

Traditional and Modern-Day Biopiracy: Redefining the Biopiracy Debate

If history is any indicator, biodiversity and biotechnology cannot coexist.¹ At odds in the traditional biopiracy debate are the developing global South, home to the large majority of the earth's flora and fauna,² and the global North, owner of the capital and technology necessary to develop this natural wealth.³ It is the South that accuses the North of "biopiracy"⁴—a claim it advances as the result of seemingly unfair and one-sided patent laws and international "agreements."⁵

Professor Heald presents two examples that illustrate what the global South has aptly coined "biopiracy":⁶

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¹ Jim Chen, *Diversity and Deadlock: Transcending Conventional Wisdom on the Relationship Between Biological Diversity and Intellectual Property*, 6 CASRIP 167, 171 (2001), available at <http://www.law.washington.edu/casrip/Symposium/Number6/Chen.pdf> (last visited Feb. 20, 2005).

² See Movement for a Socialist Future, *How Corporations Use 'Biopiracy' to Patent Food*, at <http://www.socialistfuture.org.uk/globaleconomy/The%20Issues/biopiracyfood.htm> (last visited Feb. 20, 2005) (noting that the poorer developing countries of the world are the source of 90 percent of the world's biological wealth, while the world's industrial nations hold 97 percent of all patents worldwide). Flora is defined as "all the plant life in a particular region." Princeton University, Cognitive Science Laboratory, WordNet, at <http://www.cogsci.princeton.edu/cqi-bin/webwn2.o?stage=1&word=flora> (last visited Feb. 20, 2005) (online dictionary result). Fauna is defined as "all the animal life in a particular region." *Id.*

³ Chen, *supra* note 1, at 171.

⁴ "The term biopiracy has been defined as 'the patenting of plants, genes, and other biological products that are indigenous to a foreign country' without compensating the keepers of those resources and the holders of knowledge appropriated during the ethnobiological research process." Margo A. Bagley, *Patently Unconstitutional: The Geographical Limitation on Prior Art in a Small World*, 87 MINN. L. REV. 679, 725 (2003).

⁵ See generally Chen, *supra* note 1. Faced with risk of bilateral trade sanctions from some of the world's most developed countries, it appears that developed countries faced a great deal of economic pressure to ratify the Trade-Related Intellectual Property Rights Treaty (TRIPS) "Agreement." See discussion *infra* Part III.D.2.

⁶ See Paul J. Heald, *The Rhetoric of Biopiracy*, 11 CARDOZO J. INT'L & COMP. L. 519, 520 (2003).

1. MegaPharmCorp seeks a new treatment for diabetes and sends researchers to a remote rain forest where the inhabitants suffer an unusually low incidence of the disease. After many interviews with local residents, they identify an enzyme in a variety of squash cultivated by them, which seems responsible for the low rate of the condition. The researchers return home, isolate the gene that codes for the enzyme and mass produce a successful and valuable patented drug. *The company never compensates any of the local residents.*⁷

2. MegaAgriCorp is developing a smut-resistant strain of corn and sends researchers around the world to identify varieties of plants worth studying. In the highlands of Mexico, they interview farmers who for hundreds of years have maintained a strain with significant smut-resistant characteristics. The researchers acquire several of the plants and embark on a successful cross-breeding program when they return home. The information acquired during the interviews saves them thousands of research hours. *They do not share any of the profits earned from sales of their new patented hybrid seed with the Mexican farmers.*⁸

The motivations fueling the actions of biotechnology companies are two-fold. First, bioprospecting is extremely lucrative, especially with respect to the pharmaceutical industry.⁹ Approximately one-quarter of all prescription drugs in the United States, for example, contain active ingredients derived from plants.¹⁰ In 1990, revenues in the United States from plant-based drugs reached an estimated \$15.5 billion.¹¹ Furthermore, in 1995, the worldwide estimated market value of pharmaceutical products derived from indigenous traditional knowledge was \$43 billion.¹²

Agribusiness revenue potential is similarly impressive.¹³ While genetically-modified (GM) seeds were not approved for use until 1994, by 1998 more than 45 million acres of U.S. farmland had been planted with such crops.¹⁴ Furthermore, revenues for the agricultural

⁷ *Id.* (emphasis added).

⁸ *Id.* at 520–21 (emphasis added).

⁹ See Charles R. McManis, *The Interface Between International Intellectual Property and Environmental Protection: Biodiversity and Biotechnology*, 76 WASH. U. L.Q. 255, 273 (1998).

¹⁰ *Id.*

¹¹ *Id.*

¹² Someshwar Singh, Third World Network, *Traditional Knowledge Under Commercial Blanket*, at <http://www.twinside.org.sg/title/blanket-cn.htm> (last visited Feb. 23, 2005).

¹³ See David R. Nicholson, *Agricultural Biotechnology and Genetically-Modified Foods: Will the Developing World Bite?*, 8 VA. J.L. & TECH. 7, 12 (2003).

¹⁴ *Id.*

biotechnology industry in 2002 were estimated at more than \$5 billion, and are expected to reach \$20 billion by the year 2010.¹⁵

Second, the large majority of bioprospecting occurs in the global South because of its rich biodiversity—the higher a country's biodiversity, the higher the probability of “discovering” a plant with healing qualities or a smut-resistant crop.¹⁶ Almost one-half of the 121 plant-based prescription drugs in the entire world originate from the tropics.¹⁷ Moreover, 74 percent of these drugs were discovered by simply researching native folklore claims.¹⁸

The substantial financial gains bioprospectors stand to reap from the biodiversity and traditional knowledge of developing countries sparks the debate as to how (and if) the financial benefits should be distributed to indigenous populations originally associated with the genetic source material.¹⁹ On one side are the biotechnology companies of the North that wish to freely “bioprospect” the diverse ecosystems that characterize third world countries, hoping to develop and eventually sell a socially useful and highly lucrative product.²⁰ On the other side are the developing countries of the South that accuse foreign, private companies of stealing their genetic resources and local knowledge.²¹ This represents the traditional form of biopiracy, which occurs when the source of the traditional knowledge (i.e., an indigenous population) does not share the financial benefits of a traditional knowledge-based product that is patented and commercialized.²²

¹⁵ *Id.*

¹⁶ See Ranjit Devraj, India Together, *Biodiversity or Biopiracy* (Dec. 2002), at <http://www.indiatogether.org/environment/articles/biodiv02.htm> (last visited Feb. 23, 2005). While India is located in the northern hemisphere and is not technically considered a part of the global south, a substantial amount of bioprospecting occurs there as well. India, for instance, is home to more than 45,000 species of flora and 75,000 species of fauna. Within its borders, India also contains two of the world's ten biogeographic zones.

¹⁷ McManis, *supra* note 9, at 273.

¹⁸ *Id.*

¹⁹ See Heald, *supra* note 6, at 519–21.

²⁰ See *id.*

²¹ See Chen, *supra* note 1, at 171.

²² See *supra* note 4 and accompanying text.

Recently, however, a new breed of biopiracy has emerged.²³ Modern-day biopiracy encompasses the long-term effects that result from the behavior of seed biotechnology companies such as MegaAgri-Corp. Unlike Professor Heald's description, however, the issue is not that the source of the knowledge is not being compensated.²⁴ The issue is the long-term effects associated with allowing corporations to genetically modify, patent, and essentially control the number of seed varieties used by farmers around the world.²⁵ Granting such power places restrictions on traditional farming practices, which puts the world's biodiversity into a continuing state of decline, thereby creating serious negative consequences for farmers and consumers.²⁶ Interestingly, modern-day biopiracy also redefines the players of the biopiracy debate.²⁷ Unlike its traditional counterpart, modern-day biopiracy does not discriminate between the industrialized North and the bio-rich South.²⁸ Instead, it pits the global consumer and the traditional farmer against the corporate world.²⁹

This Note addresses traditional and modern-day biopiracy and considers how the public policy that supports the U.S. patent system is undercut in both contexts. Part I discusses the pro-patent stance of U.S. patent law and recounts the landmark decision *Diamond v. Chakrabarty*.³⁰ Part II analyzes how traditional biopiracy contravenes the goal of the U.S. patent system to promote scientific breakthroughs. Part III considers modern-day biopiracy, specifically examining several factors that perpetuate the world's continuing loss of biodiversity, the significant precedents set forth in *Asgrow*³¹ and *Monsanto*³², and the efficacy of two major international agreements cen-

²³ Some have referred to the newest form of biopiracy as "biopiracy by occupation" whereby "patented genetic material contaminates genetic material held by peoples and communities, with somewhat similar results." ETC Group, *From Global Enclosure to Self Enclosure: Ten Years After—A Critique of the CBD and the "Bonn Guidelines" on Access and Benefit Sharing (ABS)* Jan./Feb. 2004, at 4, available at http://www.etcgroup.org/documents/Comm83_COP7_CBDCBonn.pdf (last visited Feb. 23, 2005).

²⁴ While this is certainly important, it should be classified under the problems and potential solutions that are specific to traditional biopiracy.

²⁵ See discussion *infra* Parts III.A-C, III.D.3.

²⁶ See discussion *infra* Parts III.A-C, III.D.3.

²⁷ See discussion *infra* Parts III.A-C, III.D.3.

²⁸ See discussion *infra* Parts III.A-C, III.D.3.

²⁹ See discussion *infra* Parts III.A-C, III.D.3.

³⁰ 447 U.S. 303 (1980).

³¹ *Asgrow Seed Co. v. Winterboer*, 513 U.S. 179 (1995).

³² *Monsanto Canada Inc. v. Schmeiser*, [2001] F.C. 256.

tral to the biopiracy debate—the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS Agreement) and the Convention on Biodiversity (CBD). Part IV sets forth suggestions for combating both traditional and modern-day biopiracy.

I

THE PUBLIC POLICY BEHIND PATENT LAW: THE RACE TO PROMOTE PROGRESS

A. Background

Under the U.S. Constitution, Congress has 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[.]”³³ In the late eighteenth century, Thomas Jefferson used the power granted by the Constitution to codify the country’s first patent act.³⁴ The Patent Act of 1793 broadly defined patentable subject matter as “any new and useful art, machine, manufacture, or composition of matter, or any new or useful improvement [thereof]”³⁵ and reflected Jefferson’s belief that “ingenuity should receive a liberal encouragement.”³⁶ The subsequent patent statutes of 1836, 1870, and 1874 all remained faithful to the broad language of the original.³⁷

When Congress recodified the Patent Act in 1952, it replaced the word “art” with “process,” an ostensibly minor change.³⁸ However, the Committee Reports accompanying the 1952 Act indicate that Congress intended to further broaden the statutory subject matter “to ‘include anything under the sun that is made by man.’”³⁹ Today, the Patent Act is codified under 35 U.S.C. § 101.⁴⁰ This statute grants a patent to “[w]hoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and use-

³³ U.S. CONST. art. I, § 8, cl. 8.

³⁴ Chakrabarty, 447 U.S. at 308 (1980).

³⁵ *Id.* (quoting Act of Feb. 21, 1793, § 1, 1 Stat. 319).

³⁶ *Id.* at 308-09 (quoting 5 WRITINGS OF THOMAS JEFFERSON 75-76 (Washington ed., 1871)).

³⁷ *Id.* at 309.

³⁸ *Id.*

³⁹ *Id.* (quoting S. REP. NO. 1979, 82d Cong., 2d Sess., 5, reprinted in 1952 U.S.C.C.A.N. 2394, 2419).

⁴⁰ 35 U.S.C.A. § 101 (2004).

ful improvement thereof . . . subject to the conditions and requirements of this title.”⁴¹

The goal of patent law is to promote advances in technology.⁴² In essence, patents may be viewed as the inventor’s reward for her discovery.⁴³ As her reward, an inventor has the right to exclude others from manufacturing, using, or selling her invention for twenty years from the date the patent application was filed.⁴⁴ This prevents an inventor’s competitors from free-riding off of her success, thus allowing the patent-holder to reap the full benefits of her investment.⁴⁵ In this sense, a patent may be viewed as the equivalent of a legal monopoly to which an expiration date is attached.⁴⁶ While monopolies of any kind are generally considered adverse to technological advancement, it is the incentive system that patent protection creates that drives new breakthroughs.⁴⁷ For example, the ability to regain, and substantially profit from, investments made in research and development acts as a strong incentive for inventors to continue making such investments and realizing new discoveries.⁴⁸ Thus, patent law attempts to strike a balance between the societal need to benefit from new discoveries and the inventor’s need to profit from her investment.

B. The Foundation that Supports Biopiracy

The U.S. Patent Act requires the filer of a patent to fulfill three requirements: (1) novelty, (2) non-obviousness of the invention, and (3) utility.⁴⁹ As will be discussed, this three-prong foundation allows Western companies to use traditional knowledge without compensation, and simultaneously acts to block indigenous populations from patenting and protecting their own traditional knowledge.⁵⁰

⁴¹ *Id.*

⁴² *See id.*; James Thuo Gathii, *The Structural Power of Strong Pharmaceutical Patent Protection in U.S. Foreign Policy*, 7 J. GENDER RACE & JUST. 267, 271 (2003).

⁴³ *See* Gathii, *supra* note 42, at 271.

⁴⁴ 35 U.S.C.A. § 154(a)(2); *see* Gathii, *supra* note 42, at 271.

⁴⁵ *See* 35 U.S.C.A. § 154; Gathii, *supra* note 42, at 271.

⁴⁶ *See* 35 U.S.C.A. § 154; Gathii, *supra* note 42, at 271.

⁴⁷ *See* Gathii, *supra* note 42, at 271.

⁴⁸ *See id.*

⁴⁹ David G. Scalise & Daniel Nugent, *International Intellectual Property Protections for Living Matter: Biotechnology, Multinational Conventions and the Exception for Agriculture*, 27 CASE W. RES. J. INT’L L. 83, 89 (1995); Leanne M. Fecteau, Note, *The Ayahuasca Patent Revocation: Raising Questions about Current U.S. Patent Policy*, 21 B.C. THIRD WORLD L.J. 69, 73–77 (2001); *see* 35 U.S.C.A. §§ 101-103.

⁵⁰ *See* discussion *infra* Part I.B.1–3.

1. Novelty

Two separate sections of the Patent Act codify the “novelty” requirement.⁵¹ Section 101, for instance, states that the invention or discovery must be “new.”⁵² Similarly, section 102 requires that the invention or discovery be “novel.”⁵³ While it may appear that the inventor must meet both of these requirements, the case law suggests that section 102 is all-encompassing.⁵⁴ Therefore, an inventor that satisfies the “novelty” requirement under section 102 also meets the “new” requirement under section 101.⁵⁵

Section 102(a) of the Patent Act speaks to the “novelty” requirement—a filer may obtain a patent unless “the invention was known or used by others in this country, or patented or described in a *printed publication* in this or a foreign country, before the invention thereof by the applicant for patent”⁵⁶ However, contrary to other patent systems, U.S. patent law does not require “absolute novelty” for obtaining a patent, which effectively waters down the novelty requirement.⁵⁷ Instead, it allows the patenting of inventions known or used in foreign countries, as long as the invention has not been patented or

⁵¹ 35 U.S.C.A. §§ 101, 102.

⁵² *Id.* § 101.

⁵³ *Id.* § 102.

⁵⁴ *In re Bergstrom*, 427 F.2d 1394, 1401 (C.C.P.A. 1970) (holding that “[t]he word ‘new’ in § 101 is defined and is to be construed in accordance with the provisions of § 102.”) (footnote omitted).

⁵⁵ *See id.*

⁵⁶ 35 U.S.C. § 102(a) (emphasis added). While Congress did not state a clear reason for the “printed publication” requirement, the Supreme Court in *Gayler v. Wilder* offered the following justification in dicta:

If the foreign invention had been printed or patented, it was already given to the world and open to the people of this country . . . upon . . . reasonable inquiry. They would therefore derive no advantage from the invention here . . . and the inventor therefore is not considered to be entitled to the reward. But if the foreign discovery is not patented, nor described in any printed publication, it might be known and used in remote places for ages, and the people of this country be unable to profit by it. The means of obtaining [the] knowledge would not be within their reach [I]t would be the same thing as if the improvement had never been discovered. It is the inventor here that brings it to them, and places it in their possession. And as he does this by the effort of his own genius, the law regards him as the first . . . inventor . . . although the improvement had in fact been invented before, and used by others.

51 U.S. 477, 497 (1850); *see also* Bagley, *supra* note 4, at 698–99.

⁵⁷ *See* 35 U.S.C.A. § 102(a); Charles R. McManis, *Intellectual Property, Genetic Resources and Traditional Knowledge Protection: Thinking Globally, Acting Locally*, 11 CARDOZO J. INT’L & COMP. L. 547, 565 n.85 (2003); Rochelle K. Seide et al., *Drafting Claims for Biotechnology Inventions*, 368 PRACTISING L. INST. 379, 396 (2003).

disclosed in a printed publication (in either the United States or a foreign country).⁵⁸ The aim of this provision is to encourage the importation of technology to the United States.⁵⁹ However, the absence of an “absolute novelty” requirement works to the detriment of indigenous populations in underdeveloped countries because their traditional knowledge is passed on by word of mouth and unlikely to be published.⁶⁰ As a result, the apparent one-sidedness of this requirement has fostered debate among critics who question whether the U.S. patent system is actually protecting the rights of valid patent holders, or whether it is merely granting privileges to profit from another country’s traditional knowledge.⁶¹

The Enola bean patent controversy illustrates this criticism.⁶² In 1994, Larry Proctor, owner of Colorado-based seed company POD-NERS, planted yellow beans he had purchased in Sonora, Mexico and allowed them to self-pollinate until a crop of distinctly yellow beans was produced.⁶³ In 1999, Proctor received a patent for his bean variety and subsequently sued a company importing Mexican yellow beans into the United States, claiming that the beans infringed on his patent.⁶⁴

The Enola bean was found to fulfill the novelty requirement⁶⁵ even though indigenous populations had cultivated yellow beans like azu-

⁵⁸ McManis, *supra* note 57, at 565 n.85.

⁵⁹ *Id.*

⁶⁰ See Fecteau, *supra* note 59, at 74.

⁶¹ See VANDANA SHIVA, *BIOPIRACY: THE PLUNDER OF NATURE AND KNOWLEDGE* 9–10 (1997).

⁶² See U.S. Patent No. 5,894,079 (issued Apr. 13, 1999).

⁶³ See Bagley, *supra* note 4, at 701.

⁶⁴ See *id.* at 701-02. According to Miguel Tachna Felix of the Agricultural Association of Rio Fuerte,

We had been exporting this yellow bean (Mayocaba) and others to the United States for over four years when POD-NERS received their patent—based on erroneous claims. When they got the patent they sent a letter to all the importers of Mexican beans in the United States, warning that this bean was their property and that if they planned to sell it they would have to pay royalties to POD-NERS. For us, this meant an immediate drop in export sales, over 90%, which affected us tremendously. And it wasn't only one bean variety, but also others, because it created fear among bean importers[.]

Enola Bean Patent Challenged (RURAL ADVANCEMENT FOUND. INT’L, Canada), Jan. 5, 2001, at 1-2, available at http://www.etcgroup.org/documents/news_enolabean.pdf (last visited Feb. 24, 2005).

⁶⁵ See generally U.S. Patent No. 5,894,079 (issued Apr. 13, 1999).

frado and mayocoba for centuries,⁶⁶ and despite the fact that Mexican seed companies had been exporting for many years prior the very type of bean variety for which Proctor had been granted a patent.⁶⁷ In addition, the “publication” requirement mandated under section 102(a) may make it impossible to challenge the Enola bean patent unless printed information on the Enola bean can be produced.⁶⁸

2. *Non-obviousness or Inventiveness*

Under section 103 of the Patent Act, the filer’s invention or discovery must also be non-obvious in order to be patentable.⁶⁹ This requirement has been criticized as being the “most unfair” to indigenous populations.⁷⁰ Similar to the novelty requirement, the prior art⁷¹ used to ascertain if an invention is obvious does not include prior knowledge or use outside the United States.⁷² Therefore, a member of an indigenous population from a foreign country is excluded from the category of a “person with ordinary skill in the particular art.”⁷³

The way in which the non-obvious requirement discriminates against indigenous populations of third world countries can be seen with the patenting of the endod berry.⁷⁴ Ethiopians have used this plant as a laundry soap and fish intoxicant for centuries.⁷⁵ In addition, other tropical indigenous groups have utilized the endod berry

⁶⁶ See Gillian N. Rattray, *The Enola Bean Patent Controversy: Biopiracy, Novelty and Fish-and-Chips*, 2002 DUKE L. & TECH. REV. 8, 11 (2002). Azufrado and mayocoba are considered the ancestors of the newly-patented Enola bean. *Id.*

⁶⁷ See *supra* text accompanying notes 65-66.

⁶⁸ See 35 U.S.C.A. § 102(a) (2004). Mexico believes that a bean registered in Sinaloa, Mexico in 1978 is genetically identical to the Enola bean. If Mexico’s claim is accurate and if it is contained in a printed publication, the Enola bean patent could be invalidated under section 102(a). Rattray, *supra* note 66, at 6.

⁶⁹ 35 U.S.C.A. § 103.

⁷⁰ Lester I. Yano, *Protection of the Ethnobiological Knowledge of Indigenous People*, 41 UCLA L. REV. 443, 460 (1993).

⁷¹ “Prior art” is defined as “[t]he body of existing patents or patent applications or any other publication throughout the world, relevant to an application or a patent.” Canadian Intellectual Property Office, Patents Glossary, at http://strategis.gc.ca/sc_mrksv/cipo/patents/pat_gd_gloss-e.html (last visited Feb. 24, 2005).

⁷² See 35 U.S.C. §§ 102(a), 103; Fecteau, *supra* note 49, at 75.

⁷³ See 35 U.S.C. §§ 102(a), 103; Fecteau, *supra* note 49, at 75.

⁷⁴ See Naomi Roht-Arriaza, *Of Seeds and Shamans: The Appropriation of the Scientific and Technical Knowledge of Indigenous and Local Communities*, 17 MICH. J. INT’L L. 919, 923 (1996); Madhusree Mukerjee, *The Berry and the Parasite*, at <http://chora.virtualave.net/lema2.htm> (last visited Feb. 24, 2005).

⁷⁵ Roht-Arriaza, *supra* note 74, at 923; Mukerjee, *supra* note 74.

for medicinal purposes to treat schistosomiasis, a potentially fatal parasitic disease carried by aquatic snails.⁷⁶

The fact that the non-obviousness requirement can be fulfilled in the above example, even though the endod berry had been used by the indigenous peoples of Ethiopia for hundreds of years, highlights the inherent inequity of the non-obvious requirement.⁷⁷ This requirement is highly technical; because the native population did not know the exact active substance that produced the endod berry's beneficial effects, obviousness was not a bar to patentability.⁷⁸

3. Utility

The third and final requirement is described in section 101 of the Patent Act, which is based on Article I, section 8 of the U.S. Constitution.⁷⁹ Under this authority, Congress has the power to promote the progress of science.⁸⁰ In exercising section 8 authority, Congress requires that an invention be useful.⁸¹ The utility requirement is considered the easiest out of the three requirements to fulfill.⁸² It has a low threshold; the patent applicant must only show that her invention or discovery has some "conceivable use."⁸³ In general, an invention would have to qualify as illegal or immoral to be denied patentability on non-utility grounds.⁸⁴

C. The Public Policy Revisited: Traditional Biopiracy and a Restriction on the Free Flow of Information

While the purpose of the U.S. patent system is to promote scientific breakthroughs, critics argue that its broad approach to patent protection does just the opposite.⁸⁵ Specifically, with respect to traditional biopiracy, granting patents to companies like MegaPharm and MegaAgriCorp undercuts patent protection by rewarding the party that confirms a discovery rather than the innovator who actually

⁷⁶ Roht-Arriaza, *supra* note 74, at 923; Mukerjee, *supra* note 74.

⁷⁷ See Yano, *supra* note 70, at 460.

⁷⁸ See *id.* at 460–61.

⁷⁹ See U.S. CONST. art. I, § 8, cl. 8; 35 U.S.C. § 101 (2000).

⁸⁰ See U.S. CONST. art. I, § 8, cl. 8; 35 U.S.C. § 101.

⁸¹ See 35 U.S.C. §101.

⁸² Fecteau, *supra* note 49, at 76.

⁸³ See Yano, *supra* note 70, at 457.

⁸⁴ Fecteau, *supra* note 49, at 76–77.

⁸⁵ See SHIVA, *supra* note 61, at 9.

makes the discovery.⁸⁶ This failure to reward can be considered the traditional form of biopiracy.

As Nicholas Hildyard of the *British Ecologist* points out, the pharmaceutical MegaCorps of the world are building upon the traditional knowledge of native populations without rewarding the source of that knowledge in any way.⁸⁷ In other words, in the context of biopiracy, the U.S. patent system merely rewards the party who confirms a prior discovery, manipulates its properties for the purposes of manufacturing and large-scale distribution, and markets the “new” product to consumers.⁸⁸ In essence, the crucial first step in rewarding the innovator is overlooked and, as a result, the incentive to share knowledge that will benefit society is lost.⁸⁹

The U.S. patent system, and the disincentive to share knowledge that it creates, has restricted the free flow of information for at least the past twenty-five years.⁹⁰ In 1979, for instance, the Organization of African Unity sought to combat biopiracy by urging herbal medicine research to be conducted in a confidential manner.⁹¹ This attitude, albeit justified, encourages Southern researchers and indigenous populations⁹² to remain tight-lipped about traditional cures.⁹³ This

⁸⁶ See discussion *infra* Parts III.A-C., III.D.3.

⁸⁷ See generally John Tanner, *India: U.S. Giant, Peasants Battle for “Blessed Tree”*, INTER PRESS SERVICE GLOBAL INFO. NETWORK, Oct. 12, 1993, available at 1993 WL 2534808.

⁸⁸ See Roht-Arriaza, *supra* note 74, at 921–23. Examples include quinine, which has been used by the Andean indigenous population to treat fevers; the endod berry, which has been used by inhabitants of Ethiopia as a fish intoxicant; and the neem seed, which has been used by the farmers of India as a natural insecticide. See *id.*

⁸⁹ This contrasts with the view of some experts, who believe that merely rewarding the person who discloses an innovation is sufficient to support the public policy that supports patent law. See Gail R. Peterson, *Overview of Intellectual Property*, 762 PRACTISING L. INST. 11, 30 (2003). I contend, however, that in order for the public policy to be effectuated, the patent applicant must do more than “disclose” an innovation, the applicant must actually make the discovery.

⁹⁰ See Craig D. Jacoby & Charles Weiss, *Recognizing Property Rights in Traditional Biocultural Contribution*, 16 STAN. ENVTL. L.J. 74, 93 (1997).

⁹¹ *Id.*

⁹² See *id.* at 93-94. Read, for example, excerpts from interview with Brazilian Indians on protecting traditional knowledge:

QUA TUTU(ph): (Foreign language spoken)

KASTE: ‘Chicki Uba(ph) is something that we put on arrowheads to kill animals,’ says a teenager named Qua Tutu The tribe considers Chicki Uba a prized natural resource, one which they believe was stolen from them in the 1980’s. Twenty-seven-year-old Puta We(ph) recalls how soon after first contact a German researcher arrived in the village, asking to see interesting plants.

Mr. PUTA WE: (Foreign language spoken)

silence lessens the chance that information from the global South will be shared and analyzed in collaborative efforts with Northern researchers with the financial means to make traditional cures available to the global market, thereby decreasing the odds that populations around the world will benefit from traditional cures.⁹⁴

Re-establishing the crucial first step and requiring biotechnology companies to compensate indigenous populations would create the *quid pro quo* exchange necessary to facilitate information sharing and, thus, effectuate the policy that supports patent protection law.⁹⁵

II

THE SPARK OF TRADITIONAL BIOPIRACY: SETTING THE STAGE FOR ITS MODERN-DAY COUNTERPART

While the inherently pro-patent stance of the U.S. patent system certainly plays an important role in perpetuating both traditional and modern-day biopiracy, it was not until the Supreme Court addressed the patentability of life that the practice of biopiracy truly began to emerge.⁹⁶ In essence, the explosion of this phenomenon may be

KASTE: 'He came to get Chicki Uba for himself,' Puta We says. 'We'd go get it for him and he'd give us prizes, a machete or a cooking pot.' Pro-Indian activist groups say the Chicki Uba samples ended up in the hands of a German company which used it as the basis for new drugs *Western companies have made million of dollars on drugs derived from tropical plants, and that alone is enough to sour the Indians' attitude toward curious outsiders.*

Mr. PUTA WE: (Foreign language spoken)

KASTE: 'A lot of people show up in the village wanting to know what we use for medicines,' Puta We says, 'but we not [sic] longer show them our medicines the way we showed them to that researcher.'

Mr. JUAN REVILLA: (foreign language spoken)

KASTE: 'And here's the product,' he says, plunking down a flask of dark, oily liquid. 'This cures sinusitis. I have 50 more products just like this, substances that only I know how to make.' Revilla says he's not about to share the details of his discoveries, despite the fact that he works for a research institute dedicated to the spirit of scientific openness.

National Public Radio: Weekend Edition, (NPR radio broadcast, Aug. 31, 2002), available at 2002 WL 7824258 (emphasis added).

⁹³ See Jacoby & Weiss, *supra* note 90, at 93.

⁹⁴ See *id.* "[T]he World Health Organization estimates that 80% of the world's population still relies on traditional medicine and that 85% of traditional medicine is based on plants." McManis, *supra* note 57, at 578 (citation omitted). In addition, it appears that American, Asian, Chinese, European, and Japanese markets have a large financial stake in such a backlash. For example, estimates in 1994 indicated that retail sales for the American herbal medicine industry totaled \$1.6 billion, \$2.3 billion in Asia, \$6 billion in the European Union, and \$2.1 billion in Japan. See *id.*

⁹⁵ See *supra* text accompanying notes 92-93.

⁹⁶ See Nicholson, *supra* note 13, at 12.

traced back to the landmark Supreme Court case of *Diamond v. Chakrabarty*.⁹⁷ In *Chakrabarty*, the Court explicitly recognized the statutory right to patent life, overturning the long-held precedent that excluded “products of nature” as patentable subject matter.⁹⁸

In 1971, Indian microbiologist Ananda Mohan Chakrabarty, an employee of General Electric (GE), genetically engineered a form of bacteria that could break down crude oil, this bacteria could be used in the clean-up of oil spills.⁹⁹ Soon thereafter, GE applied for a patent on Chakrabarty’s genetically engineered oil-eating bacteria.¹⁰⁰ The U.S. Patent and Trademark Office (PTO) rejected GE’s patent application, basing its decision on the traditional legal rule that “products of nature” (i.e., life forms) are not patentable subject matter under 35 U.S.C.

§ 101.¹⁰¹

The case was appealed all the way to the Supreme Court.¹⁰² In June 1980, by a five-to-four majority, the Court ruled that a patent should be granted to GE.¹⁰³ In so holding, the Court implicitly reaffirmed its prior precedent which stated that “products of nature” could not be patented, and distinguished Chakrabarty’s genetically-engineered bacteria on the basis that he had “produced a new bacterium with markedly different characteristics from any found in nature....”¹⁰⁴ The Court elaborated, stating that “[h]is [Chakrabarty’s] discovery is not nature’s handiwork, but his own[.]”¹⁰⁵

In opening up an entirely new subject matter as patentable, the *Chakrabarty* decision had a profound effect on intellectual property law.¹⁰⁶ In essence, the *Chakrabarty* decision created a slippery slope and paved the road for the expansion of patentability under section 101.¹⁰⁷ In *Ex parte Hibberd*, for example, the Board of Patent Appeals and Interferences relied on *Chakrabarty* and ruled that geneti-

⁹⁷ 447 U.S. 303 (1980) (recognizing the right to patent life-forms).

⁹⁸ *See id.* at 310.

⁹⁹ *See id.* at 305; SHIVA, *supra* note 61, at 9.

¹⁰⁰ *Chakrabarty*, 447 U.S. at 305.

¹⁰¹ *Id.* at 306.

¹⁰² *Id.* at 305.

¹⁰³ *Id.* at 318.

¹⁰⁴ *Id.* at 310.

¹⁰⁵ *Id.*

¹⁰⁶ Erin Kathleen Bender, Comment, *North and South: The WTO, TRIPS, and the Scourge of Biopiracy*, 11 TULSA J. COMP. & INT’L L. 281, 290 (2003).

¹⁰⁷ *See Hibberd*, 227 U.S.P.Q. 443, 447 (Bd. Patent App. and Interferences, 1985).

cally altered plants could receive patents.¹⁰⁸ And thus, traditional biopiracy mutated into its modern-day counterpart.

III

A NEW BREED OF BIOPIRACY: UNITY OF NORTH AND SOUTH

The failure to promote biological diversity, and the enactment of laws that perpetuate the loss of biological diversity, can be considered the newest form of biopiracy. Modern-day biopiracy is unique to the now biotechnology-driven agribusiness industry. While it may benefit the industry in the short-term, modern-day biopiracy will work to the detriment of agribusiness in the long run. More importantly, modern-day biopiracy will have disastrous effects on inhabitants and consumers of the world, both now and, most notably, in the future.¹⁰⁹

A. The Public Policy Revisited A Third Time: A Loss in Biodiversity

For hundreds of years, individual farmers have contributed immensely to the world's biodiversity by replanting seeds from hand-selected plants that displayed distinctive characteristics.¹¹⁰ In fact, subsistence farmers often try to increase crop diversity to better cope with the environment's "variability."¹¹¹ Plant varieties with similar genetic codes have similar reactions to variables within their environment—including, among others, drought, insects, and disease.¹¹² Where reactions are similar, shared weaknesses create a potential for disaster. A major drought, for example, could destroy an entire region's crop harvest.¹¹³

¹⁰⁸ *Id.* at 444.

¹⁰⁹ See discussion *infra* Part III.A, C, D.3.

¹¹⁰ John Tuxill, *Appreciating the Benefits of Plant Biodiversity*, at <http://usinfo.state.gov/products/pubs/biodiv/benefits.htm> (last visited Mar. 16, 2005). For example, farmers may choose to replant the seeds from a plant variety that matures more quickly, is more resistant to pests, or that exhibits a unique color or taste. *Id.*

¹¹¹ See *id.* The desire to increase crop diversity and limit damage from environmental variability has led to the development of "thousands of folk varieties, or 'landraces.'" *Id.*

¹¹² Peter J. Gross, *Guiding the Hand that Feeds: Toward Socially Optimal Appropriability in Agricultural Biotechnology Innovation*, 84 CAL. L. REV. 1395, 1403 (1996).

¹¹³ See *id.*; Yvonne Cripps, *Patenting Resources: Biotechnology and the Concept of Sustainable Development*, 9 IND. J. GLOBAL LEGAL STUD. 119, 122 (2001). "The Irish potato famine of the nineteenth century and the 1970 corn leaf blight in the United States provide examples of past catastrophes that were exacerbated by genetic uniformity." Gross, *supra* note 112, at 1403.

While on-farm crop selection still remains the practice of choice in developing countries,¹¹⁴ the seed cultivation process in industrialized nations has evolved into a corporate venture, in which companies have assumed the responsibility for supplying seeds.¹¹⁵ The commercialization of seed cultivation has caused what the United Nations Food and Agriculture Organization ironically calls an “impressively uniform” genetic base.¹¹⁶ In the Netherlands, for instance, the three most popular varieties of nine major crops surveyed blanketed 81 to 99 percent of planted crop acreage.¹¹⁷ In 1949, China grew approximately ten thousand wheat varieties; by the 1970s, that number had dwindled to only about one thousand.¹¹⁸ One single wheat variety made up 67 percent of Bangladesh’s wheat acreage in 1983 and 30 percent of India’s in 1984.¹¹⁹ Likewise, in Mexico, only 20 percent of the corn varieties cultivated there in the 1930s can still be found.¹²⁰

The reason for such losses in crop diversity can be attributed to the inherent inability of a relatively small number of commercial players to replicate what millions of farmers have done for thousands of years.¹²¹ In comparison to 1904, for instance, the commercial agriculture companies and major seed storage facilities of today carry less than 20 percent of the crop varieties for tomatoes and less than 10

¹¹⁴ Tuxill, *supra* note 110. Farmers in developing countries continue to save and replant 80% to 90% of their own seed supplies. *Id.* In the entire world, approximately 672 million acres of land are currently being cultivated—25% of which consisted of genetically-modified (GM) crops in 2003. Pew Initiative on Food and Biotechnology, Fact Sheet, at <http://pewagbiotech.org/resources/factsheets/display.php3?FactsheetID=2> (last visited Mar. 16, 2005). Beginning in 1996, the United States has led the world in GM crop production, planting 105.7 million acres of GM food in 2003. *Id.*

¹¹⁵ See Tuxill, *supra* note 110.

¹¹⁶ See *id.* Unfortunately, there is nothing impressive about the world’s dwindling genetic plant diversity: “Monoculture greatly enhances risks from pests and disease.” See Cripps, *supra* note 113, at 122.

¹¹⁷ Tuxill, *supra* note 110.

¹¹⁸ See *id.* The Mexican subsidiary Seminis has a virtual monopoly in the seed industry and built its “empire” by acquiring approximately a dozen seed companies. By 2000, Seminis controlled almost one-fifth of the worldwide fruit and vegetable seed market and provided approximately 40% of all vegetable seeds sold in the United States. Seminis proclaimed in June of 2000 that it would “eliminate” 2,000 varieties of seeds, which constitutes 25% of its total, as part of a “global restructuring and optimization plan.” *Earmarked for Extinction? Seminis Eliminates 2000 Varieties 1*, RURAL ADVANCEMENT FOUND. INT’L, (Canada), July 17, 2000, at 1, available at http://www.etcgroup.org/documents/geno_earmarked.pdf (last visited Mar. 16, 2005).

¹¹⁹ Tuxill, *supra* note 110.

¹²⁰ *Id.*

¹²¹ See *id.*

percent of the crop varieties for peas and cabbages.¹²² While some contend that biotechnology allows scientists to respond rapidly to the drawbacks that result from genetic uniformity,¹²³ it is important to note that the ability to respond is made possible not only by advances in technology, but also by the availability of a particular genetic resource.¹²⁴ In the 1970s, for example, when a virus began attacking GM Asian rice varieties, breeders combated the virus by isolating an immune wild rice species in Uttar Pradesh, India.¹²⁵ Therefore, while the ability to transfer genes made combating the virus efficient, it was the presence of a specific genetic resource that made combating the virus possible to begin with.¹²⁶ Interestingly, this specific population of rice has not been found since.¹²⁷

B. The Continuing Loss in Biodiversity: Interpretations of the Plant Variety Protection Act

It is well settled that in order to promote progress and development in plant sciences, plant varieties must be statutorily protected.¹²⁸ Legislation to grant patents for plant-related inventions, for example, was proposed as far back as 1892¹²⁹ and was supported by prominent individuals such as Thomas Edison¹³⁰ and Luther Burbank.¹³¹ In 1930, Congress passed the Plant Patent Act (PPA), which grants patent protection for asexually-reproduced plants.¹³² As the technology neces-

¹²² *Id.*

¹²³ See Gross, *supra* note 112, at 1403.

¹²⁴ See generally Tuxill, *supra* note 110.

¹²⁵ *Id.*

¹²⁶ See *id.*

¹²⁷ *Id.*

¹²⁸ See Elisa Rives, *Mother Nature and the Courts: Are Sexually Reproducing Plants and Their Progeny Patentable Under the Utility Patent Act of 1952?*, 32 CUMB. L. REV. 187, 197 (2001-2002); *Imazio Nursery, Inc. v. Dania Greenhouses*, 69 F.3d 1560, 1562–63 (Fed. Cir. 1995).

¹²⁹ *Imazio*, 69 F.3d at 1562.

¹³⁰ *Id.* Thomas Edison strongly supported plant-related patent protection, stating that “[n]othing that Congress could do to help farming would be of greater value and permanence than to give to the plant breeder the same status as the mechanical and chemical inventors now have through the law.” *Id.*

¹³¹ *Id.*; Luther Burbank was a leading plant breeder who was quoted by his widow as saying “that until Government made some such provision [for plant patent protection] the incentive to create work with plants was slight and independent research and breeding would be discouraged to the great detriment of horticulture.” *Id.* at 1562–63.

¹³² See 35 U.S.C. §§ 161-64 (2000). Asexual reproduction in plants involves detaching and growing parts of an original plant to form a new plant. See Cindy Rea, *Asexual Re-*

sary to identify plant characteristics emerged, researchers lobbied for new laws that would protect sexually-produced plants they “discovered.”¹³³ Consequently, in 1970, Congress broadened plant-patent protection and passed the Plant Variety Protection Act (PVPA), which protects sexually-reproduced plants.¹³⁴ The protections conferred under the PPA and the PVPA are similar.¹³⁵ Both award the right-holder the ability to exclude others from producing or using the protected plant or seed.¹³⁶ Both also grant a twenty-year term of protection.¹³⁷

Initially, the PVPA appeared to strike a fair balance between the desire to promote progress among plant researchers and the need to minimize the resulting restrictions that would be placed on farmers.¹³⁸ The “Farmers’ Exemption,” for instance, carved out certain rights for farmers:

[I]t shall not infringe any right hereunder, for a person to save seed produced by him from seed produced by him from seed obtained, or descended from seed obtained, by authority of the owner of the variety for seeding purposes and use such saved seed in the production of a crop for use on the farm of the person, or for sale as provided in this section.¹³⁹

Under this exemption, farmers have the right to save protected seeds to plant the next season or to sell to other farmers for the same

production Cloning, at <http://www.maximumyield.com/viewart.php?article=111> (last visited Feb. 24, 2005). Plants produced through asexual reproduction are considered clones of the original plant. *See id.* Sexual reproduction, on the other hand, involves the exchange of genetic material between parents to produce a new plant, which shares traits from both parents. *See* Master Gardener, Ohio State University Extension School, *Plant Propagation*, at <http://www.hcs.ohio-state.edu/mg/manual/prop.htm> (last visited Feb. 24, 2005). Sexual reproduction in plants usually occurs through the use of seeds. *See id.* Protection was initially restricted to asexually reproduced plants based on the notion that “plant varieties could not be reproduced reliably by seed.” Susan E. Gustad, *Legal Ownership of Plant Genetic Resources – Fewer Options for Farmers*, 18 *HAMLIN L. REV.* 459, 464 (1995).

¹³³ *See* Gustad, *supra* note 132, at 464.

¹³⁴ *See* 7 U.S.C. §§ 2321–2582. In order to receive a certificate and thus protection under the PVPA, a breeder must apply to the United States Department of Agriculture and show that the plant is: (1) new and distinct, (2) novel, and (3) uniform and stable. *Id.* §§ 2402, 2422.

¹³⁵ *See* Nicholson, *supra* note 13, at 18 n.77.

¹³⁶ *Id.*

¹³⁷ *Id.*

¹³⁸ *See* 7 U.S.C. § 2543.

¹³⁹ *Id.* § 2543.

purpose.¹⁴⁰ The exemption does not apply to farmers who sell protected seeds for reproductive purposes as their primary business enterprise.¹⁴¹ In addition, the sale of saved seed under this exemption must be to another farmer whose primary farming purpose is to grow crops for consumption or feed.¹⁴² Thus, the exemption would not apply if the seeds were sold to farmers who grew crops for reproductive purposes.¹⁴³ Despite these and other limitations,¹⁴⁴ the Farmers' Exemption initially provided farmers with sufficient leeway to save seeds from their crops and to sell to other farmers.¹⁴⁵

In *Asgrow Seed Co. v. Winterboer*, however, the Supreme Court interpreted the Farmers' Exemption and imposed significant limitations on a farmer's right to save and sell seeds.¹⁴⁶ The plaintiff, Asgrow Seed, developed agricultural seed and sold it to farmers.¹⁴⁷ The defendants, the Winterboers, were family farmers from northwestern Iowa who had purchased the plaintiff's product.¹⁴⁸ Asgrow alleged that the Winterboers were selling seeds to other farmers using a process called "brown-bagging."¹⁴⁹ This, Asgrow argued, infringed on its certification awarded under the PVPA.¹⁵⁰ The Winterboer's challenged Asgrow's claim on the basis that brown-bagging did not constitute infringement since it was exempt under the Farmers' Exemption delineated in the PVPA.¹⁵¹

Specifically, the Winterboers argued that the language of the Farmers' Exemption confers the right to sell an unlimited amount of seed produced from a protected variety as long as both the buyer and seller are farmers "whose primary farming occupation is the growing

¹⁴⁰ *See id.*

¹⁴¹ *See id.*

¹⁴² *See id.*

¹⁴³ *See id.*

¹⁴⁴ Section 2541 lists eight acts that would infringe on a certificate owner's right, which "include selling, importing, producing hybrids, and dispensing the seeds without notice that are a protected variety." Gustad, *supra* note 132, at 466 n.86; *see* 7 U.S.C. § 2541(1)–(8) (2000).

¹⁴⁵ *See* Gustad, *supra* note 132, at 466.

¹⁴⁶ *See generally* 513 U.S. 179 (1995).

¹⁴⁷ *Id.* at 181–82.

¹⁴⁸ *Id.* at 182.

¹⁴⁹ *Id.* at 181–83. In a brown-bag sale, a farmer purchases seed from a developer, plants the seed in her own fields, harvests the reproduced seed, cleans it, and sells it in non-descript brown bags to other farmers to plant on their own farms. *Id.* at 182.

¹⁵⁰ *Id.* at 181–83.

¹⁵¹ *Id.* at 183–85.

of crops for sale for other than reproductive purposes.”¹⁵² *Asgrow*, on the other hand, contended that the exemption only allows a farmer to save and resell the amount of seed that would be necessary to replant her own fields.¹⁵³

In its interpretation of the exemption, the court of appeals sided with the defendants and found nothing that would limit the amount of protected seed sold to the seller’s own acreage.¹⁵⁴ In effect, this ruling would have allowed a farmer to sell up to half of his crop production from PVPA-protected seed to another farmer for use as seed, as long as he sold the remaining half from that specific variety for non-reproductive purposes.¹⁵⁵

The Supreme Court, however, reversed. In writing the opinion, Justice Scalia applied a narrow interpretation to the word “marketing”¹⁵⁶ in section 2541(a)(3) of the PVPA, which prohibits sexual multiplication “as a step in marketing.”¹⁵⁷ Under this interpretation, the behavior of the Winterboers easily met the low threshold set by the new definition of “marketing.”¹⁵⁸ As a result, the Court found that the Winterboers did not fall within the Farmers’ Exemption and had violated section 2541(a)(3) of the PVPA. Thus, under the *Asgrow* holding, a farmer may only sell PVPA-protected seeds for reproductive purposes if the seeds were originally purchased with the intention to be harvested (i.e., nonreproductive purposes).¹⁵⁹

Under *Asgrow*, the right to sell seed under the Farmer’s Exemption is reduced to the notoriously murky issue of intent. While establishing intent may prove difficult for agribusiness, defending such a suit will prove especially costly for independent farmers like the Winter-

¹⁵² *Id.* at 184.

¹⁵³ *Id.* at 185. The amount of seed that the Winterboers saved and resold “greatly exceeded” the amount that would be needed to replant their fields.

¹⁵⁴ *Id.* at 184.

¹⁵⁵ *Id.* at 185. A sale for nonreproductive purposes would include one that is sold for food or feed.

¹⁵⁶ The court of appeals interpreted the word “marketing” to include “extensive or coordinated selling activities, such as advertising, using an intervening sales representative, or similar extended merchandising or retail activities.” Under this interpretation, the Winterboers were found “exempt” from any infringement under the Farmers’ Exemption of the PVPA since their behavior did not conform with this definition. *Asgrow Seed Co. v. Winterboer*, 982 F.2d 486, 492 (1992). The Supreme Court, however, held that marketing does *not* require that the promotional or merchandising activities connected with the selling be extensive. *Asgrow*, 513 U.S. at 187-88.

¹⁵⁷ *Asgrow*, 513 U.S. at 186.

¹⁵⁸ *Id.* at 187-88.

¹⁵⁹ 513 U.S. at 189.

boers. Establishing intent can be a very complex and nuanced factual issue, making such suits inappropriate for summary judgment¹⁶⁰—thus forcing defendants like the Winterboers to bear the enormous costs associated with discovery and trial. To avoid even the appearance of impropriety and to limit the costs of having to defend even a groundless suit, independent farmers like the Winterboers may simply opt to replant leftover seed the following season even if they originally intended to harvest it that same year.

C. Asgrow's Implication

Asgrow will prove detrimental to farmers and consumers in both the short- and long-term.¹⁶¹ Interestingly, while the case benefits agribusiness conglomerates in the short-term, it will have negative effects in the long-term.¹⁶² Generally, two main consequences will result from the Court's narrow interpretation of the Farmers' Exemption.¹⁶³

First, in the short-term, seed companies will elevate their profits from the increased prices that they can charge.¹⁶⁴ In the United States, for instance, the majority of plant patents are concentrated among a relatively small number of seed companies.¹⁶⁵ As a result, competition to offer the lowest prices is low.¹⁶⁶ In addition, the Court's narrow interpretation of the Farmers' Exemption will increase demand by forcing more farmers to buy seeds directly from seed companies more often.¹⁶⁷ These two dynamics will increase the prof-

¹⁶⁰ See, e.g., *Pullman-Standard v. Swint*, 456 U.S. 273, 287 (1982) (“Treating issues of intent as factual matters for the trier of fact is commonplace.”); *Croley v. Matson Navigation Co.*, 434 F.2d 73, 77 (5th Cir. 1971) (stating that “[t]he court should be cautious in granting a motion for summary judgment when resolution of the dispositive issue requires a determination of state of mind.”); *Flesner v. Technical Communications Corp.*, 575 N.E.2d 1107, 1110 (Mass. 1991) (stating that “[i]n cases where motive, intent, or other state of mind questions are at issue, summary judgment is often inappropriate.”); *Pederson v. Time, Inc.*, 532 N.E.2d 1211, 1213 (Mass. 1989) (stating that “the generally accepted rule is that the ‘granting of summary judgment in a case where a party’s state of mind . . . constitutes an essential element of the cause of action is disfavored.”) (quoting *Quincy Mut. Fire Ins. Co. v. Abernathy*, 469 N.E.2d 797, 800 (Mass. 1984)).

¹⁶¹ See Gustad, *supra* note 132, at 471–72.

¹⁶² See discussion *supra* Introduction.

¹⁶³ See discussion *supra* Introduction; see also Gustad, *supra* note 132, at 471.

¹⁶⁴ Gustad, *supra* note 132, at 471.

¹⁶⁵ *Id.*

¹⁶⁶ *Id.*

¹⁶⁷ *Id.*

its of seed companies, while forcing farmers (directly) and consumers (indirectly) to pay more.¹⁶⁸

Second, increased seed prices may ultimately result in a smaller selection of crops available for farmers to grow.¹⁶⁹ The Court's narrow interpretation of the Farmers' Exemption, for instance, will limit the ability of farmers to sell seeds from the previous season's crop.¹⁷⁰ As a result, they will replant the leftover seeds to harvest as the following year's crop.¹⁷¹ This will result in repetitive farming of the same crops on the same land, which will lead to soil exhaustion.¹⁷² Thus, a chain reaction will begin.¹⁷³ Lower soil quality will cause a reduction in seed variety, which will cause a decreased level of biodiversity, which will cause a decreased range of food sources, which will negatively affect both the consumer as well as the farmer.¹⁷⁴ Initially, lower soil quality will cause a reduction in seed variety to farmers like the Winterboers in the United States. However, as American biotechnology companies expand into third world, biorich countries such as India¹⁷⁵ (where the bulk of the world's seed varieties are found), the same situation will occur, causing a decrease in the world's biodiversity as well. As a consequence, the range of food resources will decrease, which will negatively affect both the consumer as well as the farmer.

Therefore, in the short-term, seed companies will generally experience a rise in profitability at the expense of both farmers and consumers.¹⁷⁶ However, in the long run, all three classes (consumers, farm-

¹⁶⁸ *See id.*

¹⁶⁹ *Id.*

¹⁷⁰ *See generally* *Asgrow Seed Co. v. Winterboer*, 513 U.S. 179 (1995).

¹⁷¹ Gustad, *supra* note 132, at 471.

¹⁷² *Id.* ("Crop rotation, even if it involves rotating different varieties of the same crop, prevents the soil from becoming fallow.").

¹⁷³ *Id.*

¹⁷⁴ *See id.* at 472.

¹⁷⁵ *Should Genetically Modified Crops Be Harvested in Third World Countries* (National Public Radio broadcast, Talk of the Nation, Dec. 27, 2000), available at <http://www.foodfirst.org/media/interviews/2000/totn12-27.html> (last visited Feb. 24, 2005).

And India, the Indian government, has taken a relatively positive view of genetic engineering, has not approved it for commercial use yet, but has started allowing testing, and government officials talk about it in fairly positive terms as far as the potential it has.

Id.

¹⁷⁶ *See* discussion *supra* Introduction; *see also* Gustad, *supra* note 132, at 471.

ers, and seed companies) will be negatively affected due to the consequences associated with a continuous decline in biodiversity.¹⁷⁷

D. United States Geo-centrism: The Assimilation of Chakrabarty and the PVPA

As the United States expanded patentability to include plants and other life forms, two nearly antithetical international concerns were welling: the need to protect the world's biodiversity and the need to protect intellectual property rights.¹⁷⁸ Not surprisingly, beginning in the early 1990s, two international agreements took center stage in the debate over how to protect the biodiversity of developing nations while promoting the interests of patent-holders.¹⁷⁹ The TRIPS Agreement and the CBD became alter-egos, creating a rift between the technology-driven industrialized countries of the North and the biodiversity-abundant developing countries of the South.¹⁸⁰

1. The Third World Challenge

In 1992, the CBD was negotiated at the Rio De Janeiro Earth Summit as a means to address the depletion of the world's biodiversity.¹⁸¹ It became effective on December 29, 1993 and 175 countries are currently parties to the CBD.¹⁸² Article 8(j) specifically obligates member countries to "respect, preserve and maintain knowledge . . . of indigenous and local communities . . . for the conservation and sustainable use of biological diversity . . . and [to] encourage the equitable sharing of the benefits arising from the utilization of such knowledge"¹⁸³

¹⁷⁷ See discussion *supra* Introduction; see also Gustad, *supra* note 132, at 471.

¹⁷⁸ See McManis, *supra* note 57, at 548–49.

¹⁷⁹ See *id.* at 549.

¹⁸⁰ See *id.* at 548.

¹⁸¹ Muria Kruger, Note, *Harmonizing TRIPS and the CBD: A Proposal from India*, 10 MINN. J. GLOBAL TRADE 169, 188 (2001).

¹⁸² See *id.*; As will be discussed, the United States has signed, but not ratified, the CBD. For a list of parties to the CBD and their ratification status, see Parties to the Convention on Biological Diversity, available at <http://www.biodiv.org/world/parties.asp> (last visited Feb. 24, 2005); see also Laurel A. Firestone, Note, *You Say Yes, I Say No: Defining Community Prior Informed Consent under the Convention on Biological Diversity*, 16 GEO. INT'L ENVTL. L. REV. 171, 175 n.20 (2003).

¹⁸³ Convention on Biological Diversity, June 5, 1992, 1760 U.N.T.S. 76, 31 I.L.M. 818, 826, available at <http://www.biodiv.org/doc/legal/cbd-en.pdf> (last visited Feb. 6, 2005) (entered into force on Dec. 23, 1993) [hereinafter CBD].

While the CBD attempts to provide some redress to countries affected by biopiracy, it has been deemed virtually ineffective in protecting the rights of biodiversity-rich countries.¹⁸⁴ In analyzing the CBD, it is helpful to begin with article 1, which enumerates the following goals: (1) the conservation of biological diversity, (2) the sustainable use of the components of biological diversity, and (3) the fair and equitable sharing of benefits arising from the use of genetic resources, including appropriate access to genetic resources—taking into account all rights over those resources, transfer of relevant technologies, and funding.¹⁸⁵ Generally, article 1 tries to strike a balance between conservation, sustainable use, and sharing of benefits.¹⁸⁶

Article 3 of the CBD also serves an ambitious purpose, granting states “the sovereign right to exploit their own resources pursuant to their own environmental policies,” subject to “the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment . . . beyond the limits of national jurisdiction.”¹⁸⁷ Therefore, according to article 3, a nation could theoretically deny all foreigners access to its genetic resources.¹⁸⁸ Realistically, however, two important considerations prevent developing countries from exercising their article-3 rights.¹⁸⁹ First, developing countries are poorly equipped to handle the intricacies of bioprospecting, which include the product’s development, patenting, and large-scale manufacturing.¹⁹⁰ Second, the governments of developing countries find the compensation offered from northern bioprospectors, however slim, difficult to resist given the growing need to provide their citizens with basic necessities.¹⁹¹

¹⁸⁴ See Firestone, *supra* note 182, at 183.

¹⁸⁵ CBD, *supra* note 183, at 823; McManis, *supra* note 57, at 556.

¹⁸⁶ See CBD, *supra* note 183, at 823.

¹⁸⁷ See *id.* at 824.

¹⁸⁸ See *id.*

¹⁸⁹ See Remigius N. Nwabueze, *Ethnopharmacology, Patents and the Politics of Plants’ Genetic Resources*, 11 CARDOZO J. INT’L & COMP. L. 585, 596–97 (2003).

¹⁹⁰ See *id.* Professor Nwabueze notes that the third world research facilities that would normally develop and patent a product “are either extinct or in a sorry state of dilapidation.” *Id.*

¹⁹¹ See *id.* at 597. Professor Nwabueze also implies that a developing country’s lack of infrastructure lends it to accept a bioprospector’s best offer: “The infrastructure is simply not there. Power supply . . . is in a permanent epileptic state . . . roads are largely in a state of disrepair . . . [h]igh rate of unemployment has created serious doubts as to the necessity and utility of formal education.” *Id.* (citations omitted).

Articles 15 and 16 are the most controversial provisions of the CBD; the articles attempt to regulate the flow of genetic resources and biotechnology between the North and the South.¹⁹² In line with article 3's purpose of guaranteeing developing nations sovereignty over their natural resources, article 15 gives national governments "the authority to determine access to genetic resources" and makes such access subject "to national legislation."¹⁹³ In addition, this Article provides that access to genetic resources may occur only on "mutually agreed terms."¹⁹⁴ Equally controversial, article 16 requires developed countries to transfer technology to developing countries.¹⁹⁵

Interestingly, the United States initially refused to sign the CBD, stating that it posed a conflict to intellectual property rights.¹⁹⁶ Recognizing the biotechnology industry's massive revenues and significant potential for future growth,¹⁹⁷ then President George H.W. Bush refused to sign the CBD because it would limit American intellectual property rights.¹⁹⁸

However, at the urging of U.S. pharmaceutical and biotechnology firms, the Clinton administration signed the CBD on June 4, 1993.¹⁹⁹ The endorsement of the CBD gave these pharmaceutical and biotechnology firms the opportunity to interpret the precise meaning of certain clauses in future treaty negotiations.²⁰⁰ To this end, while lobbying for the United States to endorse the CBD, these companies also joined a business-environmental coalition, which encouraged President Clinton to simultaneously issue an "interpretive statement."²⁰¹ The purpose of the statement was to establish that the United States would read certain provisions of the CBD in a manner that protected intellectual property rights.²⁰² The decision to sign the CBD based on

¹⁹² See CBD, *supra* note 183, at 828-29; Craig H. Allen, *Protecting the Oceanic Gardens of Eden: International Law Issues in Deep-Sea Vent Conservation and Management*, 13 GEO. INT'L ENVTL L. REV. 563, 604 (2001).

¹⁹³ CBD, *supra* note 183, at 828-29.

¹⁹⁴ *Id.*

¹⁹⁵ *Id.* at 829.

¹⁹⁶ McManis, *supra* note 9, at 256.

¹⁹⁷ "The biotechnology industry has mushroomed since 1992, with revenues increasing from \$8 billion in 1992 to \$34.8 billion in 2001." Minnesota Biotechnology, *What is Biotechnology?*, at <http://www.mnbio.org/whatisbiotech/> (last visited Feb. 24, 2005).

¹⁹⁸ McManis, *supra* note 9, at 256.

¹⁹⁹ *Id.*

²⁰⁰ See *id.* at 256-57.

²⁰¹ *Id.*

²⁰² *Id.* at 257.

this contingency was met with a flurry of protests from developing member countries of the CBD, who viewed the statement as an attempt to derail the effort to protect the world's biodiversity.²⁰³ As a result, the United States agreed to omit the text when it signed the treaty in June 1993, and planned to formulate an alternative version of the text when ratifying the treaty in September 1993.²⁰⁴ However, Congress has yet to ratify the treaty.²⁰⁵ Thus, with respect to the United States, the CBD is very much a "dead" document.²⁰⁶

Overall, while the CBD initially appeared promising to developing countries, it has done little to increase their access to biotechnology for two major reasons.²⁰⁷ First, the United States, which dominates biotechnology research and development, signed the CBD on June 4, 1993, but has yet to ratify it.²⁰⁸ Second, the CBD's provisions are ambiguous.²⁰⁹ For example, signatories are required to take legislative, administrative, or policy measures "as appropriate" and must share the results of research and development "in a fair and equitable way."²¹⁰ These vague phrases make enforcement of the CBD difficult, and thus severely undermine its efficacy. Overall, the CBD has provided the developing South with little recourse in controlling bio-piracy.

²⁰³ See Pratap Chatterjee, *Environment: Biodiversity Pact Change "Threatens Ecology"*, INTER PRESS SERVICE GLOBAL INFORMATION NETWORK, July 16, 1993, available at 1993 WL 2538431. Third World Network in India activist, Dr. Vandana Shiva, raised awareness concerning the interpretative text's implications among groups around the world, spawning large numbers of protest letters and faxes to the U.S. government.

²⁰⁴ See *id.*

²⁰⁵ McManis, *supra* note 9, at 257.

²⁰⁶ See *id.*

²⁰⁷ See *id.*; Sean D. Murphy, *Biotechnology and International Law*, 42 HARV. INT'L L.J. 47, 71 (2001).

²⁰⁸ See McManis, *supra* note 9, at 257.

²⁰⁹ Murphy, *supra* note 207, at 71.

²¹⁰ CBD, *supra* note 183, at 828-29. "Each Contracting Party shall take legislative, administrative or policy measures, as appropriate, . . . with the aim of sharing in a fair and equitable way the results of research and development and the benefits arising from the commercial and other utilization of genetic resources with the Contracting Party providing such resources . . ." (emphasis added). *Id.* Articles 8(j) and 10(c) have been criticized on the same basis. See MICHAEL HALEWOOD, CIP ESEAP, *Genetic Resources, Traditional Knowledge and International Law*, available at [http://www.eseap.cipotato.org/upward/Publications/Agrobiodiversity/pages%20501-513%20\(Paper%2060\).pdf](http://www.eseap.cipotato.org/upward/Publications/Agrobiodiversity/pages%20501-513%20(Paper%2060).pdf) (last visited Feb. 24, 2005).

2. *The Industrialized Conquest*

In 1993, the TRIPS Agreement, which sets forth minimum international standards designed to protect intellectual property, officially entered the biopiracy debate.²¹¹ One year later, the TRIPS Agreement was ratified during the Uruguay Round of the General Agreement on Tariffs and Trade (GATT), which created the World Trade Organization (WTO).²¹² Under the TRIPS Agreement, an international and highly protective intellectual property system was established.²¹³ In many ways, the TRIPS Agreement is considered the antithesis of the CBD—it was met with strong resistance from developing countries for many years.²¹⁴ However, faced with threats of bilateral trade sanctions from the United States Trade Representative,²¹⁵ resistance among developing nations quickly dissipated.²¹⁶ In this respect, “[t]he TRIPS Agreement accomplishes, through the potential threat of economic ostracism, what could not be accomplished through negotiations independent of the international economic framework.”²¹⁷

Predictably, the TRIPS Agreement has been criticized as serving the interests of industrialized nations at the expense of developing countries.²¹⁸ Such criticism is not unfounded as American lobby groups played a significant role in ensuring the passage of the TRIPS Agreement.²¹⁹ For example, the International Intellectual Property Alliance (IIPA)²²⁰ and the Intellectual Property Committee (IPC),²²¹

²¹¹ See Marrakech Agreement Establishing the World Trade Organization, Apr. 15, 1994, Annex 1C: Agreement on Trade-Related Aspects of Intellectual Property Rights Including Trade, 33 I.L.M. 81, 84 [hereinafter TRIPS]; Nabila Ansari, *International Patent Rights in a Post-Doha World*, 11 CURRENTS: INT’L TRADE L.J. 57, 60-61 (2002).

²¹² See Diana D. McCall, Note, *Stating the Obvious: Patents and Biological Material*, 2003 U. ILL. J.L. TECH. & POL’Y 239, 247 (2003).

²¹³ See generally TRIPS, *supra* note 211.

²¹⁴ See McCall, *supra* note 212, at 240.

²¹⁵ See *id.*; The United States, Japan, and the European Community were the principal supporters of TRIPS due to a then-estimated \$60 billion per year they were losing from patent violations in developing nations. In addition, intellectual property has become the United States’ largest export. See *id.* at 246-47.

²¹⁶ See *id.* at 240-41.

²¹⁷ See *id.* (quoting Ruth L. Gana, *The Myth of Development, The Progress of Rights: Human Rights to Intellectual Property and Development*, 18 LAW & POL’Y 315, 334 (1996)).

²¹⁸ See Ansari, *supra* note 211, at 60.

²¹⁹ See *id.*

²²⁰ Susan K. Sell, *Post-TRIPS Developments: The Tension Between Commercial and Social Agendas in the Context of Intellectual Property*, 14 FLA. J. INT’L L. 193, 194 (2002). The IIPA is best described as an “umbrella lobbying group” that promotes the in-

organizations that lobby for intellectual property policy that benefits the biotechnology industry and other companies with patent-intensive products, "were major players in the push for TRIPS."²²²

Because of the one-sided private interest groups involved, the TRIPS Agreement exacerbates the effects of biopiracy, causing native populations to further lose control over their resources.²²³ Article 27.3(b) of the TRIPS Agreement is especially troublesome to developing countries because it essentially transforms the *Chakrabarty* decision into an international ruling, forcing other WTO member-countries to fall in line with the United States in accepting the patentability of life.²²⁴ For example, the TRIPS Agreement effectively overrules the Indian Patent Act of 1970 by requiring the protection of plant genetic resources.²²⁵ As a result, India must protect its plant genetic resources "either by patents or by an effective *sui generis* system or by any combination thereof."²²⁶ Developing countries have criticized the *sui generis*²²⁷ alternative as being just as elaborate as a patent system.²²⁸ Consequently, this alternative provides no real

terests of eight trade associations and more than 1,500 companies, which sell products and services that are copyright-intensive. *See id.*

²²¹ *Id.* The number of IPC members has ranged between eleven and fourteen. When the Uruguay Round of GATT began in 1986, its members included Bristol-Myers, CBS, DuPont, General Electric, General Motors, Hewlett-Packard, IBM, Johnson & Johnson, Merck, Monsanto, and Pfizer. *Id.* at 194 n.2.

²²² Ansari, *supra* note 211, at 60.

²²³ *See id.*

²²⁴ *See* Shalini Bhutani & Ashish Kothari, *The Biodiversity of Rights of Developing Nations: A Perspective from India*, 32 GOLDEN GATE U. L. REV. 587, 611 (2002); Meetal Jain, Note, *Global Trade and the New Millenium: Defining the Scope of Intellectual Property Protection of Plant Genetic Resources and Traditional Knowledge in India*, 22 HASTINGS INT'L & COMP. L. REV. 777, 781 (1999).

²²⁵ Jain, *supra* note 224, at 781. Although the Indian Patent Act of 1970 does not explicitly prohibit the patenting of genetic resources, its language allows for this interpretation and "excludes from patentability any method of agriculture or horticulture and inventions that are frivolous or claim anything obviously contrary to well-established natural laws." *Id.* at 781 n.16.

²²⁶ *See* TRIPS, *supra* note 211, at 94.

²²⁷ *Sui generis* is defined as "[of] its own kind or class[.]" BLACK'S LAW DICTIONARY 1448 (7th ed. 1999). Countries that utilize such intellectual property rights protection systems (IPRPS) theoretically may specify subject areas and certain rights to which their IPRPSs will apply. *See* Jain, *supra* note 224, at 779 n.8.

²²⁸ For example, at a minimum, member-countries that promulgate their own *sui generis* system to comply with article 27.3(b) are required to:

- 1) provide for an intellectual property right;
- 2) provide the same advantages to non-nationals as nationals;
- 3) provide the same advantages to all WTO-member trading partners (MFN);
- 4) cover plant varieties of all species;
- 5) permit actions against infringement;

choice as to how member-countries may comply with article 27.3(b).²²⁹

Developing countries also take issue with the enforcement mechanism set forth under the TRIPS Agreement.²³⁰ When the WTO officially replaced GATT, it further strengthened the underlying policy of the TRIPS Agreement—protecting intellectual property rights by establishing new, relatively stringent enforcement mechanisms.²³¹ A member state that violates a TRIPS Agreement provision, for instance, sparks various dispute resolution processes, resulting in a panel decision regarding the corrective action that should be taken.²³² Under GATT, the panel's decision served merely as a recommendation to member states as to what punishment, if any, should result.²³³ However, under the WTO, the Dispute Settlement Body makes all panel decisions binding unless the members agree to override the decision.²³⁴ Therefore, because the TRIPS Agreement mandates a higher level of intellectual property protection, and because there is now a presumption that all panel decisions are binding, developing member countries are faced with greater pressure to avoid violating the TRIPS Agreement and the harsh trade sanctions that can follow.²³⁵ In the words of one commentator:

Even though the majority of the 135 members of the WTO are poor countries, they are being virtually held hostage. Third World countries . . . [are] compelled to go along with the developed countries because most of these poor countries are dependent on bilateral trade relations with one or more developed countries.²³⁶

6) be more than a registration of a trademark/name; 7) be more than a geographical denomination; and 8) provide more than protection against unfair competition.

Jain, *supra* note 224, at 781 n.18. While the rules of article 27.3(b) were to be reviewed by the TRIPS Council beginning in 1999, no changes have been made thus far. Frederick M. Abbott, *TRIPS in Seattle: The Not-So-Surprising Failure and the Future of the TRIPS Agenda*, 18 BERKELEY J. INT'L L. 165, 169 (2000); see TRIPS, *supra* note 211, at 94.

²²⁹ See TRIPS, *supra* note 211, at 94.

²³⁰ See Jain, *supra* note 224, at 781-82.

²³¹ See *id.* at 782.

²³² See *id.*

²³³ See *id.*

²³⁴ *Id.*

²³⁵ *Id.*

²³⁶ Nadia Natasha Seeratan, *The Negative Impact of Intellectual Property Patent Rights on Developing Countries: An Examination of the Indian Pharmaceutical Industry*, 3 SCHOLAR 339, 360 (2001).

Although it has been argued that developing countries will have the opportunity to benefit from the strongly protected intellectual property rights mandated by the TRIPS Agreement, this argument fails in two respects.²³⁷ First, acquiring a patent is beyond the financial means of many indigenous populations.²³⁸ Second, even if indigenous populations were able to use their traditional knowledge as a basis to patent a product, enforcement of such patents would most likely prove “prohibitively expensive.”²³⁹ Factors such as “lack of economic self-sufficiency,” “unequal bargaining power” between the third world and the corporate world, and “the high cost of litigation” effectively preclude any benefits such countries could potentially receive from the TRIPS Agreement.²⁴⁰

3. Compliance with Article 27.3(b): Monsanto

Recent developments clearly indicate that the inhabitants of even some of the most strongly developed countries will be negatively affected as their home countries enforce the TRIPS Agreement.²⁴¹

In *Monsanto Canada Inc. v. Schmeiser*, Monsanto, the world’s largest seller of GM crops in the world, sued Canadian farmer Percy Schmeiser for allegedly infringing on its patent.²⁴² The suit was based on Monsanto’s discovery of its GM RoundUp Ready canola—

²³⁷ See Graham Dutfield, *TRIPS-Related Aspects of Traditional Knowledge*, 33 CASE W. RES. J. INT’L L. 233, 255 (2001).

²³⁸ See *id.* at 255-56. “Even though patent fees in some jurisdictions may be reduced for small and medium-sized enterprises, the cost of acquiring a patent is still likely to be prohibitive.” *Id.* at 256.

²³⁹ See *id.* at 255. For example, the cost to prepare and prosecute a patent application in the United States is estimated at \$20,000. *Id.*

²⁴⁰ *Id.*

²⁴¹ See generally *Monsanto Canada Inc. v. Schmeiser*, [2001] F.C. 256, available at <http://decisions.fct-cf.gc.ca/fct/2001/2001fct256.html> (last visited Feb. 24, 2005). Among others, Monsanto has also filed suit against the North Dakota Nelson Farm in the United States, alleging that the Nelsons infringed on its patent by saving RoundUp Ready soybean seed from their 1998 and 1999 crop. While the North Dakota State Seed Arbitration Board ruled against the company’s claim, Monsanto nevertheless continues to pursue its case and has filed suit in federal court. Thompson Coburn LLP, the law firm representing Monsanto, has also taken action outside of the courtroom. In what may be described as an intimidation tactic, Thompson Coburn sent letters to at least twenty-three seed distributors in North Dakota, instructing them to “avoid selling Monsanto’s products to the Nelsons.” See generally Robert Schubert, *Monsanto Still Suing Nelsons, Other Growers*, available at <http://www.nelsonfarm.net/issue.htm> (last visited Feb. 24, 2005).

²⁴² *Monsanto*, [2001] F.C. 256, ¶ 1; see also Corporate Watch, *Monsanto*, at <http://www.corporatewatch.org.uk/profiles/biotech/monsanto/monsanto1.html> (last visited Feb. 24, 2005).

Canola designed to withstand the use of certain pesticides—growing on Schmeiser’s land without a license.²⁴³ Despite Schmeiser’s contention that the seed growth on his farm occurred through no act of his own, the lower court ruled that the way in which the seeds ended up on the defendant’s land was “really not significant” to the resolution of the case, and ordered that all of the profits made from crops produced by the patented seed belonged to Monsanto.²⁴⁴ Based on the reasoning set forth in this holding, Schmeiser was ordered to pay approximately \$140,000 in damages and legal costs.²⁴⁵ The appellate court affirmed the lower court’s ruling, but did so on different grounds, focusing instead on the knowledge of the farmer.²⁴⁶ In its decision, the court reasoned that a farmer would be liable for patent infringement if he saved seed from plants that he “knew or should have known . . . were glyphosate resistant” and then cultivated and sold the resulting plants.²⁴⁷

In 1999, Monsanto dominated 80 percent of the market share of the seed biotechnology industry.²⁴⁸ In addition, 71 percent of the GM crops planted the year before were engineered to be resistant to

²⁴³ See *Monsanto*, [2001] F.C. 256, ¶ 15, 37.

²⁴⁴ See *id.* at ¶ 11, 119. “[T]he source of the RoundUp resistant canola in the defendants’ 1997 crop is really not significant for the resolution of the issue of infringement which relates to the 1998 crop.” *Id.*

²⁴⁵ See *id.* at ¶ 128–140.

²⁴⁶ Hilary Preston, *Drift of Patented Genetically Engineered Crops: Rethinking Liability Theories*, 81 TEX. L. REV. 1153, 1157 n.40 (2003); see *Schmeiser v. Monsanto Canada Inc.*, [2002] F.C. 309, paras. 58–60.

²⁴⁷ Preston, *supra* note 246, at 1157 n.40; see *Schmeiser v. Monsanto Canada Inc.*, [2002] F.C. 309, ¶ 58–60. The Supreme Court of Canada agreed to hear the appeal, which was argued on January 20, 2004. A.B. Hansen, *Percy Schmeiser’s Supreme Court GMO update*, available at <http://www.commonground.ca/iss/0402151/schmeiser.shtml> (last visited Feb. 24, 2005).

²⁴⁸ *Speed Bump or Blow-Out for GM Seeds? Stalling Markets, Taco Debacle & Biotech Bail Outs*, (Dec. 21, 2000) 2 RURAL ADVANCEMENT FOUND. INT’L, (Canada), available at http://www.etcgroup.org/documents/geno_speedbump.pdf (last visited Feb. 24, 2005).

The market for GM seeds is overwhelmingly dominated by Monsanto (now owned by Pharmacia). In 1999, Monsanto’s GM seeds were planted on 34.8 million hectares (86 million acres) worldwide—approximately 87% of the total area devoted to GM crops in 1999. Global area devoted to Monsanto’s biotechnology traits increased a whopping 48%—from 23.5 million hectares in 1998 to 34.8 million hectares in 1999.² Wood Mackenzie, agrochemical industry analysts based in London, estimates that Monsanto held an 80% market share for agbiotech in 1999.

Id.

Roundup or a similar herbicide.²⁴⁹ As companies such as Monsanto seek to continually expand, stories such as Schmeiser's will inevitably become more common. Thus, the rulings of the trial and appellate courts place the conventional farming community in a "Catch-22."²⁵⁰ Once a farmer has reason to know that his crop has been contaminated—which poses a very real threat—he has the duty to save seed from crops that found their way onto his land.²⁵¹ The farmer, however, has no efficient means to distinguish his conventionally-grown (CG) crops from those that are GM and patented.²⁵² As a result, the farmer will be forced to employ the same means implemented by Monsanto inspectors—spraying the crops with RoundUp.²⁵³ This act will most likely kill all of the farmer's CG crops, leaving behind the GM patented crops.²⁵⁴

Since the farmer does not have a license agreement to grow the GM patented crops, and since the large majority of his CG crops are most likely dead due to the spraying, the farmer will not have the ability to make a profit on his crops.²⁵⁵ Finally, since he is prohibited from saving GM patented seed, he will be forced to purchase all new seed for the subsequent year's planting.²⁵⁶ If the farmer does not follow this process, and instead simply saves seed in accordance with normal farming tradition, he risks being sued for patent infringement and losing substantial revenues.²⁵⁷ In order to avoid the lengthy and financially-unsound process of crop distinction, and to limit potential liability, most farmers will simply opt to purchase GM patented seeds

²⁴⁹ Organic Consumers Association, *New Study Links Monsanto's RoundUp to Cancer*, at

<http://www.organicconsumers.org/Monsanto/glyphocancer.cfm> (last visited Feb. 24, 2005).

71% of genetically engineered crops planted in 1998 [in the United States] are designed to be resistant to herbicides such as glyphosate, marketed by Monsanto as Roundup. Companies developing herbicide resistant crops are also increasing their production capacity for the herbicides such as glyphosate

Id.

²⁵⁰ Preston, *supra* note 246, at 1159.

²⁵¹ *Id.*

²⁵² *See id.*

²⁵³ *See id.*

²⁵⁴ *Id.*

²⁵⁵ *See id.* at 1159-60.

²⁵⁶ *Id.* at 1159.

²⁵⁷ *Id.*

from the beginning.²⁵⁸ As a result, plant biodiversity will continue to decline, the price of CG and organic crops will increase due to lack of supply, and the price of GM patented seed will rise due to a spike in demand.²⁵⁹ In the short-term, because of price increases, farmers and consumers everywhere will be the most affected.²⁶⁰ In the long-run, due to diminishing biodiversity, no one (not even Monsanto) will benefit.²⁶¹

IV

ERADICATING BIOPIRACY—TRADITIONAL CURES AND MODERN-DAY REMEDIES

The legal duty of corporations to maximize the wealth of their shareholders is in direct conflict with the notion that corporations will compensate indigenous populations when not legally required to do so. Similarly, corporations will be inclined to use the favorable rulings in *Asgrow* and *Monsanto* to file patent infringement suits and increase their bottom line. Therefore, we should not look to the biotechnology industry to help stop biopiracy. In fact, because biopiracy is lucrative, the biotechnology industry has done, and will do, everything in its power to ensure that biopiracy continues to exist. Instead, we must turn to the institutions that allow biopiracy to remain legal (and highly lucrative) in the first place: the government and the unknowing consumer.

²⁵⁸ See *id.* at 1160.

²⁵⁹ See discussion *supra* Parts III.A, C.

²⁶⁰ Once contamination does occur, it appears that such affects will be particularly damaging to the inhabitants of the developing world where “[a]griculture is the primary source of employment and livelihood for [three] out of [four] people” See Rattray, *supra* note 66, at 12.

See discussion *supra* Part III.A, C. There are also implications that people’s health may be in danger. See Gustad, *supra* note 132, at 471. For example, if given a choice, a farmer would most likely opt to develop conventional crops that are naturally resistant to the weeds and insects, instead of relying on chemicals. *Id.* at 472. However, under the scenario described above, because farmers now have a large incentive (i.e, avoid being sued) to use GM crops, this will increase the amount of chemicals used on farms. See *id.* at 471-72. Ironically, “[a]griculture is the largest contributor to non-point water pollution because of the extensive use of fertilizer, herbicides, and pesticides.” *Id.* at 459 n.7.

²⁶¹ See discussion *supra* Part III.C.

A. *The Medicine for Traditional Biopiracy*

1. *The United States: Ensuring Non-Waivable Rights for Third World Countries*

As the leader of the industrial world, the United States should amend the TRIPS Agreement to require companies that obtain patents based on traditional knowledge to enter into a mandatory contract guaranteeing specific, non-waivable rights to the developing nations from which the resource originated. This contract should delineate two essential, non-waivable rights.

The first right, if appropriate, should be a “re-forestation” plan that calls for restocking of the natural resource from which a patent is derived at a rate similar to its extraction. When unitary corporations patent a natural resource, the traditional population’s knowledge transfers to the hands of one patent holder, and thus becomes monopolized.²⁶² This monopolization artificially drives up the price of the specific plant in question, preventing those who were first to realize and use the resource from continuing its use.

The patenting of neem seed extract serves as a good example.²⁶³ The neem tree is an indigenous plant of India and its oil has been used medicinally for hundreds of years to cure a number of ailments.²⁶⁴ In addition, the residue left behind after the oil has been extracted from neem seeds is used as a highly effective insecticide.²⁶⁵ In 1971, aware of the many uses of the neem tree, United States national Robert Larson used neem seed extract to produce and patent a pesticide known as Margosan-O.²⁶⁶ In 1988, Larson sold his patent to W.R. Grace.²⁶⁷ Soon thereafter, W.R. Grace began processing twenty tons of neem seed per day.²⁶⁸ As a result, neem seed prices in India

²⁶² See discussion *supra* Part I.A.

²⁶³ See Keith Aoki, *Neocolonialism, AntiCommons Property, and Biopiracy in the (Not-So-Brave) New World Order of International Intellectual Property Protection*, 6 IND. J. GLOBAL LEGAL STUD. 11, 51–52 (1998).

²⁶⁴ *Id.* at 51.

²⁶⁵ *Id.*

²⁶⁶ *Id.*

²⁶⁷ *Id.* The market worth of the neem seed product totaled \$400 million in 1993. Tanner, *supra* note 87.

²⁶⁸ Aoki, *supra* note 263, at 51. Under U.S. patent law, the *process* that W.R. Grace employs to extract the chemical from the neem seed and the process used to produce a stable emulsion with a stable shelf-life both meet the novelty requirement. See Shubha Ghosh, *The Traditional Terms of the Traditional Knowledge Debate*, 23 NW. J. INT’L L. & BUS. 589, 619 (2003). While the complexity of Grace’s method contrasts with that of In-

skyrocketed from 300 rupees per ton to an average of 3500 rupees per ton.²⁶⁹ In effect, patenting and large-scale production of the neem seed has made this resource too expensive for the average local farmer in India to purchase.²⁷⁰ This has forced the population to change the crops they farm and abandon the traditional cures they have relied upon for countless generations.²⁷¹ A “re-forestation” plan will keep inflation of a particular natural resource in check, which will benefit not only the indigenous population, but biotechnology companies as well.

Second, the contract should include a provision that entitles developing countries to compensation. The compensation, however, should not be in the form of a lump sum compensatory scheme. Such a payment scheme would not be effective in eliminating the drawbacks of biopiracy. If companies are allowed to compensate native countries in lump sum fashion, such compensation would function as a zero-interest loan because of the inflation that results when a patent is approved (as illustrated by the case of the neem seed). Due to such inflation, natives who continue to rely on the natural resource in question for daily living will most likely end up paying the bulk of the lump sum “award” back over time as they continue to make purchases. Instead, the contract should include a proviso that grants the country a right to receive royalties from all sales.

This cooperative approach between international intellectual property rights and the environmental protection of developing countries has already emerged in isolated incidents.²⁷² An example includes the 1991 contract between Costa Rica’s Instituto Nacional de Biodiversidad (INBio) (a private, non-profit organization with close ties to the Costa Rican government) and Merck & Company, Ltd. (Merck) (a pharmaceutical company based in the United States).²⁷³ In this contract, INBio agreed to provide Merck with 10,000 sample chemical

dian farmers – who simply smash the seeds, soak them in water overnight, skim the emulsion off the top, and throw it on their crops—the final product is essentially the same. Vandana Shiva, *The Neem Tree: A Case History of Biopiracy*, at <http://www.twinside.org.sg/title/pir-ch.htm> (last visited Feb. 24, 2005). In the end, Larson and W.R. Grace made millions, and the inhabitants of India were compensated nothing. *Id.*

²⁶⁹ Aoki, *supra* note 263, at 51.

²⁷⁰ *See id.* at 52.

²⁷¹ *See id.*

²⁷² Craig Allen Nard, *In Defense of Geographic Disparity*, 88 MINN. L. REV. 222, 233–34 (2003).

²⁷³ *See id.*

extracts from wild plants, insects, and microorganisms from Costa Rica's conserved wildlands for Merck's drug-screening program.²⁷⁴ In return, it is believed that Merck paid INBio \$1.35 million for these samples and for information on their traditional use.²⁷⁵ Merck also agreed to pay royalties "on future sales of products developed from the samples, which are invested, in part, in conservation efforts."²⁷⁶

Mandating such non-waivable rights is vital since developing countries may attempt to outbid one another in the hopes of securing much needed capital, creating a "race to the bottom" scenario.²⁷⁷ In order to further guard against this contingency, the CBD should be given the authority to approve or deny all contracts involving member developing countries. Such a procedure would essentially "unionize" all developing nations, giving them more leverage in negotiating contract terms and preventing a "race to the bottom" from occurring.

2. *The Global South: Using the Novelty Requirement to Its Benefit*

Developing countries can take an active role in resisting biopiracy by instituting a systematic publication of traditional knowledge. By implementing such a publication, developing countries will be able to use section 102(a) of the Patent Act to their advantage.²⁷⁸ In fact, in August 1998, India's Council for Scientific and Industrial Research challenged a U.S. patent for the use of turmeric as a healing agent.²⁷⁹ This became the first known case where a developing country successfully challenged a U.S. patent of its traditional knowledge.²⁸⁰ However, "in order to prevail, attorneys had to scour translated texts" and find written evidence that the powder form of turmeric "had been used for healing for several generations in India."²⁸¹ A publication, whereby such information is accumulated well beforehand, would make the litigation process much easier and would also increase the success rate of future challenges in patent cases.²⁸²

²⁷⁴ See *id.* at 234.

²⁷⁵ *Id.*

²⁷⁶ *Id.* (citation omitted).

²⁷⁷ See Frank René López, *Corporate Social Responsibility in a Global Economy After September 11: Profits, Freedom, and Human Rights*, 55 MERCER L. REV. 739, 740 (2004); Murphy, *supra* note 207, at 73.

²⁷⁸ See discussion *supra* Part I.B.1.

²⁷⁹ Jain, *supra* note 224, at 816.

²⁸⁰ *Id.*

²⁸¹ *Id.*

²⁸² See *id.*

a. *United States Assistance: The Use of Its Peace Corps*

In fact, should the United States choose to help developing countries to organize such publications, it would find itself poised to do so. Through the Peace Corps, the U.S. government has volunteers in approximately seventy-one countries.²⁸³ Out of these countries, twenty-two are among the fifty most biodiverse countries in the world.²⁸⁴ The United States could mobilize Peace Corps volunteers to gather and publish information about traditional cures. While this may require more funds on the part of the United States, such an effort should be viewed as an investment. Because native populations have become increasingly wary and hesitant to share traditional medicinal knowledge with outsiders for fear of exploitation, using Peace Corps volunteers, who work in and are an active part of these communities, will break down this barrier.

Overall, the benefits of instituting such a publication system are three-fold. First, the fact that traditional cures have been documented will prevent companies from obtaining a patent based on the loophole under section 102(a) of U.S. patent law.²⁸⁵ Indeed, the loophole created in section 102(a) undercuts the public policy behind patent law.²⁸⁶ Second, because such a publication would encourage indigenous populations to share their knowledge, a greater number of potentially patentable traditional medicinal cures will be available, which

²⁸³ See Peace Corps, *About the Peace Corps, Where Do Volunteers Go?*, at <http://www.peacecorps.org/index.cfm?shell=learn.wherepc> (last visited Feb. 24, 2005) (Peace Corps informational website).

²⁸⁴ See Fogarty International Center, *Economic Development and Biodiversity*, at <http://www.fic.nih.gov/programs/countries.html> (last visited Feb. 24, 2005).

The World Conservation Monitoring Centre has designated Groups of countries that are likely to be conservation priorities based upon species richness and endemism.

Group 1 countries are the 25 most biodiverse countries in the world in terms of sheer numbers of species present. These countries are: Argentina, Australia, *Bolivia*, Brazil, *Cameroon*, *China*, Colombia, *Costa Rica*, *Ecuador*, Ethiopia, India, Indonesia, *Madagascar*, Malaysia, México, Papua New Guinea, *Perú*, *the Philippines*, *South Africa*, *Tanzania*, the USA, [ex-USSR], Venezuela, Vietnam, and Zaire.

Group 2 countries are the 25 next most biodiverse countries in the world in terms of sheer numbers of species. These countries are: Angola, *Botswana*, Cambodia, Central African Republic, Chile, Congo, Côte d'Ivoire, Cuba, *Gabon*, *Ghana*, *Guatemala*, *Guyana*, Iran, *Kenya*, Laos, Myanmar, Nigeria, *Panama*, *Paraguay*, Sudan, *Suriname*, *Thailand*, Turkey, *Uganda* and *Zambia*.

Id. (emphasis added to denote countries where the United States has Peace Corps volunteers).

²⁸⁵ See discussion *supra* Part I.B.1.

²⁸⁶ See discussion *supra* Part I.C.

will benefit the population worldwide.²⁸⁷ Finally, the written publication would give indigenous populations leverage in negotiating contracts, which, at the very least, will include the non-waivable minimum terms described above. The opportunity to secure a continuous stream of compensation (i.e., royalty payments) will infuse third world countries with much needed funds to provide their inhabitants with improved infrastructure, healthcare, and educational opportunities.

B. The Cure for Modern-Day Biopiracy

Farmers who maintain conventional farming practices should recognize that they have much to gain from consumers who are committed to buying non-GM food. Not only do such consumers provide traditional farmers with revenue, but they also reduce the revenue of manufacturers of GM seed such as Monsanto. For example, consumers who boycott GM products give conventional farmers the economic strength necessary to counter the lobbying efforts of seed biotechnology firms and the resulting corporate-friendly laws. Specifically, conventional farmers should work to increase the percentage of people who boycott GM food products by giving consumers the power to differentiate between GM and non-GM food products.

Statistics indicate that conventional farmers already have an interested audience. For example, despite the fact that GM crop revenues continue to soar—rising from an estimated \$75 million in 1995 to \$1.6 billion in 1998, and increasing another 50 percent to reach nearly \$2.3 billion in 1999—overall consumer and food industry confidence in GM foods is relatively low.²⁸⁸ An ABC News poll conducted in 2003 revealed that one-third of Americans try to avoid buying foods that have been genetically modified or treated with antibiotics or hormones.²⁸⁹ In addition, almost half of adults indicated they would try to avoid hormone- or antibiotic-treated food labeled as such.²⁹⁰

²⁸⁷ See *supra* text accompanying note 92.

²⁸⁸ See Thomas O. McGarity, *Seeds of Distrust: Federal Regulation of Genetically Modified Foods*, 35 U. MICH. J.L. REFORM 403, 408–11 (2002).

²⁸⁹ ABC News Poll: Food Safety 1 (July 13, 2003), at <http://abcnews.go.com/images/pdf/930a1FoodSafety.pdf> (last visited Feb. 24, 2005).

²⁹⁰ *Id.* The Food and Drug Administration (FDA) “has opted to take the view that unless real consequences ensue from the fact that a food is produced employing biotechnology techniques, the mere fact that certain consumers may want information regarding whether the food is produced by biotechnology does not require such labeling.” Frederick H. Degnan, *Legal*

As expected, consumer demand continues to dictate the actions of the major players in the food processing industry. For example, in 2002 large food processors Frito-Lay, Seagram, Gerber, and Heinz pledged “not to use GM foods in their products.”²⁹¹ Furthermore, Whole Foods Markets, Wild Oats Markets, and the Iceland Supermarket Group have announced their refusal to market any GM foods.²⁹² Finally, in 1999, in what may have been the most significant setback to GM seed manufacturers in the United States, Archer Daniels Midland, one of the two major grain distribution companies, advised farmers “to segregate GM grain from non-GM grain.”²⁹³ As a result, the percentage of GM corn produced in the United States dropped from 33 percent in 1999 to 25 percent in 2000.²⁹⁴

While there is already a system in place that allows consumers to tell the difference between organic foods and non-organic foods, which may be GM or non-GM, there is no official system that differentiates between GM and non-GM foods.²⁹⁵ Thus, in order to avoid purchasing GM foods under the current system, consumers must opt for the products labeled as “certified organic.” This may have a limited effect on the consumer boycott rate of GM foods because organic foods are more expensive.²⁹⁶ Rather than lobbying Congress to require labeling of GM foods,²⁹⁷ efforts should be directed toward establishing a system that labels conventional foods.

Aspects of FDA's Food Regulation of Food Biotechnology, SJ033 A.L.I. 131, 138 (2003).

²⁹¹ McGarity, *supra* note 288, at 474.

²⁹² *Id.*

²⁹³ *Id.*

²⁹⁴ *Id.*

²⁹⁵ The stickers that grocery stores place on fruits and vegetables and that contain price look-up (PLU) codes may be viewed as an unofficial system to differentiate between organic, conventional, and GM foods. For example, the PLU code for conventionally grown fruit consists of four numbers, organically grown fruit has five numbers prefaced by the number nine, and GM fruit has a PLU code consisting of five numbers prefaced by the number eight. Joseph Mercola & Rachael Droege, *How Do You Know if your Food is Genetically Modified?*, at http://www.mercola.com/2004/jan/24/gm_foods.htm (last visited Feb. 24, 2005). The problem with this system is that it is voluntary and does not allow consumers to differentiate when purchasing processed foods. See Kristen Philipkoski, *Cracking the Frankenfood Code* (Oct. 22, 2003), at http://www.wired.com/news/medtech/0,1286,60911,00.html?tw=wn_story_related (last visited Feb. 24, 2005). See Andrew J. Nicholas, Note, *As the Organic Food Industry Gets its House in Order, The Time Has Come for National Standards for Genetically Modified Foods*, 15 LOY. CONSUMER L. REV. 277, 283 (2003).

²⁹⁶ Nicholas, *supra* note 295, at 279.

²⁹⁷ The likelihood of this is slim. See *supra* text accompanying note 289.

The organic food industry had modest beginnings as a grass roots movement in the 1960s. Since its inception, it has become “an \$11 billion-a-year business,” with sales increasing by nearly 30 percent from 1998 to 2000.²⁹⁸ Unsurprisingly, consumers cite perceived health benefits as the most common reason for purchasing organic products.²⁹⁹ Similarly, by educating the public about the health risks associated with GM foods³⁰⁰ and establishing a national labeling system, conventional farmers may begin to carve their own niche, further limiting the revenues that seed manufacturing conglomerates generate from consumers. Reducing consumer demand for GM products will cause an increasing number of farmers to choose to grow organic or conventional crops. In turn, GM seed revenues for companies like Monsanto will continue to shrink, which will decrease the funds that such companies may spend to research and develop new GM products.³⁰¹ Overall, this will reduce the amount of GM seed contaminants in the environment, effectively limiting modern-day biopiracy.

CONCLUSION

With regard to traditional biopiracy, fostering a mutually beneficial coexistence is a relatively straightforward solution. Put simply, the United States must ensure that indigenous populations receive compensation. To fail in this respect would stunt innovation, and thereby undermine the policy that supports the U.S. patent system and fuels the pharmaceutical industry.

The “cure” for modern-day biopiracy, on the other hand, will involve farming alliances and consumer outcry. Conventional farmers must organize to ensure the future of their farming practices; such a strategy will only be successful if they educate consumers about the risks of GM food.

²⁹⁸ See Nicholas, *supra* note 295, at 278.

²⁹⁹ For an interesting summary of the hazards associated with GM foods see Ronnie Cummins, *Hazards of Genetically Engineered Foods and Crops: Why We Need A Global Moratorium* (Aug. 24, 1999), at http://www.mercola.com/2000/dec/3/ge_food.htm (last visited Feb. 24, 2005).

³⁰⁰ “In 1989 a genetically engineered brand of L-tryptophan, a common dietary supplement, killed 37 Americans and permanently disabled or afflicted more than 5,000 others with a potentially fatal and painful blood disorder, eosinophilia myalgia syndrome (EMS), before it was recalled by the Food and Drug Administration.” *Id.* Just five years later, despite warnings of increased cancer rates, the Food and Drug Administration approved Monsanto’s much-contested GM recombinant Bovine Growth Hormone, which dairy cows are currently injected with to produce more milk. *See id.*

³⁰¹ See generally Nicholson, *supra* note 13, at 12.

While the methods to eradicate traditional and modern-day biopiracy are different, the ultimate goal is the same: long-term sustainability.