may pose a serious threat to the human race, or, at the very least, that the dangers are far too substantial to permit such research to proceed apace at this time. We are told that genetic research and related technological developments may spread pollution and disease, that it may result in a loss of genetic diversity, and that its practice may tend to depreciate the value of human life. These arguments are forcefully, even passionately, presented; they remind us that, at times, human ingenuity seems unable to control fully the forces it creates—that with Hamlet, it is sometimes

10. Even an abbreviated list of patented inventions underscores the point: telegraph (Morse, No. 1,647); telephone (Bell, No. 174,465); electric lamp (Edison, No. 223,898); airplane (the Wrights, No. 821,393); transistor (Bardeen & Brattain, No. 2,524,035); neutronic reactor (Fermi & Szilard, No. 2,708,656); laser (Schawlow & Townes, No. 2,929,922). See generally Revolutionary Ideas, Patents & Progress in America, United States Patent and Trademark Office (1976).

better "to bear those ills we have than fly to others that we know not of."

It is argued that this Court should weigh these potential hazards in considering
[317] whether respondent's invention is [patentable subject matter under § 101. We disagree. The grant or denial of patents on micro-organisms is not likely to put an end to genetic research or to its attendant risks. The large amount of research that has already occurred when no researcher had sure knowledge that patent protection would be available suggests that legislative or judicial fiat as to patentability will not deter the scientific mind from probing into the unknown any more than Canute could command the tides. Whether respondent's claims are patentable may determine whether research efforts are accelerated by the hope of reward or slowed by want of incentives, but that is all.

[9] What is more important is that we are without competence to entertain these arguments—either to brush them aside as fantasies generated by fear of the unknown, or to act on them. The choice we are urged to make is a matter of high policy for resolution within the legislative process after the kind of investigation, examination, and study that legislative bodies can provide and courts cannot. That process involves the balancing of competing values and interests, which in our democratic system is the business of elected representatives. Whatever their validity, the contentions now pressed on us should be addressed to the political branches of the Government, the Congress and the Executive, and not to the courts.[11]

[318] We have emphasized in the recent past that "[o]ur individual appraisal of the wisdom or unwisdom of a particular [legislative] course . . . is to be put aside in the process of interpreting a statute." *TVA v. Hill*, 437 U.S., at 194, 98 S.Ct., at 2302. Our task, rather, is the narrow one of determining what Congress meant by the words it used in the statute; once that is done our powers are exhausted. Congress is free to amend § 101 so as to exclude from patent protection organisms produced by genetic engineering. Cf. 42 U.S.C. § 2181(a), exempting from patent protection inventions "useful solely in the utilization of special nuclear material or atomic energy in an atomic weapon." Or it may chose to craft a statute specifically designed for such living things. But, until Congress takes such action, this Court must construe the language of § 101 as it is. The language of that section fairly embraces respondent's invention.

Accordingly, the judgment of the Court of Customs and Patent Appeals is

Affirmed.

Mr. Justice BRENNAN, with whom Mr. Justice WHITE, Mr. Justice MARSHALL, and Mr. Justice POWELL join, dissenting.

I agree with the Court that the question before us is a narrow one. Neither the future of scientific research, nor even, the ability of respondent Chakrabarty to reap some monopoly profits from his pioneering work, is at stake. Patents on the processes by which he has produced and employed the new living organism are not contested. The only question we need decide is wheth-

11. We are not to be understood as suggesting that the political branches have been laggard in the consideration of the problems related to genetic research and technology. They have already taken action. In 1976, for example, the National Institutes of Health released guidelines for NIH-sponsored genetic research which established conditions under which such research could be performed. 41 Fed.Reg. 27902. In 1978 those guidelines were revised and relaxed. 43 Fed.Reg. 60080, 60108, 60134. And Committees of the Congress have held extensive hearings on these matters. See, *e. g.*, Hearings on Genetic Engineering before the Subcommittee on Health of the Senate Committee on Labor and Public Welfare, 94th Cong., 1st Sess. (1975); Hearings before the Subcommittee on Science, Technology, and Space of the Senate Committee on Commerce, Science, and Transportation, 95th Cong., 1st Sess. (1977); Hearings on H.R. 4759 et al. before the Subcommittee on Health and the Environment of the House Committee on Interstate and Foreign Commerce, 95th Cong., 1st Sess. (1977).

er Congress, exercising its authority under Art. I, § 8, of the Constitution, intended that he be able to secure a monopoly on the living organism itself, no matter how produced or how used. Because I believe the Court has misread the applicable legislation, I dissent.

[319] The patent laws attempt to reconcile this Nation's deep seated antipathy to monopolies with the need to encourage progress. *Deepsouth Packing Co. v. Laitram Corp.*, 406 U.S. 518, 530–531, 92 S.Ct. 1700, 1707–1708, 32 L.Ed.2d 273 (1972); *Graham v. John Deere Co.*, 383 U.S. 1, 7–10, 86 S.Ct. 684, 668–690, 15 L.Ed.2d 545 (1966). Given the complexity and legislative nature of this delicate task, we must be careful to extend patent protection no further than Congress has provided. In particular, were there an absence of legislative direction, the courts should leave to Congress the decisions whether and how far to extend the patent privilege into areas where the common understanding has been that patents are not available.[1] Cf. *Deepsouth Packing Co. v. Laitram Corp., supra.*

In this case, however, we do not confront a complete legislative vacuum. The sweeping language of the Patent Act of 1793, as re-enacted in 1952, is not the last pronouncement Congress has made in this area. In 1930 Congress enacted the Plant Patent Act affording patent protection to developers of certain asexually reproduced plants. In 1970 Congress enacted the Plant Variety Protection Act to extend protection to certain new plant varieties capable of sexual reproduction. Thus, we are not dealing—as the Court would have it—with the routine problem of "unanticipated inventions." *Ante*, at 2211. In these two Acts Congress has addressed the general problem of patenting animate inventions and has chosen carefully limited language granting protection to some kinds of discoveries, but specifically excluding others. These Acts strongly evidence a congressional limitation that excludes bacteria from patentability.[2]

[320] First, the Acts evidence Congress' understanding, at least since 1930, that § 101 does not include living organisms. If newly developed living organisms not naturally occurring had been patentable under § 101, the plants included in the scope of the 1930 and 1970 Acts could have been patented without new legislation. Those plants, like the bacteria involved in this case, were new varieties not naturally occurring.[3] Although the Court, *ante*, at 2209, rejects this line of argument, it does not explain why the Acts were necessary unless to correct a pre-existing situation.[4] I cannot share the

1. I read the Court to admit that the popular conception, even among advocates of agricultural patents, was that living organisms were unpatentable. See *ante*, at 2209, and n. 8.

2. But even if I agreed with the Court that the 1930 and 1970 Acts were not dispositive, I would dissent. This case presents even more cogent reasons than *Deepsouth Packing Co.* not to extend the patent monopoly in the face of uncertainty. At the very least, these Acts are signs of legislative attention to the problems of patenting living organisms, but they give no affirmative indication of congressional intent that bacteria be patentable. The caveat of *Parker v. Flook*, 437 U.S. 584, 596, 90 S.Ct. 2522, 2529, 57 L.Ed.2d 451 (1978), an admonition to "proceed cautiously when we are asked to extend patent rights into areas wholly unforeseen by Congress," therefore becomes pertinent. I should think the necessity for caution is that much greater when we are asked to extend patent rights into areas Congress has foreseen and considered but has not resolved.

3. The Court refers to the logic employed by Congress in choosing not to perpetuate the "dichotomy" suggested by Secretary Hyde. *Ante*, at 2209. But by this logic the bacteria at issue here are distinguishable from a "mineral . . . created wholly by nature" in exactly the same way as were the new varieties of plants. If a new Act was needed to provide patent protection for the plants, it was equally necessary for bacteria. Yet Congress provided for patents on plants but not on these bacteria. In short, Congress decided to make only a subset of animate "human-made inventions," *ibid.*, patentable.

4. If the 1930 Act's only purpose were to solve the technical problem of description referred to by the Court, *ante*, at 2209, most of the Act, and in particular its limitation to asexually reproduced plants, would have been totally unnecessary.

Court's implicit assumption that Congress was engaged in either idle exercises or mere correction of the public record when it enacted the 1930 and 1970 Acts. And Congress certainly thought it was doing something significant. The Committee Reports contain expansive prose about the previously unavailable benefits to be derived from extending patent protection to plants.[5] 1321 H.R.Rep.No.91–1605, pp. 1–3 (1970), U.S. Code Cong. & Admin.News 1970, p. 5082; S.Rep.No.315, 71st Cong., 2d Sess., 1–3 (1930). Because Congress thought it had to legislate in order to make agricultural "human-made inventions" patentable and because the legislation Congress enacted is limited, it follows that Congress never meant to make items outside the scope of the legislation patentable.

Second, the 1970 Act clearly indicates that Congress has included bacteria within the focus of its legislative concern, but not within the scope of patent protection. Congress specifically excluded bacteria from the coverage of the 1970 Act. 7 U.S.C. § 2402(a). The Court's attempts to supply explanations for this explicit exclusion ring hollow. It is true that there is no mention in the legislative history of the exclusion, but that does not give us license to invent reasons. 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.

The Court protests that its holding today is dictated by the broad language of § 101, which cannot "be confined to the 'particular application[s] . . . contemplated by the legislators.'" *Ante*, at 2211, quoting *Barr v. United States*, 324 U.S. 83, 90, 65 S.Ct. 522, 525, 89 L.Ed. 765 (1945). But as I have shown, the Court's decision does not follow the unavoidable implications of the statute. Rather, it extends the patent system to cover living material 1322 even though Congress plainly has legislated in the belief that § 101 does not encompass living organisms. It is the role of Congress, not this Court, to broaden or narrow the reach of the patent laws. This is especially true where, as here, the composition sought to be patented uniquely implicates matters of public concern.

5. Secretary Hyde's letter was not the only explicit indication in the legislative history of these Acts that Congress was acting on the assumption that legislation was necessary to make living organisms patentable. The Senate Judiciary Committee Report on the 1970 Act states the Committee's understanding that patent protection extended no further than the explicit provisions of these Acts:

"Under the patent law, patent protection is limited to those varieties of plants which reproduce asexually, that is, by such methods as grafting or budding. No protection is available to those varieties of plants which reproduce sexually, that is, generally by seeds." S.Rep. No.91–1246, p. 3 (1970).

Similarly, Representative Poage, speaking for the 1970 Act, after noting the protection accorded asexually developed plants, stated that "for plants produced from seed, there has been no such protection." 116 Cong.Rec. 40295 (1970).

447 U.S. 323, 65 L.Ed.2d 159

Darnell BROWN, Petitioner,

v.

State of LOUISIANA.

No. 79–5364.

Argued March 25, 1980.

Decided June 16, 1980.

Defendant was convicted in the Criminal District Court, Parish of Orleans, Oliver P. Schulingkamp, J., of simple burglary and he appealed. The Supreme Court of Louisiana affirmed, 371 So.2d 746. Certiorari was granted. The Supreme Court, Mr. Justice Brennan, held that the rule of *Burch v. Louisiana*, i. e., that a conviction of a nonpetty criminal offense by a nonunanimous six-person jury violates an accused's right