

The Biotech and Pharmaceutical Industries and Indigenous Medicine:
Conquest or Complementarity?

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ABSTRACT

The Biotech and Pharmaceutical Industries and Indigenous Medicine: Conquest or Complementarity?

Louise Otmar

This thesis explores the relationship between the biotechnology and pharmaceutical industries and indigenous medicine, with specific focus on the appropriation of traditional knowledge and the prospecting of plant materials and human cell lines. The exploitation of indigenous peoples is based in an ethos of conquest and supported by an increasingly entrenched system of international law that imposes Western intellectual property rights on Native communities and the developing world. Recognizing the inherent complementarity of Western and indigenous cultures would lead to a more harmonious coexistence between the two forms of medical knowledge. The notion of cultural complementarity implies a relationship between equals, suggesting the kind of mutuality that precludes the domination of one culture by the other. Given a situation in which power is unevenly shared, its actualization will require fully recognizing the wisdom and long-term benefits of transforming the current situation into one based in cooperation and respect.

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There are many interpretations of the medicine wheel. But it contains four sacred colors, and it is believed that they pertain to the four major colors on earth: to the north, the white race. People blessed with technology and the responsibility to share it in a good way. To the east, the red nations, in the direction of the sun. Our power and responsibility is the connection to the earth. To the south, the yellow nations, people blessed with great spiritual and philosophical traditions. To the west, the black nations. The gift of art, music, rhythm, dance and song. Their responsibility is to share that with us and make us joyful. Each of the four colors represent the four races. But the ultimate principle is that all four races are brought together in the center, where our creator resides, and where our spirit resides. Our spirits are the same, because they all come from the same source. We are all related, we are all brothers and sisters, we are all connected, and I say, welcome, brothers and sisters.

- Forrest Cuch, Utah Bureau of Indian Affairs, speaking at the
1999 General Assembly of the Unitarian Universalist
Association.

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CHAPTER 1

CULTURAL COMPLEMENTARITY AND BIOPIRACY: POLICY IMPLICATIONS

This thesis explores the relationship between the biotechnology and pharmaceutical industries and indigenous medicine, with specific focus on the appropriation of traditional knowledge and the prospecting of plant materials and human cell lines.¹ While the exploitation of indigenous peoples has led to fragmentation and conflict, the premise of this thesis is that the potential exists for Western and indigenous forms of medical knowledge to be complementary aspects of a mutually beneficial system. Both international and Canadian policies need to reflect an awareness of the intrinsic and instrumental value of evolving toward an international system that offers a greater degree of protection to indigenous peoples. In addition to the moral consideration of promoting global justice, policy-making must be informed by an understanding of the long-term consequences of allowing the current situation to persist. In an interdependent and interconnected world, the loss of biological and cultural diversity that is associated with the exploitative prospecting that has been termed “biopiracy” (Shiva, 1997) is a serious consequence, not only for those cultures that are endangered, but also for the developed world. In addition, indigenous societies worldwide have started withholding knowledge and genetic materials in reaction to their treatment by the biotech and pharmaceutical industries. This is in marked contrast to their generosity in the past, and carries with it the future loss

¹ As my ideas on the potential for the current situation of biopiracy to be transformed through an appreciation for complementarity have been evolving for several years, some passages from previous essays have been incorporated into this thesis.

of potentially powerful new medicines based on indigenous plants and traditional knowledge.

The widespread search within Western society for a greater sense of balance, wholeness, connection, and meaning is in a broader sense a quest for healing. Indeed, a significant aspect of shamanic healing is reconnecting with the natural world and the realm of spirituality in a way that provides balance and reduces the sense of alienation that is so prevalent in the developed world. A greater acceptance of the natural cycles of life and the inevitability that individual lives eventually end heals the profound sense of fear that accompanies the perception of death as an enemy to be conquered. Developing an appreciation for the subjective, qualitative modes of thought that are characteristic of indigenous cultures also enables us to achieve the deeply healing effect of accepting and reintegrating those aspects of ourselves. In addition to being intrinsically valuable, learning from those societies that are the keepers of holistic healing practices has repercussions that extend far beyond the bounds of individual healing, with the potential to contribute to the resolution of many of the developed world's social problems. Reconnecting with the natural world leads to a greater sense of stewardship for the environment, while a reduced degree of fear and alienation ameliorates a whole range of social problems, from addictions to violent crimes. Such personal transformations, accomplished not in isolation, but by changing perceptions on a societal level, are crucial elements of addressing the social and environmental problems that have grown out of an unbalanced

worldview. Broadening the Western paradigm of medicine has far-ranging implications to society, and is therefore of central importance from a public policy perspective.

This thesis should not be interpreted as an indictment of Western medicine, but rather as an attempt to balance it through its reintegration within the broader context of those diverse healing modalities that have existed in the past and continue to exist both in other cultures and within the alternative health movement of the developed world. Indeed, it has been a deep respect for the strengths of Western medicine, as well as the realization that the best allopathic physicians embody the qualities of true healers, that have been motivating factors in addressing the potential for its continued evolution.

Underpinning the emphasis on cultural complementarity that resonates throughout this thesis is the spiritual conviction that all of human life has intrinsic value, and that there is a fundamental unity that underlies all of its diverse expressions. The emphasis on the value of biodiversity that will be discerned throughout this thesis is an extension of this basic spiritual orientation, while also reflecting a deep sense of personal connection with plant life. Hopefully, this work will contribute to enlarging the scope of public policy beyond the consideration of pragmatic, economic factors by reintegrating the kinds of qualitative, normative arguments that have too often been deemed irrelevant or inappropriate.

An exploration of the cultural context and scientific paradigms that give rise to the existence of biopiracy is essential to the task of understanding this issue comprehensively enough to effectively address it from a policy perspective. In a culture that assumes separation and the corresponding primacy of the individual as fundamental realities, and is imbued with a sense of the inevitability of domination as a fact of political and commercial life, viewing the world as a storehouse of raw materials to be exploited seems entirely predictable. The achievement of an equitable world requires a careful re-examination not only of international and Canadian policies, business practices, and international laws, but also of the underlying beliefs and values that inform them. It is unlikely that justice can be achieved through the unjust imposition of Western laws favouring developed countries to the detriment of the global poor. Similarly, the prospects for successfully solving the problems of biopiracy while failing to venture beyond the framework of its supporting worldview are uncertain at best.

The first step in addressing this limitation is developing an appreciation for the intrinsic value of other cultures, as well as for their potential to provide balance to the Western worldview. This also involves reintegrating the aspects of life that have been rejected in the drive to technological achievement, and recognizing the extent to which this has been accomplished by dominating the natural world and other cultures. The integrative worldview of indigenous cultures easily lends itself to an appreciation and respect for the contributions of other peoples. However, a culture in which fragmentation and separation are implicitly contained

in its emphasis on competitive individualism is one that has more readily viewed differences and dualities as antagonistic rather than complementary. This tendency can be considerably softened by policies that explicitly acknowledge the success of indigenous communities in sustainably managing their resources, and that contain provisions for consulting indigenous peoples on matters pertaining to the preservation of their cultures and the biodiversity with which they have coevolved.

The solution to the problem of biopiracy lies as much in the process of approaching it as it does in any ultimate strategies. One of the most important lessons to be learned from indigenous cosmology is the belief, informed by a more general holistic perspective, that each culture has a unique contribution to make to the human family. Rather than relying exclusively on the Western economic paradigm, solving the issue of biopiracy depends on adopting an attitude of openness and willingness to acknowledge the inherent complementarity of indigenous and Western cultures. A corresponding respect for traditional medicinal knowledge will render an orientation that views indigenous peoples and medicinal plants as nothing more than raw materials as increasingly morally untenable. The current propensity of biotech and pharmaceutical multinationals to deny the validity of the knowledge they appropriate rationalizes the way in which indigenous communities are treated and disguises the degree to which exploitation occurs. Explicitly acknowledging the accomplishments of indigenous peoples, as well as the value of their

medicinal knowledge, will counteract this denial and contribute to achieving a greater degree of justice. In the process, Western culture will have been subtly enriched and expanded, not by conquest, but through the recognition of cultural complementarity.

The specific ways in which international law imposes a Western paradigm of intellectual property rights on indigenous peoples and the developing world are discussed in chapter 2, where the strong level of protection available to multinational corporations is contrasted with the general lack of protection for indigenous peoples for their medicinal knowledge and genetic materials. A general overview of these issues as well as a discussion of the historical progression of the increased willingness of courts in the developed world to allow patents on life forms is followed by an exploration of the vastly different concepts of property that exist in the developed world and indigenous cultures. An assumption of the exclusive validity of the Western concept of private property would seem to justify the kind of disciplinary measures that are increasingly taken by the developed world against other cultures when they fail to respect Western intellectual property rights. However, the inherent value of indigenous systems of common rights is suggested by their correlation with a high level of environmental sustainability. The Western transition from common to private property rights is traced by using the representative example of the history of enclosure in England. This is followed by an exploration of how the philosophy of

John Locke legitimized both the enclosure movement and the conquest of indigenous territories.

Later in this chapter, the Roman classification of property rights is outlined in order to provide the basis for a comparison between these different systems, while the validity of using Garrett Hardin's "The Tragedy of the Commons" to conclude that common property rights systems lead to environmental degradation is questioned. This discussion proceeds by examining whether Hardin's article actually describes a common rights system or a situation in which no property rights exist at all. In addition, indigenous systems of property rights are discussed, and found to most resemble the common property rights systems of Roman law with the important distinction that the validity of actually owning land or living beings such as plants is rejected.

The rationale behind patent protection for pharmaceutical products is discussed, while the current international regime of intellectual property rights as guaranteed under the Trade-Related Intellectual Property Rights (TRIPs) agreement of the Uruguay Round of the General Agreement on Trade and Tariffs (GATT) is outlined. While developing countries like India (Maskus, 2000: 94) and Brazil (Maskus, 2000: 172 – 3) have resisted strengthening intellectual property rights to the level stipulated by the TRIPs agreement, theorists such as Keith Maskus believe patent protection to be in their long-term best interests (Maskus, 2000).

Included in this chapter is an exploration of the effect that strong patent protection has on access to affordable medicines for the global poor.

The strength of the international intellectual property rights regime that provides protection to pharmaceutical companies is contrasted by the relative lack of protection for indigenous peoples. In addition to covering the appropriation of traditional knowledge and plant materials, this chapter explores the issue of patenting cell lines taken from the bodies of indigenous peoples. The common denominator in both these practices is exploitation and a lack of respect for both indigenous peoples and their medicinal knowledge. This is accompanied by an increasing reluctance on the part of indigenous communities to cooperate with Western biotech and pharmaceutical companies, leading to the reduced opportunity to develop potentially powerful new drugs. The need for both international and Canadian public policy to seriously address the issue of biopiracy is clear in light of a scenario in which short-term corporate profits may ultimately be gained at the expense of long-term public health considerations.

The inevitability of the current relationship between the biotech and pharmaceutical industries and indigenous medicine is questioned in chapter 3. There is the potential to transform the current ethic of conquest and competition to one of cooperation by recognizing the complementarity of different cultures and forms of knowledge. An overview situates this concept within the context of a discussion of modernism and its alternatives. An exploration of the value of

diversity is followed by an examination of the potential to recognize the essential complementarity between cultures. Indigenous and modern worldviews are compared and contrasted, with an attempt made to address the underlying reasons that competition and conquest so often overshadow an appreciation for cooperation, interdependence, and complementarity in Western culture.

The ultimate expression of this ethos, the conquest of mortality that is envisioned by many biotech supporters, is explored within the context of the heroic subtext that informs it. The dream of immortality is compared with the stages of the universal hero's journey, as outlined by Joseph Campbell in *The Hero With a Thousand Faces* (1973). In addition, alternatives to modern science are explored, with an emphasis on similarities between postmodern disciplines such as quantum physics, chaos theory, and ecology and indigenous science.

Recommendations for actualizing the complementarity of cultures and medicinal knowledge by correcting the imbalances that currently exist within the international system are outlined in chapter 4. The recognition of complementarity as a fundamental aspect of existence includes a deep respect for the value of cultural diversity and the preservation of different forms of knowledge. In addition to the intrinsic, spiritual value of ensuring the survival of indigenous cultures, traditional medicinal knowledge has the potential to play a key role in healing Western culture of many of its imbalances.

Exploring some of these imbalances and questioning the wisdom of the quest for immortality that underlies the more extreme manifestations of the biotech project will hopefully contribute to the evolution of a more balanced Western medical paradigm. At the same time, shedding light on the strengths of indigenous healing science should lead to a greater attitude of respect that can only improve the relationship between the pharmaceutical and biotech industries and the indigenous cultures they rely upon for knowledge and resources. This outcome is intrinsically valuable, but would also make a positive contribution to public health in the developed world by creating an environment based in trust in which knowledge continues to be shared with the willingness indigenous peoples have demonstrated in the past.

The notion of cultural complementarity implies a relationship between equals, suggesting the kind of mutuality that precludes the domination of one culture by the other. Given a situation in which power is unevenly shared, its actualization will require fully recognizing the wisdom and long-term benefits of counteracting the West's more usual tendency toward exploitation. The knowledge exchange envisioned in this thesis is very different from the unidirectional appropriation of indigenous wisdom by the developed world that has tended to characterize the relationship between the two cultures until now. Whereas the pharmaceutical and biotech industries currently benefit from indigenous knowledge and genetic material, offering them little or nothing in return, a true partnership based on the recognition of cultural complementarity would be one in which the strengths of

each culture are recognized, and in which all would benefit from a mutual exchange of knowledge and resources. The key elements are respect and the intention to share benefits equitably, making this kind of learning from indigenous cultures qualitatively different from taking knowledge in an exploitive way. In addition, the synergistic effect of combining diverse forms of knowledge in order to heal some of the current imbalances would benefit all cultures. Indeed, many indigenous leaders

feel it is time for these teachings to be made known to all peoples. Many Elders now are coming forward to share their sacred knowledge and help integrate it with modern cultures and technologies to assist humanity and Mother Earth in realizing peace, healing, and full spiritual awareness. . . . Their intention is to restore balance with the Earth, and create peace among all peoples of this planet. (World Council of Elders).

The specific ways in which the relationship between the pharmaceutical and biotech industries and the holders of traditional medicinal knowledge can be transformed remains an open question, as each situation is unique and therefore demands a customized approach. However, an internalization of the importance of cultural diversity and knowledge preservation by policy-makers and industry leaders should contribute to a situation in which respect would be the common denominator of interactions between the pharmaceutical and biotech corporations of the developed world and indigenous communities and healers. At the same time, Western culture will have taken an important step forward in being healed of some of the imbalances that have resulted from a worldview that favours conquest over complementarity, with positive repercussions for the entire human family.

CHAPTER 2

INTELLECTUAL PROPERTY RIGHTS AND INDIGENOUS PEOPLES

2.1 Overview

The continued evolution of the neo-liberal globalization project depends in large part on the ability of technologically advanced states to impose Western-style intellectual property rights (IPRs) on the developing world. Disputes surrounding this issue have been particularly contentious in the area of pharmaceutical patents. This is due in part to the obvious importance of Western medicines to the developing world. The imposition of patents has in many instances compromised access to essential medicines, resulting in serious public health consequences for the global poor. While weak patent protection has traditionally made cheaper generic drugs readily available the international imposition of the TRIPs agreement by the World Trade Organization (WTO) denies developing countries the freedom to continue choosing this public health care policy option.

Another factor adding to the intensity of the debate is the imbalance inherent in the fact that while Western IPRs are enforced by the WTO, there is much less protection offered by international governing bodies for the fair compensation of the traditional knowledge that contributes to the development of pharmaceuticals. Western IPRs are intended to protect proprietary inventions that are “novel, non-obvious, and useful” (Rifkin, 1998: 45). As such, they are poorly suited to adequately compensate indigenous peoples for knowledge that is often communally held and may have existed for millennia. While the “soft law” of the

Convention on Biological Diversity (CBD) advocates state sovereignty and fair compensation to indigenous peoples for their natural resources (CBD, article 8j), the Western-dominated World Trade Organization is more effectively served by the “hard law” of the TRIPs agreement. In addition, since indigenous communities and ecosystems transcend international borders, pharmaceutical companies often have the option of purchasing knowledge and plant materials from several different sources, thereby creating competition and driving down prices. The injustices inherent in this system cause destabilizing imbalances, while the erosion of both biological and cultural diversity is intrinsically and morally undesirable, and ultimately self-defeating even from a pragmatic perspective.

In addition to plant materials and traditional knowledge, pharmaceutical corporations and the United States government have been targeting the bodies of indigenous people as potential sources for the development of powerful and lucrative new drugs. A patent on the cell line of a Hagahai indigenous person from Papua New Guinea was dropped by the National Institute of Health in 1996 amid a storm of international controversy (RAFI, 1996a). The similarly controversial Human Genome Diversity Project (HGDP) is now quietly continuing to gather tissue samples from people all over the world in spite of unresolved ethical issues (RAFI, 2000b). The HGDP, dubbed the “Vampire Project” by critics (RAFI, 1996b), is an international consortium of scientists dedicated to

harvesting and preserving the DNA of diverse races of people, mostly indigenous groups (RAFI, 1996b).

The imposition of Western IPRs on developing states and indigenous peoples has its roots in a 1980 U.S. Supreme Court decision, *Diamond vs. Chakrabarty* (Kimbrell, 1997; Godrej, 2002). For the first time, a patent was granted on a living organism (Shiva, 1997: 20), a genetically-engineered bacterium that had been developed by a General Electric employee, Ananda Mohan Chakrabarty, in 1971 (Shiva, 1997: 20; Kimbrell, 1997). The court based its decision on the judgment that a life form had actually been invented, despite the fact that Chakrabarty minimized his achievement by stating that he had “simply shuffled genes, changing bacteria that already existed” (Shiva, 1997: 19; Godrej, 2002: 12). Following this decision, the U.S. Patent and Trademark Office (PTO) embarked on a “slippery slope” (Kimbrell, 1997) that resulted in genetically engineered plants becoming patentable in 1985 (Kimbrell, 1997), and genetically modified animals following suit in 1988 with the patenting of the Harvard oncomouse (Rudolph, 1997: section 4.1). It is worth noting that the oncomouse patent was struck down by the Supreme Court of Canada in a 5 – 4 ruling in December of 2002. Indeed, “Canada stands alone among affluent nations in not granting patents on animals and plants” (Kimmelman, 2002: 9). Although the Canadian Biotechnology Advisory Committee (CBAC) recommends that “higher life forms [. . .] that meet the criteria of novelty, non-obviousness and utility be recognized as patentable” (CBAC, 2001c: 10), and the Federal Court of Appeal

rendered a decision to patent the Harvard oncomouse in August 2000, the Supreme Court's ruling decisively establishes that higher life forms can not be patented in Canada.

While pharmaceutical corporations lobby vigorously for stronger patent protection in order to safeguard their investment in research and development, many poor countries are opposed to the imposition of Western IPRs. The overall effect of stronger patent protection on developing countries is uncertain: while it is argued that strong IPRs are a prerequisite for building a stronger economy (Maskus, 2000: 14), it is also acknowledged that improved protection may cause such adverse effects as price increases in developing countries (Braga, Fink, and Sepulveda, 1998: 33; Maskus, 2000: 159 – 164). This debate is relevant to any discussion of the imposition of pharmaceutical patents on developing countries and indigenous peoples. However, it is also important to note that the desirability of Western-style economic development assumed in the formulation of this question is a normative stance not necessarily shared by indigenous communities themselves. Nor does it seem consistent with the goals of preserving cultural diversity and safeguarding the continued existence and further development of traditional knowledge: the neo-liberal model of economic development with its emphasis on private property rights, industrialization, and consumer capitalism lies in direct opposition to indigenous beliefs and social systems. Indeed, the International Labour Organization (ILO) Convention 169 contains provisions explicitly safeguarding the rights of indigenous peoples to

seek development on their own terms (Posey and Dutfield, 1996: 57). In addition, the discussion of fair compensation is complicated by the social disruptions that are potentially caused by the manner in which payment is carried out. Clearly, any effective solution to the issue of biopiracy must go beyond simply increasing royalty payments to indigenous peoples.

As this paper discusses indigenous and Western healing practices, the main emphasis with regard to fair compensation will be centered on medicinal plants. However, it is important to note that the distinction between food and medicine is very much a Western construct: "The food upon which indigenous people around the world depended for life was also their medicine. The two were so intimately intertwined that many foods, under proper supervision and application, were components of a medical system based on the natural properties of plants and animals" (Cajete, 2000: 115).

2.2 Divergent Paradigms of Property Rights

2.2.1 The History of Enclosure in England

The enclosure of agricultural lands was carried out in England from 1450 until 1900 (Atkins, Simmons and Roberts, 1998: 85), resulting in the privatization of most of the country's farmland by 1700 (Campbell and Godoy, 1992: 101). This action was initially undertaken by feudal lords, who "forcibly hunt[ed] the peasant off the land (although the peasant had the same feudal title as the baron himself), and [. . .] usurp[ed] [. . .] the common lands" (Marx, 1930: 796). However, with

the agricultural revolution of the late fifteenth and sixteenth centuries, enclosure increasingly became the task of a rising class of capitalist farmers” (Marx, 1930: 823 - 825). This entire process was aided by a series of parliamentary acts, “in other words, decrees whereby the great landowners made a present to themselves of the people’s land, which thus became their own private property” (Marx, 1930: 803). The growing trend toward enclosure was greatly legitimized by the publication of John Locke’s *Second Treatise on Government* in 1690, to be discussed in more detail in section 2.2.2.

Prior to enclosure a series of properties, each held in common, was the predominant way in which England’s agricultural land was organized. This system was characterized by four principal attributes:

First, the holdings of individual cultivators comprise[d] many separate parcels scattered among unenclosed commonfields. Second, after the harvest, and usually during fallow years, these commonfields revert[ed] from private farmland to communal pasture ground, as all villagers exercise[d] their customary right to graze their animals on the herbage temporarily available on the arable land. . . [V]illagers also enjoy[ed] the collective right to gather peat, timber, and firewood from common pastures and fallow fields. Finally, regulation and supervision of the entire system [was] provided by an “assembly of cultivators”. (Campbell and Godoy, 1992: 99).

This equilibrium was disturbed as demographic and economic factors created the impetus to move toward a system of enclosure. With the disintegration of the feudal system, landlords became more driven by market forces that included a growing demand for wool and a declining demand for grain. They were therefore increasingly motivated to convert commonly held arable fields into sheep pastures intended for private use.

Enclosure was extremely unpopular among cottagers who had enjoyed common access to fields for centuries. However, by the seventeenth century “educated opinion came to favour enclosure as a means of improvement. To many it seemed a rational and even a necessary condition for modernizing agriculture” (Atkins, Simmons, and Roberts, 1998: 86). The values inherent in this preference on the part of the educated elite are consistent with the development of both capitalism and the Scientific Revolution that occurred during the time of enclosure. “Improvement” and “modernization” became key watchwords justifying the social changes taking place during this period. While it is difficult to argue that improvement is in itself undesirable, it is instructive to recall Carolyn Merchant’s question regarding the related argument that scientific progress improved the standard of living for all of humanity: “But did the ‘public good’ really include the cottager, journeyperson, and peasant, or did it function so as to benefit the master craftsman, clothier, and merchant?” (Merchant, 1990: 179). Within the context of the enclosure movement, there were both winners and losers in the game of improvement and modernization.

2.2.2 The Philosophy of John Locke

John Locke’s *Second Treatise on Government* was written in 1690 in the midst of England’s drive toward enclosure. It served to legitimize both the enclosure movement and the conquest of indigenous territories that took place during the same time period.

Locke's central argument is that because man owns his own labour, any natural resource developed by him through the application of it also belongs to him: "Whatsoever . . . he removes out of the state that Nature hath provided and left it in, he hath mixed his labour with it, and joined to it something that is his own, and thereby makes it his property" (Locke, 1690). Although he applies this principle to both "the fruits of the earth and the beasts that subsist on it" (Locke, 1690), his main concern is with "the earth itself" (Locke, 1690): "As much land as a man tills, plants, improves, cultivates, and can use the product of, so much is his property. He by his labour does, as it were, *enclose it from the common* [emphasis mine]" (Locke, 1690).

It is important to note that "labour" in this context does not necessarily refer to physical labour, but rather, "labor in its 'spiritual' form, as manifested in the control of capital" (Shiva, 1997). Therefore, certain kinds of labour are recognized and legitimated, while others are marginalized. According to Locke, although "God gave the world to men in common"(Locke, 1690), he did so with the intention that those who are most "industrious and rational" (Locke, 1690); will improve and cultivate it, thereby converting it into a divided set of private possessions. Common property rights inevitably give way to private property rights because the latter results naturally from the divinely sanctioned task of improving upon nature.

The idea of improvement is open to different interpretations and possibilities. Throughout history humanity has interacted with nature in many different ways, and various forms of improvement for human benefit can be imagined. We may choose to alter our environment in order to create a greater degree of safety, to facilitate a sense of community, to celebrate a spiritual connection with nature, or for purely aesthetic reasons. None of these kinds of improvement necessarily demands the institution of private property, and may even be compromised by its existence. Indeed, if the idea of improvement is framed in aesthetic terms, “[p]ossession, in landscape as in love, is a manifestation of power, not appreciation. Both sacrifice intrinsic, aesthetic value to an outside purpose that is much less reputable” (Berleant, 1997: 15).

However, “improvement” as envisioned by Locke is narrowly characterized as whatever brings the highest agricultural yields and profits:

An acre of land that bears here twenty bushels of wheat, and another in America, which, with the same husbandry, would do the like, are, without doubt, of the same natural, intrinsic value. But yet the benefit mankind receives from one in a year is worth five pounds, and the other possibly not worth a penny; if all the profit an Indian received from it were to be valued and sold here, at least I may truly say, not one thousandth. It is labour, then, which puts the greatest part of value upon land, without which it would scarcely be worth anything. (Locke, 1690).

The implication of this line of thought is that European conquerors were justified in appropriating American land that was already populated by indigenous peoples because, according to the mainstream value system of the Enlightenment period, they were not labouring to improve it.

Since improvement is defined strictly as that which increases yields and profits, alternative approaches to interacting with the environment are devalued. As a result, the claims of both peasants in England and the indigenous populations in America are invalidated while the emerging capitalist class is legitimated in its pursuit of financial gain at all costs. Locke's exposition on property rights served to uphold the status quo and justify both the enclosure movement and the appropriation of indigenous land.

2.2.3 Property Rights According to Roman Law

According to Roman law, which is a foundation for both Canadian and American property rights, there are four categories of rights (Watt, 2000: 8 – 9):

Res privatae, private property owned by an individual or corporation.

Res publicae, government property owned by the state and dedicated to public use.

Res communes, property with common rights of access.

Res nullius, items with no property rights attached. This category was originally intended to refer only to unoccupied territories. However, with the European drive to expansion in the age of discovery, indigenous lands also came to be treated as *res nullius*.

While the first category of private property rights is fairly straightforward and easily conceptualized, the remaining three can all be interpreted to indicate some form of common access. *Res publicae* implies common access to property owned by the state on behalf of the public, while *res communes* indicates

commonly owned property without the intermediary participation of a government body. Although the original meaning of *res nullius* is that no property rights have been assigned because the territory is unoccupied, it has historically evolved to mean that access is unregulated although the land may be occupied. It has also been misapplied to situations in which access is shared through systems unfamiliar to European explorers.

2.2.4 “The Tragedy of the Commons” and the Property Rights Debate

Many conservative observers (Shaw and Hospers, 1989; Machan, 1999; Fairbanks, 2001; Humphries, 2002) have pointed to “The Tragedy of the Commons” as justification for converting common property to privately held land. However, an important prerequisite to our discussion of property rights within this context is to determine whether Hardin’s article actually describes *res communes*, or whether it is being confused with one of the other non-private systems, either public property or a lack of property rights.

The central argument of this article is that freedom in a commons inevitably leads to environmental degradation as individuals are driven to maximize their gains, even at the expense of their present community and future generations. The metaphor used by Hardin is “a pasture open to all” (Hardin, 1968: 1244) in which each “rational herdsman concludes that the only sensible course for him to pursue is to add another animal to his herd. And another . . . But this is the conclusion reached by each and every rational herdsman sharing a commons.

Therein is the tragedy” (Hardin, 1968). According to this line of reasoning, the result of the natural tendency on the part of each individual to pursue their own self-interest is that “freedom in a commons brings ruin to all” (Hardin, 1968).

It is important to remember that the dynamic taking place in Hardin’s pasture is a theoretical construct. He assumes atomistic actors driven by rational self-interest, a situation that is not necessarily representative of human motivation in every possible social setting. The assumption of mutual defection in “The Tragedy of the Commons” echoes the outcome of the well-known prisoner’s dilemma game in which isolated prisoners betray each other in an attempt to reduce their respective punishments. However, “[i]f the rules (institutions) are designed to be favorable for exacting confessions from isolated suspects, then let us not be surprised when prisoners confess. But also let us not impute to this observed behavior some overarching ‘truth’ about human motivation” (Bromley, 1992: 6). The lesson contained in “The Tragedy of the Commons” does not invariably apply to every real world situation in which there is shared access to environmental resources.

Although Hardin acknowledges that the commons may work well for centuries, he attributes this success to the fact that “tribal wars, poaching, and disease keep the numbers of both man and beast well below the carrying capacity of the land” (Hardin, 1968). In more technologically advanced society, however, greater longevity and corresponding population growth inexorably lead to

environmental destruction as the supply of natural resources becomes increasingly threatened. Hardin advocates a coercive system that restricts the “freedom to breed” (Hardin, 1968: 1246), which he deems “intolerable” (Hardin, 1968: 1246) under such conditions. According to him, appeals to conscience are futile since natural selection will favour those who cheat: free riders will continue to procreate as they wish, thereby “setting up a selective system that works toward the elimination of conscience from the race” (Hardin, 1968: 1247). In a line of reasoning reminiscent of Hobbes, strict governmental controls are advocated to compensate for humanity’s natural destructive tendencies. Whereas Hobbes postulates a state of nature in which the primacy of human fear leads to a state of “war of each against all” (Chanteur, 1992: 51), Hardin conceives of one in which rational self-interest creates environmental tragedy. Both advocate a strong state capable of compensating for the misery and violence caused by humanity when free to express its natural inclinations.

The definition of *res publicae* is not consistent with Hardin’s scenario: in a state-regulated system, each individual does *not* have the freedom to pollute the commons with impunity. Indeed, Hardin’s comparison of his proposed coercive measure with the existing system of taxation implicitly indicates that he favours governmental sanctions as a solution to the problem of the commons. Clearly, then, the problem of the commons in his view does not arise from publicly-owned land. Similarly, integral to the *res communes* form of property rights is a set of

rules and obligations, in addition to rights, which would mitigate against the kinds of effects Hardin describes for his metaphorical commons.

On the other hand, *res nullius*, or “open-access resources” (Bromley, 1992: 4), more accurately describes the scenario of “The Tragedy of the Commons”: each individual acts out of self-interest with no regard for any sense of state or community. There are no governmental laws to inhibit each person from pursuing their own self-interest, nor are there group norms or loyalties to regulate their behaviour. In the absence of property rights of any kind, without private ownership, communal ownership, or state regulation, open-access resources are vulnerable to suffering the kinds of environmental effects described by Hardin. The tragedy of the commons ensuing from *res nullius*, or open-access resources, is that “rights have no meaning without correlated duties, and the management problem with open-access resources is that there are no duties on aspiring users to refrain from use” (Bromley, 1992: 4).

This does not apply, however, to indigenous lands that have been *mistakenly* labelled as “*res nullius*”: “Often, what appears to the outside observer to be open access may involve tacit cooperation by individual users according to a complex set of rules specifying rights of joint use. This is common property” (Runge, 1992: 18).

2.2.5 Common Rights in Indigenous Systems

Of the four classifications of property rights in Roman law, indigenous systems of land access most closely resemble *res communes*, or common property rights. However, there is an important difference between indigenous systems and common property systems as conceptualized under Western laws: although indigenous peoples often have systems based on common rights, the idea of land ownership is inconsistent with their beliefs. Land ownership is a uniquely Western idea with a relatively short history. The concept of *private* land ownership is even newer and more specific to Western laws and attitudes toward nature. According to a Blackfoot Indian chief, “we cannot sell this land . . . because it does not belong to us” (Baird, 1987). Human beings have a responsibility to protect the land, which is used by those closest to it, rather than being bought and sold for profit. The concept of an absentee landlord reaping the benefits of his investment in land is completely foreign to indigenous systems of thought.

In the Pacific Islands Nations, the process of colonization five hundred years ago introduced the concept of land ownership by individuals for the first time. A speaker at a 2001 Pacific Islands conference stated, “We then saw the fencing of large areas of our ancestral land, armed security around the claimed boundary, the destruction of our ancestral sacred places, deforestation for cattle farms and cash crops, mining the inner soul of the land, the prohibition of access to our water sources and total disrespect of our philosophy of land being a mother”

(Lini, 2001). Although based on a workable system of *res communes*, indigenous lands were treated as *res nullius* and converted into private property by European colonialists, a process that continues to the present day.

In indigenous systems, knowledge is treated as commonly held. As with land rights, the idea of owning knowledge and selling it for profit is contrary to their belief system: “no one is permitted to appropriate a plant, an animal, or a piece of knowledge, to use it for his/her own individual benefit. Nobody has the right to be the owner of these elements of life, everything is at the service of the community” (Hurtado, 1998). Therefore, “biodiversity is not privatizable, because life is not something that can be someone’s property, for only [their] gods are its owners” (Hurtado, 1998). This belief system is diametrically opposed to the Western capitalist emphasis on individual gain and profit based on the ownership of nature. In addition, the concept of private property is inconsistent with indigenous systems since “creation is generally communal rather than individual [. . .] so that the creator is generally not identifiable” (Maffi, 2001: 415).

In the view of some indigenous people, the capitalist system is inherently unsustainable, making the term “sustainable development” incompatible with the setting in which it was coined: indigenous peoples have been practicing the only true form of sustainable development for centuries by living in balance with their environments. As such, it is inappropriate for Western scientists to presume to teach Native people how to develop sustainably. The sustainable use of

medicinal plants can only be achieved if indigenous peoples are allowed to retain control over the continued development of their biodiversity resources.

Consistent with this stance, many aboriginal people would reject the idea of patenting biodiversity even if the international patent protection system compensated them by recognizing their knowledge as commonly owned trade secrets. Medicinal plants have intrinsic, spiritual value, and should therefore not be for sale at any price.

2.3 Patent Protection for Pharmaceutical Companies

Patent protection for pharmaceutical corporations is guaranteed under the TRIPs agreement of the Uruguay Round of the General Agreement on Trade and Tariffs (GATT). In contrast to many international agreements that lack enforcement capabilities, TRIPs is a form of “hard law” that enables wealthy states to impose sanctions on the developing world if they refuse to internalize Western intellectual property rights. Although the WTO operates under a veil of secrecy, with sanctions determined by panels of unelected experts, it nevertheless “possesses the judicial and legislative powers to override the decisions of democratically elected legislatures” (Clarke and Inouye, 2002: 36). The genesis of TRIPs owes a significant debt to the efforts of the pharmaceutical industry: according to Edmund Pratt, CEO of Pfizer, their “combined strength enabled [them] to establish a global private sector-government network which laid the groundwork for what became TRIPS” (Oxfam, 2001a). The TRIPs agreement

“turned out to be, almost word-for-word, the same as those originally drafted by the IPC [Intellectual Property Rights Committee]”, an organization that had been formed by US corporations, including Bristol Myers Squibb, DuPont, Pfizer, and Monsanto, and supported by Japanese and European big business lobbies (Clarke and Inouye, 2002: 35).

Intellectual property rights were originally developed to protect individual inventors. However, these rights are increasingly being used to protect corporate profits: pharmaceutical companies are reluctant to invest in the costly process of developing new drugs if future profits are not safeguarded by a strong international patent system. It has been estimated that “the cost of developing a new drug is now more than \$800 million” (Gilmartin, 2001). However, it is not clear whether this figure represents a corporation’s true costs, or whether it also includes tax credits, which may be substantial: in 1993, “[t]he after-tax R&D cost per new chemical entity (NCE) that is placed on the market [was] estimated [. . .] at [. . .] \$194 million (\$359 million before tax credits)” (Maskus, 2000: 53).

Most manufactured goods are both rival and excludable: only one person can consume a product at a time, and potential buyers can be excluded from consuming a product. Pharmaceutical corporations are particularly vulnerable to appropriation, since in the absence of IPRs “technological knowledge is a good for which the characteristics of rivalry and excludability do not hold perfectly”

(Verspagen, 1999: 5). It is relatively easy to carry out reverse engineering on technologically sophisticated products such as pharmaceuticals, making the information value ensuing from research activities transportable: “the costs of original product research and marketing continue to grow rapidly, but imitation costs remain low.” (Maskus, 2000: 83). “The frontier technologies, once developed, are capital-efficient (per unit of output), skill-intensive, easy to imitate by trained personnel, and footloose in geographical location.” (Patel, 1996: 315). While millions of dollars may be invested in developing a product, other companies can “free ride on the efforts of the inventor, and, hence, assuming that imitation is cheaper than developing the invention, put the new product on the market for a far lower price than the original inventor” (Verspagen, 1999: 5).

Pharmaceutical company representatives insist that an absence of strong international patent protection would have an adverse effect on profits, and therefore on future R&D: “PhRMA [Pharmaceutical Research and Manufacturers’ Association] tentatively estimated its member firms’ annual sales losses to be some \$500 million in India and \$600 million in Argentina” (Maskus, 2000: 101). However, research conducted in India suggests that “the forgone profits from ‘patent piracy’ [. . .] may not be as high as often indicated by producers in the developed world” (Braga, Fink, and Sepulveda, 1998: 29).

A contentious feature of TRIPs has been an increase in the duration of monopoly rights. Included in the agreement is “a minimum of 20-year patent protection for

products and processes in all sectors” (Oxfam, 2001a: 3), a longer period than has been the norm even in the developed world. While some developing countries had been providing protection of 5, 7, or 10 years, many others had terms of 14 to 16 years (Watal, 2001: 114). Indeed, even in the United States the term had to be extended from 17 to 20 years in order to accommodate the TRIPs agreement (Watal, 2001: 114). This has been justified in part by the increasing amount of time it takes for a drug to become commercially viable. The pharmaceutical industry maintains that the “drug development period has increased from an average of 8.1 years in the 1960s to 11.6 years in the 1970s to 14.2 years in the 1980s and 14.9 years in the mid-1990s. Nearly 50 per cent of the time is spent in clinical trials.” (Juma, 1999: 7).

Developing countries have traditionally preferred weak patent protection. This has been “driven by the view that these countries had a limited ability to create much intellectual property and thus little to gain from IPRs protection to the extent that they would be mainly granting ‘monopolies’ to foreign patentees” (Braga, Fink, and Sepulveda, 1998: 7). Keeping patents weak has been a conscious strategy to ensure the affordability of public health and to protect nascent industries. In addition, weak patents have aided the development of poor economies by contributing to their acquisition of technological knowledge: “[i]nternational technology spillovers through uncompensated imitation have long been an important justification for refusing to grant patents” (Maskus, 2000: 33). Indian activist Surendra J. Patel points to the fact that a lack of foreign intellectual

property rights enabled the Western world to develop without outside interference: they had the freedom to “legislate according to their own perception of their national interests” (Patel, 1996: 312). Throughout the history of the industrialized world: “[n]ations seeking to develop technologically have often imitated and learned from those already possessing the knowledge” (Juma, 1999: 4). A strong international IPR system is therefore “unfair and contrary to the behaviour of many developed countries when they were becoming industrialised” (Dutfield, 1999: 8). Indeed, although Japan was an early adopter of a patent protection regime at the turn of the twentieth century, “the system was developed with the interests of a technology follower in mind. The Japanese regime significantly limited patent scope and breadth” (Maskus, 2000: 143). Similarly, in the United States of the nineteenth century, “discrimination against foreign authors and publishers remained central to US copyright law, as it did in many other major countries” (Maskus, 2000: 34). This situation was only reversed in the face of “pressures from foreign governments and, more importantly, growing interests on the part of US authors and publishers to receive protection abroad. Even so, the new law [. . .] remained explicitly protectionist.” (Maskus, 2000: 34).

In the specific case of pharmaceuticals, “[m]any of the industrialized countries introduced patent legislation in this field [only] after they had reached a certain level of technological competence and international competitiveness” (Juma, 1999: 4). Indeed, “until recently even developed countries recognized some

sectoral exceptions in their laws. For example, product patents for pharmaceuticals were recognized by Japan in 1976, Switzerland in 1977 and Italy in 1978. As of 1988 seven developed countries: Finland, Greece, Iceland, Monaco[,] Norway, Portugal and Spain excluded pharmaceutical products from patentability” (Watal, 2001: 109).

While weak patent protection has been a factor contributing to the economic growth of wealthy countries, the developing world is being denied the freedom to implement similar public policies to protect infant industries, encourage technology spillover, and ensure the affordability of public health care. The advent of the TRIPs agreement has been unprecedented in its ability to prevent the world’s poor nations from being able to implement governmental policies that they believe will safeguard their interests. While TRIPs protects the intellectual property of wealthy countries,

it is clear that technology importing countries have very little to gain from shifting to higher international standards of intellectual property protection than already exist. TRIPS has extended the system of IPRs to a huge number of countries very rapidly. *This is unlike most developed countries’ experience. Most tended to copy from the market leaders in technology and reached a certain level before adopting IPRs* [emphasis mine]. (Centre for European Agricultural Studies, 2000: 79)

Indeed, developing countries “are now being pressured to enact IPR laws and to invest resources in enforcing them not necessarily because such countries agree that these laws are necessary for economic development, but merely because the World Trade Organization’s rules require them to provide such rights.”

(Dutfield, 1999: 8).

The argument that developed countries are the prime beneficiaries of an strengthened international patent regime is supported by the fact that the United States is “[t]he biggest exporter of proprietary rights and thus the largest recipient of royalties and license fees” (Braga, Fink, and Sepulveda, 1998: 18). This correlates with the magnitude of their research and development expenditures: while developing countries spent only \$57 billion, or 1% of GDP, on R&D in 1992, the United States alone spent \$167 billion, or 2.8% of GDP, during the same year (Braga, Fink, and Sepulveda, 1998: 12). In addition, less than 5% of patents in 1994 – 1995 were awarded domestically to residents of the developing world (Braga, Fink, and Sepulveda, 1998: 25). “Patent applications from firms in developed economies continue to dominate global registrations. Developing countries continue to be overwhelmingly net importers of technology and new products.” (Maskus, 2000: 85). Clearly, it is the developed world that stands to benefit most from stronger international patent protection.

More than one source (Braga, Fink, and Sepulveda, 1998; Maskus, 2000) has identified a correlation between the level of patent rights and per capita GNP. The following graph illustrates a model in which IPR strength has been determined according to “extent of coverage, membership in international patent agreements, provisions for loss of protection, enforcement mechanisms, and duration of protection” (Braga, Fink, and Sepulveda, 1998: 8):

Strength of IPRs regime and GNP per capita for 95 countries, 1975

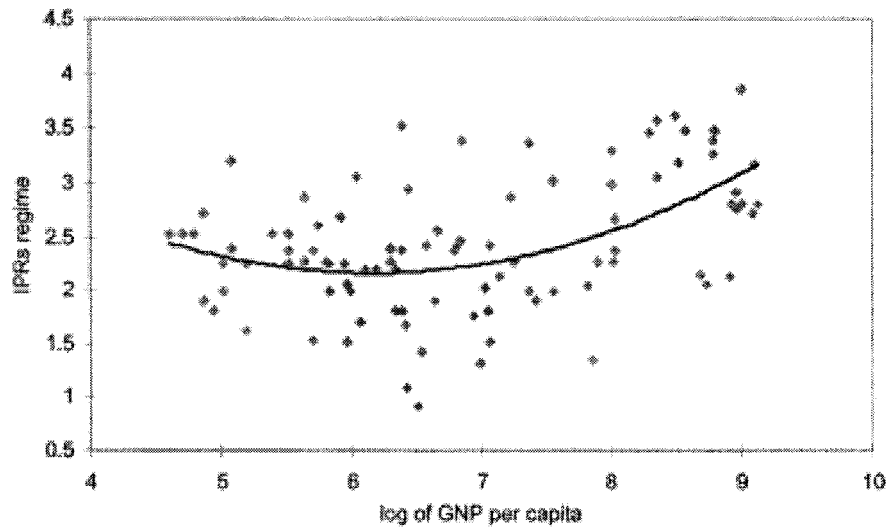


Figure 1

(Source: Braga, Fink, and Sepulveda, 1998: 8)

This correlation leads economist Keith Maskus to conclude that “the strength of IPRs appears to be a nonlinear function of economic development, at first falling as incomes rise and then increasing after that” (Maskus, 2000: 144).

However, causality is assumed rather than suggested by the results of these studies, which only show the correlation between the level of patent protection and GNP of various countries. Reversing the assumed causal direction yields a cautionary conclusion, as it would suggest that as the level of intellectual property rights protection is strengthened, economic development may be compromised for the poorest countries. This conclusion would be in keeping with the concerns of the developing countries, which have insisted that strong patent

protection is not in their best interests. While poorer countries prefer weaker IPRs, there is a concern that “it is likely to take considerable time before many significant developing countries approach the necessary per capita income” (Maskus, 2000: 144) for this preference to shift to stronger patent protection. In order to advance the interests of wealthy nations, “the world is undertaking an unprecedented experiment: to accelerate the introduction of higher standards into regions that would not ordinarily be expected to adopt them” (Maskus, 2000: 144).

Keith Maskus has argued that stronger patents, in addition to being in the best interests of the developed world, can also have a positive effect on the welfare of the poorer countries (Maskus, 2000: 170). However, it is generally acknowledged that “the ratio of empirical demonstration to assumption in this literature must be very close to zero” (Maskus, 2000: 87). One justification for imposing the adoption of patent protection on developing countries has been “the general proposition that secure property rights are a precondition for growth” (Maskus, 2000: 145). Instituting a system of tangible property rights established the stability necessary for European economic growth to occur (Olson, 1993: 572). However, “whether intellectual property rights have the same effects as general private property rights” is uncertain (Maskus, 2000: 146). While patents protect innovators, they also create monopolies that disadvantage consumers. This tension “is often discussed as the trade-off between static efficiency (stimulating competition) and dynamic efficiency (stimulating invention through

patents)” (Verspagen, 1999: 6). This distinction has important redistributive implications when consumers and monopoly holders of information are polarized between poor and rich countries: in order to reap the rewards of dynamic efficiency, countries need to have sufficient wealth to invest in research and development. If they are unable to do so, their domestic static efficiency will suffer in the face of strengthened IPRs, while wealthy countries enjoy the benefits of greater dynamic efficiency. Although it is possible that stronger patent protection will encourage more innovation in developing countries, there is also the danger that, particularly in the short term, they will become further impoverished as the result of a decline in static efficiency.

In addition, monopoly rights have the potential to encourage anti-competitive practices: “IPRs may facilitate cartelization of potential competitors through cross-licensing agreements that fix prices, limit output, or divide markets” (Braga, Fink, and Sepulveda, 1998: 36). They may also give corporations the power to “exclude competitors in particular markets by raising entry barriers through tie-in sales or restrictions on the use of technology” (Braga, Fink, and Sepulveda, 1998: 36). Further, they may encourage firms to purchase “exclusive rights to competing goods and services – effectively leading to horizontal mergers” (Braga, Fink, and Sepulveda, 1998: 36), a very real danger in the pharmaceutical industry, where mergers have become increasingly common. Finally, monopolists may raise barriers to market entry by “threatening or initiating bad-faith litigation and opposition proceedings” (Braga, Fink, and Sepulveda, 1998:

36). The implementation of TRIPs has given pharmaceutical companies the opportunity to launch an unprecedented assault on fair competitive practices worldwide.

The TRIPs regime has recently come under attack as the AIDS crisis in Africa has spotlighted its health effects on the global poor. Pharmaceutical companies have successfully used the TRIPs agreement to keep developing countries from using less expensive generic versions of proprietary drugs. From 1997 until 2001, the pharmaceutical industry managed to block a law passed by the South African government that was intended to improve access to affordable generic medications to over 4 million people with HIV (Oxfam, 2001d: Global Exchange, 2001: 3). Although the legal action by thirty-nine pharmaceutical corporations was abandoned following “an intense period of international activism and mobilization” (Berger, 2002), the four-year battle proved fatal to many South Africans with HIV unable to afford patented medications (Oxfam, 2001d). Indeed, each year “[f]ourteen million people die [. . .] of preventable, infectious diseases, most of them in developing countries” (Oxfam, 2002b). While some form of protection seems reasonable in light of pharmaceutical companies’ investments in research and development, the current global system has clearly become unbalanced in favour of transnational corporations and against the global public interest. In the quest to safeguard corporate profits, millions of afflicted people in poverty-stricken countries have been prevented from obtaining adequate medical treatment.

In November 2001, Oxfam and other NGOs were successful in convincing WTO ministers to sign the Doha Declaration in order to begin the process of correcting this imbalance. Ministers agreed that:

the TRIPS Agreement does not and should not prevent Members from taking measures to protect public health. Accordingly, while reiterating our commitment to the TRIPS Agreement, we affirm that the Agreement can and should be interpreted and implemented in a manner supportive of WTO Members' right to protect public health and, in particular, to promote access to medicines for all. (WTO, 2001).

A remaining issue is that while poor countries have been granted the right to manufacture and import generic drugs, there are very few that are still allowed to export them: compulsory licensing, or "the practice by a government to authorise itself or third parties to use the subject matter of a patent without the authorisation of the right holder for reasons of public policy" (ICTSD: 2003), is restricted under article 31(f) of the TRIPs agreement to production that serves the domestic market (ICTSD: 2003). Therefore, those most impoverished countries without domestic production facilities have limited and diminishing sources of affordable medicines. India, "one of the main sources of cheap drugs for Africa and other low-income countries" (Oxfam, 2001a: 26), is still able to export generics, but only until January 1, 2005. Ministers have committed to solving this problem by the end of this year, with developing countries and NGOs arguing "that the simple solution [. . .] is to lift TRIPS restrictions on exports of public-health related products" (Oxfam, 2002a). However, there have been some attempts to renege on this promise, with the United States advocating a moratorium on WTO disputes over this issue (Oxfam, 2002a). In addition, even after the Doha Declaration, pharmaceutical companies continued to advocate

trade sanctions against offending states (Oxfam, 2002a). As of February of 2003, this situation had yet to be resolved, with TRIPs Council chair Eduardo Perez Motta proposing that compulsory licensing should be restricted to "national emergencies or other circumstances of extreme urgency" (Doctors Without Borders, 2003; ICTSD, 2003).

2.4 A Lack of Protection for Indigenous Peoples

2.4.1 Plants and Knowledge

While Western pharmaceutical companies have aggressively pursued patent protection for the proprietary drugs they develop, and the global poor have been prevented from having access to affordable pharmaceutical medicines, indigenous medical knowledge has been inadequately compensated, resulting in a double injustice. Even worse, plant materials are often taken without the prior informed consent of the indigenous groups that originally discovered their medicinal properties. The issue of fair compensation is an important one since its denial represents an opportunity cost to indigenous peoples that they can ill afford, given the destruction of their lands that is caused by development projects such as mining and logging. However, removing plants from the holders of biological resources without obtaining their consent is an even more crucial aspect of biopiracy, since it compromises their autonomy and the ability to continue developing their resources in a sustainable manner.

Indigenous knowledge that has existed for many hundreds of years does not

qualify for patent protection under a system that was developed to protect novel, non-obvious inventions (Rifkin, 1998: 45). In addition, the private ownership of patents is not applicable to knowledge that is commonly held and non-exclusive. As a result, pharmaceutical companies are able to patent drugs that may be based on uncompensated or poorly compensated traditional knowledge and plant materials. The extent of this issue's impact on global inequity is highlighted by the fact that "95% of patents on life or life processes are held in industrial countries, despite the fact that 90% of the world's biological resources are found in developing countries" (Global Exchange, 2001: 4).

As the world's plant biodiversity becomes vulnerable to ownership and control by multinational corporations, the global poor are often displaced and alienated from their traditional ecosystems. Access to medicinal plants is often negotiated between pharmaceutical companies and national governments without any consideration for the rights of the indigenous peoples who originally discovered their healing properties. The injustice to holders of traditional knowledge and plant materials is two-tiered: Western pharmaceutical corporations offer inadequate compensation to developing countries, who often neglect to pass along whatever meager proceeds have accrued from the sale of biological resources. A specific danger is that "[a]s chemicals derived from natural sources are identified and isolated, corporations may be able to take over or destroy markets for some natural, medicinal tropical products" (RAFI, 1994). As a result, "the community could be left without either the expected income from the

harvest, or the ability to easily revert to the sustainable agriculture it abandoned. Unfortunately, there are far too many examples of each of these scenarios among past bioprospecting projects” (ETC Group, 2000).

The attitude of the United States during the TRIPs negotiations was that “‘anything under the sun made by man’, except human beings, was patentable” (Watal, 2001: 131). This perspective is consistent with the Lockean concept of property rights that underpins Western law: the position of pharmaceutical companies that plants should be patentable if minor technical modifications are made to them is characteristic of this philosophical orientation. Vandana Shiva, an Indian physicist, ecologist, feminist, and activist, rejects these claims, dismissing biotechnological plant modifications as “petty tinkering” (Shiva, 1997: 71). A particularly contentious element of TRIPs is article 27.3b, which allows patenting on micro-organisms and microbiological processes for creating plants and animals. Indigenous peoples are concerned that this article “will further denigrate and undermine [their] cultural and intellectual heritage, [their] plant, animal, and even human genetic resources and discriminate against [their] ways of thinking and behaving” (Indigenous Peoples’ Statement, 1999). While generating new plant varieties through breeding techniques has been practiced for millennia, “it is only relatively recently that these and other newer ways of inducing desirable features in plants ha[ve] been systematically rewarded through IPRs” (Watal 2001: 135).

The American patent system is “not based on searching both the written and oral prior art for world-wide novelty” (Watal, 2001: 174). In 1986, an American scientist named Loren Miller obtained a patent on the medicinal plant *Banisteriopsis caapi*, a strain of *ayahuasca* that is considered sacred by many indigenous peoples of the Amazon (Wiser, 1999, Fecteau, 2001: 69), after obtaining a sample from a family garden in Ecuador (Jacanimijoy, 1999). To many South American Native groups “this is tantamount to them patenting the Roman Catholic host” (Goering, 1999). Although the Coordinating Body of Indigenous Organizations of the Amazon Basin (COICA), an organization representing over 400 indigenous groups, only became aware of the patent in 1994, a successful campaign was orchestrated that ultimately led to its revocation in 1999 (Fecteau, 2001: 70; Wiser, 1999). This was accomplished on the “narrow basis” (Wiser, 1999) that “the same plant had been described in herbarium sheets in Chicago’s Field Museum over a year prior to Miller’s application” (Fecteau, 2001: 86). The fact that *ayahuasca* is considered a sacred plant by most Amazonian tribes, and that its properties have been known to indigenous peoples for hundreds of years did not figure into the final decision by the Patent and Trademark Office (PTO) to withdraw Miller’s patent. Indeed, foreign prior use, knowledge, and invention are excluded from U.S. patent law requirements (Fecteau, 2001: 97). Foreign knowledge can only be protected by the existence of patents or printed publications (Fecteau, 2001: 97). Since traditional knowledge is transmitted orally and rarely exists in written form (Fecteau, 2001: 97), the American patent system is inadequate to the task of

protecting indigenous rights. The Canadian system similarly discriminates against orally transmitted knowledge: in order to be protected as prior art, a publicly-available document must be in existence more than one year before a patent application is filed (Rudolph, 1997: section 4.2). When these foreign prior art exclusions are situated within the context of the homogenizing TRIPs agreement that imposes Western IPRs on developing countries, it becomes clear that the international playing field is far from level.

Ayahuasca once again became the centre of a controversy in November of 2001 when an Ecuadoran shaman, Juan Uyunkar, and his son, Edgar were arrested in Ontario following the death of a 71-year-old woman during a healing ceremony in October (Little, 2002). The Uyunkars, who used a mixture containing *Banisteriopsis caapi* (O'Neill, 2002), were charged with "criminal negligence causing death, administering a noxious substance as well as importing and trafficking in a controlled substance" (Little, 2002). It is interesting to situate these arrests within the context of the 44,000 to 98,000 deaths that occur in American hospitals each year as the result of medical error (American Iatrogenic Association) and the additional 90,000 deaths caused by infections acquired during hospitalization (American Iatrogenic Association). Clearly, both allopathic and indigenous medicines have the ability to harm as well as to heal. Given that an American scientist was able to hold a patent on *ayahuasca* for thirteen years, the Canadian arrest of a shaman with three decades of experience administering it (Little, 2002) seems symptomatic of an imbalance in the international system.

In 1990, the U.S. government and W.R. Grace jointly filed a patent application with the European Patent Office (EPO) for a neem-based product that controls fungi on plants. Neem is a traditional Indian plant that has been used for this purpose for centuries; therefore, “the basis of IPR claims to neem is illegitimate on two grounds. First, it claims nature’s creativity and the creativity of other cultures as its own. Second, [. . .] this leads to the false claim that the biopesticide property was created by the patentee” (Shiva, 1997: 71). Although the EPO initially granted a patent on this product in 1994, it was struck down five years later as a result of scientific evidence brought forward demonstrating the invalidity of the applicants’ claim to novelty. (Shiva, 2001b: 61). Achieving a successful outcome against the formidable resources of multinational pharmaceutical corporations required the efforts of the European Union Parliament’s Green Party, Vandana Shiva’s Research Foundation for Science, Technology and Ecology, and the International Federation of Organic Agriculture Movements (Raghavan, 2000) over a period of six years (Raghavan, 2000). Indeed, the average cost of patent litigation in the United States is over one million dollars (Global Exchange, 2001: 4). With over ninety patent claims by Western corporations in effect on neem (Shiva, 2001b: 61), it would be a mistake to assume that the EPO victory represents anything more than a hopeful beginning. The theft of traditional medicinal knowledge and plants is an ongoing process that is legitimized by the TRIPs regime.

Few countries “insist on disclosure of the origin and proof of prior informed consent [. . .] for the use of the biological materials or traditional knowledge on which the invention is based” (Watal, 2001: 174). The U.S. position has been that genetic materials are the common heritage of mankind. This stance has lead Western pharmaceutical companies to feel they have the right to take the South’s knowledge, plants, and genetic materials without obtaining permission from the indigenous holders of medicinal knowledge and plant materials, and without offering compensation. This kind of “biopiracy” (Shiva, 1997) has often been justified by underestimating the contribution of indigenous peoples in discovering the medicinal properties of plants. A 1999 statement by a U.S. trade official epitomizes the way in which traditional forms of knowledge are undervalued: “That anybody thinks they should get a share of the profits because they happen to be squatting on the forest where the resources are is laughable” (Goering, 1999). However, when the “squatter” happens to be the American government, the rate of compensation is much higher, although still inadequate according to several observers (GRAIN, 1999). Diversa, an American biotechnology company, managed to get away with paying the National Autonomous University of Mexico (UNAM) far less than it paid the US Department of the Interior for access to the biological resources of Yellowstone National Park in a similar deal (Global Exchange, 2001: 5; GRAIN, 1999). The minimization of indigenous peoples’ role in discovering medicinal plants can be even more insidious than the blatantly derogatory characterization of local residents as “squatters”: scientific terminology that is supposedly objective often

embodies the same misguided prejudice. “By declaring landscapes as *wildernesses* or resources as *wild*, scientists have effectively placed these into the public domain – thereby ignoring historical interactions” between indigenous peoples and the ecosystems they inhabit (Posey, 2001: 385).

It has been pointed out that this view of indigenous medicinal plant materials echoes European colonialists’ perception of native lands (Shiva, 1997: 51): both land and plant materials have been treated as though no prior rights exist. “In the first colonization, the land of indigenous people was robbed from them. Through intellectual property rights and patents, the minds and bodies of indigenous people are being pirated; life itself is being colonized” (Shiva, 2001b: 9). Just as the inability to recognize forms of stewardship not tied to increasing yields and profits enabled Locke (1690) to rationalize the appropriation of indigenous land in America, the positive impact on biodiversity resulting from centuries of interaction with indigenous populations is ignored. In fact, however, “even apparently ‘wild’ genetic resources may not be ‘gifts of nature’ at all. Rather, the useful characteristics of plants and animals expressed by genes identifiable only in laboratories may be well known to local and indigenous communities who may have legitimate claims over access to and use of these resources and the information they possess about them” (Dutfield, 1999: 2).

Ignoring indigenous peoples’ contributions to discovering and developing medicinal plants enables bioprospectors to justify removing resources without

obtaining prior informed consent. However, the Convention on Biological Diversity attempts to rectify this problem by stipulating that “[a]ccess to genetic resources shall be subject to prior informed consent of the Contracting Party providing such resources, unless otherwise determined by that Party” (CBD, article 15.5). This provision carries with it the implicit possibility that knowledge and materials will be withheld. Although the CBD requires states to “endeavour to create conditions to facilitate access to genetic resources” (CBD, article 15.2), indigenous groups are under no such obligation: “[b]ioprospectors must expect and be prepared to accept ‘no’ as an answer – to understand that there may not be ‘prior informed consent’” (RAFI, 2000a). Indeed, the fact that “[m]ost indigenous groups see bioprospecting as a breach of their privacy” (Posey, 2001: 391), coupled with the resentment caused by denying their contributions while depending on their generosity, has resulted in consent being withheld to an increasing degree. Although biopiracy serves the short-term interests of pharmaceutical companies, the increasing reluctance of indigenous people to share their knowledge with the developed world has the long-term consequence of reduced opportunities to develop useful new drugs in the future.

There have been many recent examples of access to knowledge and plant materials being blocked by local opposition. Indigenous participants in a United Nations Development Programme (UNDP) consultation, held in Suva, Fiji in 1995, “[c]all[ed] for a moratorium on bioprospecting in the Pacific and urge[d] indigenous peoples not to co-operate in bioprospecting activities until appropriate

protection mechanisms are in place” (Regional Consultation on Indigenous Peoples' Knowledge and Intellectual Property Rights, 1995). Similarly, Lorenzo Muelas Hurtado of the *Movimiento Autoridades Indígenas de Colombia* called for “a moratorium on all access activities to [their] resources and knowledge in [their] territories” in 1998 (Hurtado, 1998). Indigenous communities in Ecuador were so resentful of the *ayahuasca* patent that they managed to convince their legislature to “reject a proposed bilateral intellectual property rights agreement with the United States.” (Wiser and Downes, 1999). In 2000, Brazil also put a stop to a Novartis Pharma bioprospecting project (Cevallos, 2000) to research 10,000 microorganisms. And in 2001, after a two-year struggle (ETC Group, 2001), the Council of Indigenous Traditional Doctors and Midwives from Chiapas (COMPITCH), “a coalition of 12 traditional medicine organizations with grass roots support in almost 3,000 communities” (Global Exchange, 2001: 5), managed to obtain a moratorium on a bioprospecting project involving a partnership between the Maya-International Cooperative Biodiversity Group (Maya-ICBG) and El Colegio de la Frontera (ECOSUR), based in Chiapas, Mexico (ETC Group, 2001; Global Exchange, 2001: 5). Fears included the potential extinction of plants being managed unsustainably in a drive for profits. Ironically, it seems that the failure to treat indigenous peoples fairly in matters involving patents based on traditional plants and indigenous knowledge “interfere[s] with the achievement of the mission of the patent law – to encourage progress in science and useful arts.” (Wiser and Downes, 1999).

Although drug companies may be reluctant to acknowledge the contributions of traditional knowledge, they have displayed little hesitation in reaping its benefits: of the “over 120 pharmaceutical products [that] are plant-derived, [. . .] some 75% of these were discovered by examining the use of these plants in traditional medicine” (Bierer, Carlson, and King, 1996). Since plant-based drugs represent an estimated 25 percent of all medicines prescribed between 1959 and 1980 (Carlson, 2001: 491), this means that “approximately 20 percent of all pharmaceutical prescriptions written between 1959 and 1980 were pharmaceuticals derived from ethnobotanical leads” (Carlson, 2001: 491). Clearly, Western medicine is indebted to local communities for their knowledge of medicinal plants: their contributions deserve to be fairly compensated. In addition to this moral imperative, a pragmatic concern for future health benefits accruing from continued access to indigenous knowledge and resources dictates that they be accorded far more respect than they have received in the past.

One possible solution for solving the problem of inadequate compensation for indigenous knowledge and plant materials is the formation of cartels. According to Joseph Vogel (2000), this issue stems in large part from the current system of bilateral deals that leaves poor countries with limited bargaining power. Largely in response to the American position of plant genetic materials as the common heritage of mankind, the Convention on Biological Diversity, drafted in 1992, guarantees the right to negotiate bilateral deals: “Recognizing the sovereign rights of States over their natural resources, the authority to determine access to

genetic resources rests with the national government and is subject to national legislation.” (CBD, 1992: Article 15).

However, Vogel sees this right to sovereignty as a Trojan horse: it only lowers prices by creating competition among countries sharing the same plants in common. As a result, already poor states end up selling their resources for far less than they are actually worth. While the monopoly rights awarded to pharmaceutical companies inflate the price of medicines in the developing world, the market value for indigenous knowledge is driven down by market competition between disadvantaged and desperate states. In addition, since the United States has many plants on its territory and in botanical gardens, American companies are able to source plants in the U.S. after obtaining knowledge from indigenous cultures.

Vogel addresses this issue by advocating that institutional mechanisms be put into place to allow the South to form biodiversity cartels: the monopoly protection Western corporations enjoy under TRIPS should be balanced by oligopoly rights for the developing world. Under this scheme, aboriginal communities holding the same medicinal plants and knowledge would share any compensation on the basis of habitat, and individual nations would have the responsibility of ensuring that benefits are passed on to the indigenous communities residing within their borders. Rather than resisting IPRs, Vogel tries to find a more equitable deal for indigenous peoples within the existing international IPR system by advocating

the designation of their knowledge as “trade secrets”. There are, however, several problems with this approach. First, the implementation of this system would entail high administrative overhead, with a huge database and associated management costs, making it impractical for adoption by poor states with limited resources. Second, there is no way of guaranteeing that indigenous communities would actually be the beneficiaries of payments made to developing nations: “[t]he fact that local communities are not asking for compensation in the name of their countries, coupled with the fact that their national governments are not addressing the issue of compensating local communities as distinct from the state, provides [a caution] against uncritical adoption of the intellectual property rights approach” (Dove, 1996: 56). And, third, both the complexity and the economic structure in which this kind of solution is embedded are contrary to the values and beliefs of indigenous communities. Many aboriginal people would reject the idea of owning nature even if the international patent protection system compensated them by recognizing their knowledge as trade secrets. In their view, medicinal plants have intrinsic, spiritual value, and should therefore not be for sale at any price.

The issue of fair compensation is therefore complicated by the question of whether it would be counterproductive to the goal of safeguarding cultural diversity. Compensation is sometimes advocated as a means of ensuring that indigenous societies have adequate resources to resist the encroachment of Western cultural values and economic practices. However, “if intellectual

property rights is (*sic*) a property and component of Western capitalism, then abetting its acceptance elsewhere must lead to economic transformation or adoption of the market form exactly among those people whom it is said to protect” (Gudeman, 1996: 104). A specific concern is that if only some holders of traditional medicine are compensated, this “has the potential of putting individual against individual and community against community in a community of communities” (Shiva, 2001b: 66), with “the normal give and take of cultural ideas and genetic resources between farmers and villages [. . .] obstructed or otherwise distorted by property relations and the expectation of profit” (Brush, 2001: 528).

This does not mean that attempts to find workable solutions to the problem of exploitation should be abandoned. Rather, it serves as a cautionary note that efforts must be taken to ensure that compensation is carried out in a way that is consistent with indigenous values and beliefs. One possible solution that could minimize the social disruptions caused by imposing a Western IPR system on indigenous peoples might be to circumvent the entire question of monetary compensation by instead “[e]nhancing other public goods – education, health, and agricultural technology – which affect traditional farmers” (Brush, 2001: 529).

Stephen Gudeman suggests that “[o]ne alternative or supplement to the establishment of legal property rights might be to work at enabling innovations at the local level for local benefit. The processes of innovation might be fostered

not in hopes of securing individual profit but as a way of helping people remake their commons" (Gudeman, 1996: 188), ensuring the preservation of a system more in keeping with traditional values. Within this context, however, it is important to note that incentives from the developed world are not the only possible means of driving innovation: indigenous knowledge is not necessarily "ancient or static" (WIPO, 2001: 212). As such, in addition to taking measures to preserve ancient cultural wisdom that is in danger of disappearing, "it is also important to envisage a system that contributes to the promotion and dissemination of innovations which are based on [the] continuing use of tradition" (WIPO, 2001: 212). An Indian initiative called *panchayat* or "living democracy" encourages villages to "register their traditional plant life and to take out communal patents on them before the biotech corporations move in and claim ownership" (Clarke and Inouye, 2002: 50). It must be noted, however, that such initiatives run the risk of being challenged by the TRIPs regime: when legislation that would allow indigenous healers to register their traditional remedies was recently proposed by the Thai government, the United States threatened to take action through the WTO (Clarke and Inouye, 2002: 43). In addition, while playing the property rights game may allow indigenous communities to retain control over the healing plants they have used for generations, such a defensive move would imply the acceptance of treating plants intellectual property, in contradiction to their basic beliefs. (Haffajee, 2002: 21).

Simply respecting already existing systems of rights rather than attempting to impose foreign norms would go a long way toward the goal of protecting indigenous cultures:

[L]ocal-level property rights systems and regulations often do exist and the real problem is that these are not recognised by the wider society. Biodiverse lands are nationalised or privatised so that the owners become the state or non-local private interests and the local people are disenfranchised and even forcibly removed from their traditional territories. (Dutfield, 1999: 4).

Rather than assuming that poverty in the developing world is exclusively endogenous, “the international community needs to ask not just what it can do to help, but also what it must do to stop hurting. The cessation of most deforestation depends not on stimulating benevolent intervention by the international community, but on halting existing predatory interventions and not initiating any new ones” (Dove, 1996: 60-1).

2.4.2 Harvesting Humans

In addition to the patenting of pharmaceutical drugs based on medicinal plants and indigenous knowledge, there has also been recent controversy surrounding the harvesting and patenting of cell lines taken from the bodies of indigenous people. Major players in the gene patenting business include pharmaceutical companies, gene-sequencing enterprises, academic and research institutions, and participants in the Human Genome Diversity Project (HGDP) (RAFI, 2000b). From the perspective of Western science, relatively isolated indigenous groups are ideal sources of unique DNA sequences that serve as codes for specific diseases, and therefore hold promise for their eventual cures. To pharmaceutical

companies, these cell lines represent a potential gold mine for the development of lucrative new drugs. From the perspective of indigenous peoples, however, the harvesting and patenting of their common genetic heritage is often seen as a sacrilege for many of the same reasons that plant patenting is rejected: just as medicinal plants have intrinsic, spiritual value, so too do their bodies. It is inappropriate for life, including the Earth, plants, and human bodies, to be bought and sold. Just as indigenous peoples have common rights, but not common ownership, of healing plants, they also share their genetic heritage in common. According to Aroha Te Pareake Mead of the Ngati Awa and Ngati Porou tribes and Director of the International Association of the Mataatua Declaration of Cultural and Intellectual Property of Indigenous People (IAMD), "indigenous peoples are not advocating one value for human genes and another value for all others. The call is the same – nature and living things, tangible and intangible, all are sacred. They are not objects, they are not property, they cannot be owned" (Mead, 1996: 47). In addition to the incompatibility of concepts of private ownership with indigenous belief systems, the claim to private ownership by outsiders for this genetic makeup is viewed suspiciously by both indigenous groups and non-governmental organizations such as the Winnipeg-based Action-Group on Erosion, Technology, and Concentration (ETC Group), formerly known as the Rural Advancement Foundation International (RAFI). The failure of the developed world to reciprocate the generosity with which indigenous groups have shared their resources is seen by many as an ongoing, predictable pattern.

The controversy surrounding the patenting of indigenous cell lines began in 1993 when RAFI discovered that the U.S. government Secretary of Commerce had applied for American and world patents on the cell line of a 26-year-old Guaymi woman from Panama (Christie, 1996: 34; RAFI, 1994b). This cell line is of interest to researchers for its potential use to help treat people with leukemia and chronic degenerative neurological disease caused by human T-lymphotropic virus type I (HTLV-I) (RAFI, 1994b). Having been alerted by RAFI of these claims, lawyer Isidro Acosta, President of the Guaymi General Congress, met with Adrian Otten, the senior GATT official responsible for TRIPs to protest the Guaymi patent (Christie, 1996: 34). Acosta's indignation is evident in the following statement:

I never imagined people would patent plants and animals. It's fundamentally immoral, contrary to the Guaymi view of nature, and our place in it. To patent human material... to take human DNA and patent its products.... That violates the integrity of life itself, and our deepest sense of morality (RAFI, 1994b).

As a result of this meeting, as well as growing pressure from the World Council of Indigenous Peoples (WCIP), the World Council of Churches, and other organizations, the patent claims were dropped (RAFI, 1994b).

Shortly after this situation was resolved, the non-governmental organization SWISSAID discovered two additional patent claims on indigenous cell lines that researchers hoped would prove helpful in addressing diseases caused by the HTLV-I virus (RAFI, 1994b). One of the most controversial and widely contested incidents involving the patenting of human cell lines centres around a small tribe

in Papua New Guinea called the Hagahai. The Hagahai's first contact with the outside world was in 1983 (Woodard, 1999) when the National Institutes of Health (NIH) began collaborating with Dr. Carol Jenkins of the Papua New Guinea Institute of Medical Research to collect blood samples from the Hagahai people (Bhat, 1996: 30). Scientific interest in them was piqued by the discovery that although Hagahai carry the HTLV-I virus in their white blood cells, they remain unaffected by leukemia (Salopek, 1998). Additional cell lines exhibiting the same characteristics were discovered in another population in the Solomon Islands (Bhat, 1996: 30). Following an agreement between the National Institutes of Health (NIH) and the Hagahai people to equally share any royalties accruing from discoveries, the NIH filed patent applications in 1990 and 1991 on the two cell lines infected by the virus (Bhat, 1996: 30). While the application for the Solomon Islands cell line was subsequently withdrawn (Bhat, 1996: 30), Dr. Jenkins requested that the Hagahai patent application remain in effect for the sake of potential royalties that would accrue to the Hagahai people in the event of the development of a profitable product (Bhat, 1996: 30). The withdrawal of the Solomon Islands patent has been variously attributed to the collaboration between the Solomon Islands government and RAFI to suppress it (RAFI, 1996), and the low level of demand for commercial products that was expected to result from both it and the Hagahai patent (Bhat, 1996: 30). While the U.S. Patent Office granted a patent on the Hagahai cell line in 1995 (Christie, 1996: 35), and the NIH still retains the Hagahai's blood samples in its freezers (Salopek, 1998),

the patent was abandoned by in 1996 as a result of widespread criticism from indigenous groups and non-governmental organizations (RAFI, 1996).

The controversy surrounding the Hagahai patent is complicated by the fact that although it was condemned by many indigenous groups around the world, the Hagahai people themselves seemed happy to have entered into an agreement with the NIH (Ibeji and Gane, 1996: 33). Their only real concern was that the Papua New Guinea government might try to take away their share of any eventual profits (Ibeji and Gane, 1996: 33). The subtleties underlying the issue of informed consent are relevant here. As one observer asks, “how can scientists possibly obtain informed consent – as is required by more governments – when they can’t explain the profound repercussions of genetic testing to preliterate cultures?” (Salopek, 1998). While it is important to guard against paternalistic attitudes that underestimate a group’s ability to make their own decisions, it must also be pointed out that the beliefs and technology leading to the patenting of DNA are far removed from the kinds of issues most indigenous groups are accustomed to handling. Therefore, it is incumbent upon researchers to ensure that the implications of consent are fully understood before proceeding with their sampling. A further issue is that while consent may be obtained from an individual, it is the common characteristics of a people’s genetic code that make a given cell line attractive to researchers. Therefore, although an individual may grant consent to have his blood or tissue sampled, the information acquired is representative of the group as a whole (Senituli, 2002: 14) who may

be against the idea of sharing their DNA in such a way. The Guaymi patent is a case in point: although researchers say they obtained the informed consent of the woman whose blood was sampled (RAFI, 1993), the Guaymi people, as represented by General Congress and lead by Isidro Acosta, were adamantly opposed to the patent claim.

An additional example involves residents from the Pacific island of Tonga and Australian businessman Joseph Gutnick's company Autogen Limited (Senituli, 2002: 13). In 2000, Tongans heard from Australian media reports that an agreement had been signed between Autogen and the Tongan government to collect samples of blood from "consenting individual Tongans" (Senituli, 2002: 14) in order to study their unusually high rate of diabetes (Senituli, 2002: 13). The Minister of Health assured them that, although there had been discussions with Autogen, no agreement had been signed (Senituli, 2002: 13). The Tonga Human Rights and Democracy Movement (THRDM), headed by Lopeti Senituli, then embarked on a campaign to block Autogen from obtaining an agreement (Senituli, 2002: 13). One of their objections was that the agreement that Autogen claimed it had signed

failed to look beyond informed individual consent. Tongan extended family groupings would have no say, even though the genetic material donated by individual members would reflect the entire extended family's genetic make-up. Although Autogen stated that their research would not involve the whole Tongan population, only individual patients, the database that they would establish would in effect be pretty close to complete given the limited size of the population, the high rate of diseases such as diabetes and intermarriage over the centuries. (Senituli, 2002: 14).

Informed consent is obtained once “the investigator provide[s] an explanation of the purposes of the research, a description of reasonable risks involved, a disclosure of appropriate alternative procedures or treatment, etc. The information must be given in a language understandable to the subject or representative” (RAFI, 1994b). However, these provisions are clearly based on the developed world’s emphasis on individual rights, while most indigenous groups are also concerned with group rights. In addition, the nature of the technology itself, as well as the information being sought, demands an acknowledgement of the group as the appropriate decision-maker and research subject: specific genetic characteristics that generate scientific interest are commonly shared among members of a given indigenous group. Allowing sampling to proceed on the basis of informed consent from one or several individuals when cell lines with specific traits have evolved in common among all members of a social group is analogous to compensating one indigenous group for medicinal plants and knowledge that are common to several different peoples. In both cases, laws based on protecting private property coexist uneasily with the reality of common rights and assets that exists in most parts of the world.

Researchers are also interested in non-indigenous ethnic groups who have evolved in relative isolation. Sequana Therapies, in conjunction with scientists from the Samuel Lunenfeld Research Institute of Canada (Cunningham and Scharper, 1996), studied a group from Tristan da Cunha island, located between Brazil and South Africa, who are descended from British colonists, and are

particularly prone to developing asthma (Salopek, 1998). A University of Toronto researcher named Noe Zamel had learned of the Tristanians when they were forced to live in England for two years as the result of a volcanic eruption on their island in 1961 while Zamel was a medical research fellow working in a London hospital (Scott, 2003). Between one-third and one-half of the approximately three hundred islanders were found to suffer from asthma (Salopek, 1998; Scott, 2003; Raeburn, 2001). Zamel collected blood samples from the Tristanians in 1993 and 1996, the second time accompanied by a Sequana scientist (Raeburn, 2001). Sequana then signed a deal with Boehringer Ingelheim, which invested an additional \$70 million (Salopek, 1998). In 1997, Sequana “announced it had found the genes responsible for asthma in the Tristanian population. Indications are that the genes might be responsible for many cases of the disease worldwide. Sequana’s gamble seems to be paying off” (Raeburn, 2001). In exchange for having donated their blood, Tristanians will be given any drugs based on their DNA free of charge (Salopek, 1998). In addition, Boehringer Ingelheim paid for the modernization of the hospital (Scott, 2003), while each islander received a cash payment of \$50 (Scott, 2003). Sequana, which has since been acquired by Axys Pharmaceuticals (Raeburn, 2001), has filed for patents on the genes (Scott, 2003), and will retain any future profits, which could be considerable, given that “300 million people in the world have asthma, which is usually not fatal but a chronic disease. In other words, tens of millions of people might want to use a drug year in and year out to alleviate the symptoms” (Scott, 2003). In a remark reminiscent of the U.S. trade official who commented,

“[t]hat anybody thinks they should get a share of the profits because they happen to be squatting on the forest where the resources are is laughable” (Goering, 1999), Sequana Therapies president Kevin Kinsella stated that gene discovery is “a process that costs [them] millions and takes years of work. So how much does somebody who gets his arm pricked deserve?” (Salopek, 1998).

Perhaps a more valid justification, and at the very least a more astute one from a public relations perspective, is given by Noe Zamel, the scientist who first began investigating the Tristan da Cunha islanders: paying them more than \$50 each “would have broken the ethics rules written by the University of Toronto to prevent researchers from enticing subjects with large sums of money” (Scott, 2003). Presumably, he is referring to the University of Toronto’s *Guidelines on the Use of Human Subjects*, drafted in 1979, which also states that “[i]deally, all participation in research would stem from altruism and the love of learning” (University of Toronto, 1979). It is evident that there is an imbalance between the altruism that is still expected from research subjects and the profit motive that drives corporations. Moreover, when the University of Toronto’s guidelines were drafted in 1979, it would still be many years before the patenting of human cell lines would become an issue. The stipulation that “compensation should not hinder the freedom of the subject to withdraw at any time” (University of Toronto, 1979) is irrelevant when only one sample is required from each subject. The rule that “no one should be compensated financially for undergoing a significant risk” (University of Toronto, 1979) is similarly irrelevant: the risk ensuing from blood

testing is negligible. While the strength of the international intellectual property rights regime has grown exponentially since 1979, the justification for continuing to offer low rates of compensation to research subjects is still based on rules that were drafted long before the advent of TRIPs.

A related issue is that “[t]he widespread concept of ‘prior informed consent’ currently has no provision for informing the individuals that their DNA or a product derived from it may become a marketable commodity or that someone stands to profit if a commercial product is someday derived from their DNA” (Raghavan, 1995). Motivations based on a sense of altruism may be altered when research subjects understand that they are not only contributing to the advancement of science and the possibility of an eventual cure for chronic and acute diseases, but that their generosity may also be supporting huge financial returns to pharmaceutical and biotechnology corporations. Even in the absence of disclosure by investigators that research may result in a commercially viable product, increasingly savvy groups can assume that when they are approached to donate blood or tissue samples, the expectation of future profits is likely to be a motivating factor. The fact that sampling is dominated by considerations of intellectual property rights, with the potential to confer highly lucrative profits to their holders, mitigates against the continued validity of expecting altruism from research subjects. There is a marked contrast between the collection of blood samples with the aim of claiming private ownership to protect any future proceeds from commercialization and the collection of blood destined for

transfusions. In the former case, huge profits may accrue to pharmaceutical corporations. In the latter, at least in Canada, there is no expectation of profit on either the part of donors, the Red Cross, or health professionals. It is unrealistic to expect subjects to continue focusing on the common good when the pharmaceutical industry has managed to alter international laws in favour of the privatization of ownership and profits.

In the case of the Tongans' battle with Autogen, in addition to objecting to the purported agreement's failure to address the issue of commonly shared genetic makeup, the THRDM felt that

the benefits offered by Autogen were a drop in the ocean. The promised royalties from any new therapeutics and the provision of these free of charge to the Tongan people were . . . prefaced by a huge 'if'. In contrast, Autogen would reap rewards from the moment they were able to say they had an 'official' agreement with the Tongan Government as they would immediately attract research and development capital from the giant pharmaceutical conglomerates. (Senituli, 2002: 14).

As with the battle over medicinal plants and traditional knowledge, the unintended consequence of private property protection is a growing reluctance on the part of peoples around the world to behave generously in promoting the common good. Although corporations argue that patent protection is necessary in order to encourage them to invest in research that may lead to public health benefits, it is also increasingly the case that it discourages research subjects from continuing to contribute to the pursuit of medical advances (King, 2001).

There is even some reason to question whether patent protection really does lead to new drug development, or whether it actually has the overall effect of discouraging innovation. A current trend is the rush to patent as many single nucleotide polymorphisms (SNPs), the smallest units of DNA, as possible, even when patent holders have little or no understanding of their function (RAFI, 2000b: 4), as a defensive strategy against losing patent rights to other corporations in the future. This kind of activity has been compared to “patenting the Periodic Table of chemical elements” (King, 2001). Although the publication of information pertaining to patents theoretically encourages innovation, “as soon as a researcher tries to make commercial use of developments based on the original patent – by going into partnership with a drugs firm, for instance, or charging patients at cost for a genetic test – the patent holder can step in to stop them, or oblige them to pay a license fee” (Meek, 2000a). In other words, innovation is discouraged, while medical costs are increased (RAFI, 2000b: 3). Indeed, this danger was confirmed by a leading industry figure, Dr. William A. Haseltine, Chairman and CEO of Human Genome Sciences, when he stated, “Any company that wants to be in the business of using genes, proteins, or antibodies as drugs has a very high probability of running afoul of our patents. From a commercial point of view, they are severely constrained – and far more than they realize” (King, 2000; RAFI, 2000b: 3). Human Genome Sciences has been ranked sixth of “the top ten patenters on the human body” (The Guardian, 2000c). Indeed, this kind of tendency toward oligopoly shows every sign of increasing: “It is expected that in less than eight years [as of November, 2000],

nearly all the genes that make up the genetic blueprints of the human race will have been identified and become the intellectual property of trans-national life science companies” (Rifkin, 2000). Although new drugs based on biotechnologies promise enormous potential health benefits, “the risk to society is that future medical researchers – private and public – will have to hack their way through forests of patents, paying out hefty licence fees to a host of gene-squatters, before the miracle drugs of the genetics revolution reach the market” (Meek, 2000b). The profit potential that lies in the hands of relatively few corporations is underlined by the fact that “most gene therapy products are being designed to be administered repeatedly rather than as one-time cures” (King, 2000), resulting in a situation in which more and more people will become increasingly dependent on a few multinational corporations for their health requirements.

In addition to the questionable effect SNP patenting has on medical research, there is also a strong argument to be made against allowing patents for molecules whose function is not even known (RAFI, 2000b; Meek, 2000b). Characterizing naturally occurring genetic material as an invention even when its function is known seems to defy the requirement that inventions be innovative and non-obvious. In addition, with the use of automated gene analysis techniques, identification of genes is far from non-obvious. In such cases, it seems more accurate to characterize gene fragments as discoveries (Meek, 2000a). Further, the lack of understanding of the function of many genes means

that the criterion of usefulness is also not being fulfilled (RAFI, 2000b: 4). It would be more consistent with intellectual property rights principles to restrict patents to drugs (Meek, 2000a) that are useful in treating disease, and can more legitimately be claimed to result from human inventiveness. However, even this may cause issues for indigenous peoples in the same way that pharmaceuticals based on the active ingredients of traditional medicinal plants pose a problem: in both instances private ownership is claimed on products that are based on the common heritage of indigenous groups.

It may be argued that the biotechnology industry's focus on high-tech cures is a choice that is based on considerations of commercialization and profit, and not necessarily on finding the best possible solutions to issues of public health. When a Pacific regional consultation on bioethics was held in March 2001, participants concluded that "the best way to address lifestyle diseases such as diabetes should be through preventative measures – educating people to change their dietary habits and lifestyles" (Senituli, 2002: 14). It is also significant that although a high incidence of diabetes was discovered in the Tongan population, it is a disease that is more typically found in affluent countries. Indeed, "many of the genes being sought are for diseases and problems of the wealthy rather than treatments for problems which would benefit the groups being studied" (RAFI, 2000b: 3). Proponents of sequencing argue that "[s]uch research can have direct medical benefits if it involves diseases affecting the group, or indirect benefits if researchers provide participants with medical care" (Olson, 2001). In fact,

groups such as the Tristanians have benefited from upgrades to their medical facilities (Scott, 2003), and promises have been made that subjects would receive any drugs ensuing from research that had been conducted on them free of charge (Senituli, 2002: 14; Salopek, 1998). This potential benefit, however, needs to be balanced against the legitimate reticence that indigenous peoples may have in engaging in procedures that contradict their belief that life should not be owned. And particularly where lifestyle choices play a significant factor in the incidence of disease, genetic sampling may not be the optimal path for indigenous groups to take, even when there may be some medical benefit to participating in a study. In some instances, at least, altering diet and lifestyle choices may confer equal health benefits to indigenous groups, while at the same time allowing them to retain the integrity of their spiritual beliefs.

Although the biotech lobby argues that patenting is necessary in order to safeguard profits and encourage corporations to continue doing research that benefits public health, many companies “have staked claims on discoveries only possible because of years of research by scientists in academic institutions, who thought they were working for the public good, or for groups of patients cursed by congenital affliction” (Radford, 2000). In addition, it has been pointed out that “the cost of identifying the function of a gene is a fraction of the cost of turning that gene into something useful, like a drug” (Meek, 2000a), suggesting that the pharmaceutical industry “would do better if firms were able to work freely with any genes and focused on patenting drugs instead” (Meek, 200b). An alternative

suggestion is to “consider crafting a great global treaty to make the human gene pool – and the gene pool of our fellow creatures – a ‘commons’ administered jointly by every nation on behalf of all future generations” (Rifkin, 2000).

In addition to private companies, the Human Genome Diversity Project (HGDP), an international conglomerate of scientists referred to by the World Council of Indigenous Peoples as the “Vampire Project” in 1993 (Posey, 1998; Indigenous Peoples Council on Biocolonialism), is a significant player in the rush “to sequence and store the world’s human genetic diversity” (RAFI, 2000b: 2). In contrast to the Human Genome Project (HGP), which aims to sequence all of the genes of a “typical” Western European person (RAFI, 2000b: 2), the HGDP is conducting a world-wide study of 722 genetically diverse human groups, including many indigenous peoples (RAFI, 1994b), with the goal of “‘immortalizing’ the cells by converting them into laboratory cell lines, and using the cells’ DNA to reconstruct human evolution and history” (Olson, 2001). This project, the brainchild of genetics professor Luigi Luca Cavalli-Sforza (Olson, 2001), has been roundly condemned by indigenous groups, and by non-governmental organizations such as RAFI. It has also been criticized by UNESCO’s International Bioethics Committee (IBC) (RAFI, 2000b: 10), contrary to HGDP’s false claim that “[t]he HGDP is under ethical supervision of a UNESCO committee” (RAFI, 2000b: 11, quoting Dr. Luca Cavalli-Sforza). Cavalli-Sforza’s well-intentioned vision for the HGDP was that it could be a means to help end racism by demonstrating that visually dissimilar ethnic groups

are often more genetically alike than ethnic groups with less obvious physical differences (Olson, 2001). In addition, he states that “[t]he variation among individuals is much greater than the differences among groups. In fact the diversity among individuals is so enormous that the whole concept of race becomes meaningless at the genetic level” (Mead, 1996: 48, quoting Luigi Luca Cavalli-Sforza). However, a UNESCO report stated that “[t]he claim that the HGDP will reduce racism is debatable” (RAFI, 2000b: 11, quoting a UNESCO report), indigenous groups have “accused the HGDP of stealing their genes, destroying their culture, and even contributing to genocide” (Olson, 2001), and “[a]cademic critics claimed that the project would encourage racist thinking, by oversimplifying issues of great complexity” (Olson, 2001). Even if supporters of the HGDP were correct in claiming that it could be helpful in combating racism, it seems presumptuous and even unconsciously imperialistic to expect indigenous peoples to submit to procedures that are contrary to their belief systems in order to cure Western society of racial misconceptions that they had no part in creating.

Since its inception in 1993 (Morrison Institute web site), the HGDP has been embroiled in controversy. The HGDP has consistently ignored the objections of indigenous peoples, as well as those of observers in the developed world, many of whom have serious doubts about the ethical validity of privatizing and commodifying the human body (King, 2001). Critics charge that there was a lack of representation from the groups who were targeted for study (Mead, 1996: 48),

and that a request by indigenous peoples that the activities of the HGDP be suspended “until its moral, ethical, socio-economic, physical and political implications have been thoroughly discussed, understood and approved by indigenous peoples” (Mead, 1996: 48, quoting the Mataatua Declaration on the Cultural and Intellectual Property Rights of Indigenous Peoples, 1993) was ignored. Many Native Americans, whose creation stories say they have always lived in the Americas, are particularly offended by the scientific legitimacy given by the HGDP to the notion that they migrated across the Bering land bridge (Olson, 2001).

In addition, questions have been raised regarding the enormous sums of money that are being spent to “collect the blood of groups that were disappearing because of poverty, disease, and official neglect” (Olson, 2001). As Aroha Te Pareake Mead states,

The survival of indigenous cultures will not come about because of gene banks. It will come from an observance by states of fundamental human rights and freedoms, recognition of the right to self-determination of indigenous peoples; attention to environmental problems (climate change, bio-prospecting, pollution); access to clean water, food and shelter for a sector of the world’s population that shares in common, across continents and oceans, the lowest socio-economic status within their countries. (Mead, 1996: 48).

Focusing on saving the genes of disappearing ethnic groups seems a misguided use of resources when they could be better applied to saving the people themselves (Liloqula, 1996). In addition to representing an opportunity cost, the HGDP has the potential to engender a sense of complacency by deflecting attention away from the more important issue of preserving indigenous cultures.

A focus on cultural survival, combined with a shift from private ownership and profit to a recognition of the human gene pool as a commons, as suggested by Jeremy Rifkin (2000), will mean that blood and tissue sample obtained on the basis of prior informed consent can be freely shared with true altruism on all sides. Instead of viewing indigenous peoples as research subjects, it seems infinitely wiser to recognize the intrinsic value of cultural diversity, and focus on safeguarding the survival of the human family in all of its rich variation.

CHAPTER 3

CULTURAL CONQUEST OR COMPLEMENTARY ASPECTS OF THE WHOLE?

3.1 Overview

The biotech industry's stance toward the traditional knowledge and genetic materials of Native peoples is generally characterized by exploitation and appropriation and supported by an increasingly entrenched system of international law that imposes Western intellectual property rights on indigenous peoples and the developing world. However, the potential exists for Western and indigenous forms of medical knowledge to be complementary aspects of a mutually beneficial system.

The issue of biopiracy must be firmly situated within the context of the modernist paradigm that informs it. Charlene Spretnak offers a relevant summary of how modernism applies to the disciplines of science, political philosophy, economics, and aesthetics:

Modern science constructed mechanistic models of how the world works and then perceived only the sort of data that would fit the model. Modern political philosophy locates all legitimacy in the modern nation-state. Modern economic theory asserts that the market is guided by a 'hidden hand' that benefits society as a whole. Modern aesthetics values design that is free of 'constricting' references to tradition or place. (Spretnak, 1999: 13).

In the contemporary era, multinational corporations have used the rhetoric of the hidden hand of the modern economy to advance their interests, even though Adam Smith, who originally articulated the concept in 1776 in *The Wealth of*

Nations, cautioned against the kind of monopolistic tendencies that ensue from unrestrained corporate power (Korten, 2001: 62). The pharmaceutical industry's success in selling the TRIPs agreement to the WTO is an example of such corporate lobbying that assumes a greater good resulting from unfettered economic expansionism. In addition, the technology that makes bioprospecting possible is firmly rooted in the mechanistic atomism of modern science: genetic engineering is contingent on the biological reductionism of identifying the properties of discrete genetic components while ignoring the interrelationships that exist between them (Pratt, 2002). In similar fashion, the exploitation that often accompanies bioprospecting can only be made possible by ignoring the interdependence that exists among diverse cultures.

In their influential and controversial book, *Empire*, published in 2000, Michael Hardt and Antonio Negri distinguish between two modes of modernity: the first mode "destroys its relations with the past and declares the immanence of the new paradigm of the world and life. It develops knowledge and action as scientific experimentation and defines a tendency toward a democratic politics, posing humanity and desire at the center of history." (Hardt and Negri, 2000: 74). According to Spretnak, this reactionary break with the past "steered the newly freed modes of inquiry in a particular direction: a radical break from all perceptions of organicism, holism, and interrelatedness and toward any works or discoveries that fit into the neoclassical, mechanistic worldview." (Spretnak, 1999: 44). The appropriation of power by the multitude that forms the basis of

the first mode of the modern project was opposed by the forces of Empire and transformed into a second mode of modernism, “constructed to wage war against the new forces and establish an overreaching power to dominate them.” (Hardt and Negri, 2000: 74). The mechanism, secularism, and alienation from the natural world that characterize the modern era exist within the context of an Empire that is currently manifested by the neoliberal globalization project. Spretnak refers to our current age as “*hypermodern*, not so much because the tarnished ideologies of the modern worldview are still believed to be salvational, but because the *conditions* of modernity are now driven by the dynamics of the technosphere and the globalized economy.” (Spretnak, 1999: 222). The hypermodernity of the biotech industry extends the salvational promise of modernism by accelerating the rhetoric of technological advancement within the context of extending global corporate hegemony.

The hypermodern discipline of biotechnology coexists with recent advances in postmodern science and philosophy that recognize the reality of interrelatedness, extending their focus beyond an exclusively atomistic orientation. In many ways, these advances mirror indigenous thought. Their meeting place is the realm of the non-modern (Spretnak, 1999: 28 gives this term a slightly different meaning), where all that has been rejected for the sake of enabling the spectacular rise of modern technology reappears to balance it and ensure its sustainability. While modernity has led to such positive achievements as the concept of universal human rights (Spretnak, 1999: 9) and impressive technological advances, its

rejection of spirit, nature, the feminine, and the body make it incomplete and unbalanced. The current propensity of the biotech industry to appropriate other forms of knowledge while simultaneously denying their validity is indicative of this broader tendency within the modern era, and has played a part in creating a situation based on fragmentation and conflict. In this section, I propose that, in addition to contributing to global injustice, this approach fails to incorporate the reality that modernity is situated within the wider perspective of non-modernity, just as the technological achievements of the developed world are supported by nature. While modernism is predated by the pre-modern within Western society, and challenged by various strains of postmodernism (Rosenau, 1992; Spretnak, 1999: 73), the non-modern encompasses the pre-modern as well as the ecological (Spretnak, 1999: 73), or affirmative (Rosenau, 1992: 53) modes of postmodernism. In contrast to deconstructive postmodernism, the ecological and affirmative modes of postmodernism make an attempt to reintegrate organicism, spirituality, and interrelatedness into their models of reality (Rosenau, 1992; Spretnak, 1999: 73). The ideas and findings of the science of ecology, which is based on the study of interrelationships that exist between living beings and their environments (Stuart, 1999), serve as the framework for the broader ontological orientation of ecological postmodernism. Although the origins of this discipline can be traced back to the late nineteenth century (Stuart, 1999), it was only accepted as a legitimate branch of science in the latter half of the twentieth century (Stuart, 1999). Its emphasis on interconnectedness as well as its holistic orientation has increasingly resonated in a culture that has witnessed the

limitations and dangers of the modern atomistic worldview (Stuart, 1999). Indeed, the growth of ecology has wide-ranging implications as the foundation for theories of social ecology that point to “the fundamentally antiecological nature of many of our social and economic structures and their technologies” (Capra, 1996: 8). The focus of social ecology is on the environmental problems that have resulted from social structures based on domination. The starting point for ecological postmodernism, however, is the social and political issues themselves, with the science of ecology proposed as a metaphor for reintegrating interrelatedness and complexity into the Western worldview.

The non-modern has also coexisted alongside Western society throughout its various phases in the form of indigenous societies worldwide, as well as in pockets of resistance within the developed world throughout the modern period (Spretnak, 1999: 131 – 180). The fact that humanity has evolved sustainably and continues to do so in the non-modern world must give pause to the hubris of assuming that the finely balanced system of the non-modern world exists only for the sake of providing raw materials for the further technological advancement of the tiny historical blip that is the modern project. The impressive height of modernism’s tower of technology (Hulme, 2001) will continue to be accompanied by a dangerous instability until its existence within the broader context of non-modernism is acknowledged.

The following discussion on the value of diversity and the role of complementarity is an attempt to reintegrate those aspects of life that have been repressed and denied by the modern project, while the section on the biotech myth explores the heroic subtext and hypermodern context of one aspect of the biotech revolution, the drive to immortality. Finally, recent advances in Western postmodern science are shown to mirror the non-modernism of indigenous thought: these are proposed as a more balanced context for informing the goals of the hypermodern biotech project.

3.2 The Value of Diversity

The development of global environmental crises, such as the ongoing loss of biodiversity, within the context of Western scientific, political, and corporate hegemony suggests that an exclusively Western orientation is inadequate to the task of providing urgently required solutions. Indeed, given the “inextricably link between cultural and biological diversity” (*The Declaration of Belém*, as quoted in Posey and Dutfield, 1996: 2), “attempts to conserve the world’s biological diversity require the immediate strengthening and enhancement of indigenous peoples and local communities” (Posey, 2001: 380). In addition, there is intrinsic and moral value in preserving both genetic and cultural diversity: if we accept William James’s view that diversity is “the very means through which consciousness operates” (Harmon, 2001: 55), it follows that “[w]hen we act in ways that reduce diversity, whether in the nonhuman world or in our own cultures, we corrode our essential humanity.” (Harmon, 2001: 64). The

importance of biological diversity is also emphasized within the discipline of ecology (Capra: 1996, 303). And the richness of the ethnosphere (Davis, 2001; Parsell, 2002), or “all the thoughts, beliefs, myths, and institutions brought into being by the human imagination” (Parsell, 2002 quoting Wade Davis), is dependent on the preservation of cultural diversity.

A personal regard for diversity is a central aspect of much indigenous philosophy.

As one Native American leader wrote:

Biodiversity is another term for life; it is an all-encompassing term that reflects the technological societies we live in today. It is a scientific term that fills another category in a technological world. We say, “all our relations”. Both terms talk about the same things. But our term reflects association and love. And that is the basic difference between indigenous peoples and Western societies. (Lyons, 2000: 450).

Within some segments of Western society, however, this gap has narrowed. Although some of Harvard biologist Edward O. Wilson’s ideas, such as his uncritical promotion of bioprospecting as a panacea for the preservation of biodiversity (Wilson, 2002: 124 – 28), are inconsistent with indigenous views, association and love are strongly implied in his concept of biophilia, which he defines as “the innately emotional affiliation of human beings to other living organisms.” (Wilson, 1993: 31).

In addition to a personal relationship with all of life, “there is a spiritual aspect to what is also part of biodiversity” (Segundad, 2000: 147) within the indigenous perspective. The value that indigenous peoples place on biodiversity has practical implications as well. It is important from a pragmatic perspective to

remember that “[i]f one being or part of biodiversity is disturbed or not kept in the perfect manner, an imbalance is created which will affect all other things.” (Segundad, 2001: 147). The developed world, where approximately 25 percent of all medicines prescribed between 1959 and 1980 were originally derived from plants (Carlson, 2001: 491), has much to learn from the simple wisdom that “[y]ou have to be kind to nature so that nature will give you more” (Turi, 2000: 152).

Much has been written recently about the relationship between biological and cultural diversity (Maffi, 2001; Smith, 2001; Wollock, 2001; Posey, 2001; Lovgren, 2003). The positive impact of cultural survival on the continued existence of biological diversity prompted one scholar to propose a “Rule of Indigenous Environments’: ‘Where there are indigenous peoples with a homeland there are still biologically-rich environments.’” (Maffi, 2001: 11, quoting B.Q. Nietschmann). In the self-sustaining, balanced systems that are characteristic of Native societies, “biodiversity is the inspiration for spirituality and culture for indigenous peoples, who through their production activities and shamanic practices contribute to respect for and the enhancement of biological diversity.” (Gray, 2001: 62). Indeed, because of the inseparability of indigenous societies from the unique life forms and spirits of their immediate environments “indigenous people [. . .] argue that the concept of biological diversity is alien because it separates the phenomenon of non-human diversity from their knowledge and livelihood.” (Gray, 2001: 62). The concept of biological diversity

as a distinct category distinguishable from the reality of human existence “is in every sense a post-Darwin reductionist construct which separates culture and spirituality from nature. It removes the inter-relationship between humankind and other living things.” (Mead, 2001: 113). The concept of biodiversity as normally defined in the West is “part of an approach to the environment which separates what so many indigenous people keep together and simplifies unnecessarily what is so complicated and unique to each people” (Gray, 2001: 62). An added danger in adhering to a concept of biodiversity as separate from cultural diversity is that it “ignores human beings and dispossesses them of their lands and territories in the name of conservation.” (Gray, 2001: 62). And the risk of viewing people as separated from either their genetic material or the biological diversity with which they are in reality so closely linked is a devaluation of human life to the level of mere instrumental importance uninformed by its intrinsic value. However, since the starting point for Western observers is an orientation that views biodiversity and cultural diversity as separable, there is merit in exploring ways to conceive of them as linked and mutually dependent, while recognizing that for indigenous peoples there was never any separation to begin with. Acknowledging that “[t]he earth’s biodiversity is intimately linked with indigenous peoples’ traditional knowledge” (Cariño, 1997: 66) is a positive step toward preserving the richness of the world’s interrelated biological and cultural diversity.

3.3 Conquest or Complementarity?

The growing awareness of the value of diversity poses a challenge to the competitive ethos of the modern paradigm. Indeed, the widespread extinction of both species and cultures can be rationalized from the Darwinian perspective of life as a struggle for existence (Mayr, 2001: 124 – 25) in which only the fittest survive (Mayr, 2001: 118 - 120). It is unsurprising that the global hegemony of such a worldview has coincided with the reduction of both cultural and biological diversity. Ironically, one of humanity's best hopes for reversing this trend lies in the preservation of those diverse cultures holding worldviews that are capable of providing balance to the modern paradigm.

A corollary of cultural diversity is complementarity since the preservation of diversity relies upon an appreciation of how different cultures have the potential to complement and complete one another. As anthropologist Wade Davis states, “[d]istinct cultures represent unique visions of life itself, morally inspired and inherently right. And those different voices become part of the overall repertoire of humanity for coping with challenges confronting us in the future” (Parsell, 2002 quoting Wade Davis), strongly suggesting that it would be a mistake to rely only on Western culture and modern science to provide solutions to all of humanity's dilemmas. While modern science has much to offer, there is an imbalance that is created when the wisdom of other cultures is ignored. This viewpoint is also expressed by the symbolism of the Native American medicine wheel, which

envisions all races having complementary purposes within “the great sacred hoop of life” (Little Bear and Hummox, 1998):

The Yellow People were entrusted with *Spirit* and the element of *fire*. The Black People were given *Soul* corresponding to the element of *water*. The White People learned about the *Mind* and the element of the *air*. And the Red People had *Body* and the element of *earth*. (Little Bear and Hummox, 1998).

Just as the spirit, soul, mind, and body are complementary aspects of each individual human being, a complementarity exists between all races within the human family. According to this story, however, “[t]he people of the *Mind* believe their knowledge is all that is needed. So they destroy the *Body* of Mother Earth, and ignore *Spirit* and *Soul* altogether” (Little Bear and Hummox, 1998). The teaching of the medicine wheel suggests that wholeness and balance are dependent on honouring the unique contributions of each race of people, rather than assuming the superiority of one over all the others, implying a shift in focus from domination to the recognition of interdependence. This symbolism does not imply that conflict and disagreement do not exist, but rather that they exist within the context of a larger appreciation for the way in which cultures can complement each other. If cultures had nothing to offer each other, a predictable response to otherness would be conquest, domination, and destruction. Indeed, given the mainstream Western stance of superiority to other cultures, and the corresponding denial that they have anything of significance to teach us, these outcomes have been the norm.

While the form of Western cosmology is rooted in a linear concept of time, Native societies have a profound appreciation for its cyclical nature. The Darwinian theory of evolution is wholly dependent on the uniquely Western notion of time as unidirectional and linear. In addition, Western society has been steadily progressing toward a greater emphasis on the manipulation and mechanization of the physical to the exclusion of other realms of reality. This process began with the rise of patriarchy, and was accelerated by the modern project. The hypermodernism of the biotechnological age is a further manifestation of this underlying drive toward materiality and progress through linear time. Conversely, in indigenous societies, there is a greater ease and fluidity of movement between different realms of reality and dynamic change through the cycles of nature.

Modern society is further differentiated from Native worldviews in its underlying emphasis on maximization as opposed to optimization, a distinction that is related to the one between conquest and complementarity. While less technologically developed societies are characterized by an effort to maintain the balanced optimization of a plurality of factors, Western society strives for maximization, ignoring the wisdom of balance: “we cannot have too much rational consciousness, too much profit or power, too many accomplishments, too gross a Gross National Product” (Berman, 1981: 256). Humanity is best served, according to this worldview, by maximizing profits and attaining the highest possible level of scientific knowledge. An emphasis on maximization implies an imbalance, as well as linearity, while optimization suggests balance

within a circular form. Implicitly, maximization is the development of one aspect of life that has been deemed the most important, or superior to all others, while optimization is more consistent with an appreciation for complementarity, since achieving it necessitates a striking a balance between the various elements.

The logical outcome of an ethos based on maximization is conquest: all other cultures must be suppressed and dominated in order to allow sufficient space for the one “best” culture to be maximized. The quest for immortality as expressed through the conquest of death, to be discussed in more detail in the following section, is one manifestation of this drive for maximization. The HGDP’s project to immortalize the cells of indigenous peoples is also symptomatic of this same underlying drive. Instead of focusing on optimizing the human family by preserving cultures that are recognized to be complementary aspects of the whole, the HGDP project represents the domination of indigenous peoples by Western culture. And rather than treating indigenous people as whole human beings with interrelated aspects of their being that function complementarily, the goal of immortalizing cells is an attempt to select the part of the human body deemed most useful within the context of a particular scientific perspective, and maximize its utilization by preserving it for eternity. An ethos based on maximization ignores the systemic interrelatedness of all aspects of life. The inherent danger of this orientation is that “[i]f one tries to maximize any single variable instead of optimizing it, this will invariably lead to the destruction of the system as a whole.” (Capra, 1996: 303).

The modern narrative of evolution and progress based on linear time is also a story of the superiority of man to all other creatures and nature. Since time is unidirectional, always leading in the direction of improvement, man has earned the right to dominate the inferior nature from which he has evolved. With Sir Francis Bacon, the natural world is seen for the first time as best knowable by way of objectification and artificiality: by distancing ourselves as subjects and by vexing and disturbing nature. (Berman, 1981: 31). In contrast, “[t]he Indigenous ‘physicist’ not only observes nature, but also participates in it with all his or her sensual being.” (Cajete, 1999: 20). Modernism paved the way for the Darwinian view of evolution that formalized this view of man’s superiority to other beings. However, even in Plato’s Republic, Socrates argues that good men who aspire to be like the gods should not imitate animals, the sounds of nature, or mad people (396b). This is in direct contradiction to the shamanic experience of learning from animals through imitation and communion: “[the hunter] literally begins to feel himself move and think like the mountain lion – becoming him.” (Bennett, 2000: 21)

The theory of evolution based on linear time enabled biologists to assume “the existing great apes . . . as representing the earliest human stage of evolution, and from this erroneous supposition, pass to the existing races of humankind, which were arranged in a strictly vertical series of developments, with the white Victorian male assumed to represent the summit of human evolutionary ascent”

(Highwater, 1982: 18). Not merely separated from the natural world, Western man's perceived superiority also isolates him from the rest of the human family. The Darwinian view of evolution supports the assumption of the moral superiority of Western society that legitimates the drive to assimilate all other modes of being into the dominant culture, a drive that is consistent with the imperial nature of the neoliberal globalization project: "Empire is formed not on the basis of force itself but on the basis of the capacity to present force as being in the service of right and peace" (Hardt and Negri, 2000: 15). Misapplying a theory of temporal evolution to coexisting races of people leads to an emphasis on economic development by assuming that the goal for all nations and all races is to evolve to the greater level of material wealth enjoyed by Western culture. This "has served the political and economic aggressiveness of the West" (Highwater, 1982: 19) by helping to legitimize the aggrandizement of Empire. More recently, it has also enabled Western science to extend the language of harvesting that has been applied to plants and animals to other members of the human family.

At the same time, the death of a God based in religious hierarchy translated into a denial of spirituality. Although promising progress, the Western world became in many ways more limited. All of the richness of human experience was compressed into a linear view of time, while nature and bodies became soulless machines. Linear time and an insistence on literal materiality created an increasingly narrow form with which to mould the content of our experience.

The linearity of Western time leads away from the Earth, a metaphor that manifests literally in the project of space flight. It distances humanity from nature while retaining an emphasis on explaining life from a purely scientific, materialistic perspective. It is not surprising that the technologies, or contents, that are shaped by the form of Western cosmology have been developed for the purpose of continual improvement and maximization of the physical body and nature. The project of modern science is to mould physical reality to accommodate an unbalanced, linear cosmology.

Conversely, in indigenous societies, the cosmological form is more expansive, with recognition given to the cyclical nature of time and an acceptance of realms of existence other than the purely physical. Nature is animate rather than mechanistic, while spiritual and physical exist as complementary aspects of the whole. Chaos, as represented by the trickster figure (Cajete, 2000: 66, 217), is honoured for its potential to “facilitate creative understanding” (Cajete, 2000: 66), and coexists with order as a necessary complement to it.

In indigenous societies, plants and animals are seen to be interdependent with human beings and their wisdom and contributions to human life are honoured. People learn from the spirits of animals in their shamanic journeys and often consider them to be the re-embodiment of their ancestors. The past and present coexist without contradiction in the respect that is accorded to the ancestors in the form of current living beings. When it is necessary to kill animals in order to

provide people with food, this is not done thoughtlessly, but with gratitude. In the Zuni culture of New Mexico, the hunter enters “into a symbiotic relationship with the beast in order to anticipate its every action, and perhaps more importantly, to make contact with its spirit-self in order to explain the need of the tribe for its flesh and fur” (Bennett, 2000: 20). Once it has been captured, the hunter “offer[s] prayers for the animal’s spirit to pass swiftly to the next world. . . Even as the animal lays dying, the hunter rushes forward and cradles its head to his body. Then, pressing his lips to its mouth, he exchanges its last breaths with it. This ritual is one of literally intermingling the spirits of hunter and hunted, of honoring the sacrifice and acknowledging their spiritual bonds. Unlike modern day hunters, he joins spirits with the animal instead of separating himself from his prey.” (Bennett, 2000: 21) Animals are honoured for their unique wisdom, while “plants themselves reveal their healing properties” (Narby, 1998: 18). The logical outcome of this respect for our fellow creatures is natural democracy (Cajete, 1999: 52):

In the inclusive view of natural democracy, humans are related and interdependent with plants, animals, stones, water, clouds, and everything else. Thus, it becomes in every sense abnormal to view the world as dead matter, private property, commodities, or commercial resources. The manifestations and roots of the Native sense of democracy run much deeper than the modern American political version of democracy today in that all of nature, not only humans, has rights. (Cajete, 1999: 53).

However, the use of animals for the purpose of modern medical science is carried out in an entirely different style. Animals are treated as mechanical assemblages of useful parts that are forcibly harvested without any acknowledgement or appreciation for their contribution or sacrifice.

Biotechnology has made possible extremes of this objectification by manipulating the genetic material of animals in order to turn them into “furry little factories” (Greenpeace web site). This content has been shaped by the form of a Western cosmology that views the body and nature as mechanistic, and plants, animals, ancestors, and other cultures as inferior beings whose level of evolution we have surpassed in a linear progression of time.

The use of animals’ organs for the purpose of xenotransplantation has generated a certain amount of anxiety, not only because of the physical risks involved, but also because incorporating animal organs into the human body is sometimes seen as demeaning to human beings (McCarthy, 1995). There is a tension created between the idea that nature exists to be mastered and exploited for the benefit of humanity and the perception that human beings should continue to improve by evolving away from nature. At the same time, our separation from nature leaves us feeling alienated. We unconsciously desire the connection with the natural world and other beings that we have lost, and express this in the only way our cosmology allows: through the domination and the harvesting of what are considered to be the lesser beings of plant and animal life.

Indigenous cosmologies do not engender the same anxiety at the thought of merging with animals. In a world in which time is circular and physical reality coexists with alternate realities, the mutual interdependence of humans and all other life forms is acknowledged through the ritual of merging with animal spirits.

This is a cyclical process that alternates between separation and fusion, and physicality and spirituality. In addition, there is not the same notion of the superiority of human life, and therefore no reason to feel demeaned by communing with animals and acknowledging their interdependence.

The concept of complementarity has until recently been a foreign one in mainstream Western thought, with the perception of antagonistic duality more the norm. The Taoist conception of the necessity of balancing yin and yang, which has been compared with the pre-Colombian indigenous mindset (Moyers, 2002, interviewing Gregory Nava), is relevant here:

The yin and the yang may be considered the primal parents of the universe whose mating generates all of reality, but they are also, and more importantly, complementary principles, neither of which can exist apart from the other. Yin, the dark, receptive, yielding, intuitive, feminine principle is inextricably intertwined with yang, the light, creative, active, rational, masculine principle. Both are equally essential to the whole. (Shafer, 2002).

Harmonious existence is dependent upon achieving a balance between these two complementary forces. The idea of claiming the superiority of one over the other would be nonsensical within this context, since each is a vital aspect of the whole, and necessary to the maintenance of overall balance.

In the West, however, qualities associated with yin have been devalued, while those associated with yang have been over-expressed, resulting in a state of imbalance. The circular image of the Tao, with its suggestion of balance and harmony is replaced in the West by the linearity of rating certain aspects of life as better or worse than others. Rather than seeing opposites as mutually

completing, the West has tended to see them as antagonistic, resulting in the perceived necessity for domination in order to control those aspects perceived as undesirable. This domination has extended to nature, women, and indigenous peoples, among others. While indigenous thought takes a holistic perspective, Western scientific progress has been based upon separation and classification, as well as on “the secularization of space, time and matter” (Peat, 1997). This has led to great advances in scientific progress, but in the absence of a holistic viewpoint that acknowledges the potential for adverse consequences resulting from efforts to effect improvements in a given area, it has also played a strong role in contributing to the present ecological crisis. In contrast to Western science, indigenous wisdom dictates that “[e]verything – from every action, plant and animal to the cosmos – has to be analyzed as a whole, according to its surrounding environment, spiritual context and relationships.” (Augustine, 1997). Indeed, “[u]nless one understands his/her place in the whole, there is always a tendency to move beyond, to glorify, to self-aggrandize. The technologies that humans build tend to follow understanding, or the lack thereof, of their role in the world.” (Cajete, 2000: 38).

The yin-yang symbol is often conceptualized as a serpent with two complementary natures (Cirlot, 1988: 287), which is also a characteristic image associated with the shamanic experience (Narby, 1998). In addition, anthropologist Jeremy Narby has noted a similarity between this vision of the double serpent and the structure of the DNA molecule (Narby, 1998). The

double helix of DNA is comprised of two complementary strands of bases: since adenine always binds with thymine, and cytosine always binds with guanine, each strand can be seen as the negative image of the other, and can be reconstructed in reference to it. Similarly, the double serpents of shamanic visions are perceived as complementary aspects of the same totality in much the same way as the symbol of the *yin-yang* of Chinese philosophy. Dualities coexist and complete each other rather than clashing in opposition.

It is interesting to note that in many cultures, including our own, one or two serpents in the shape of a spiral, either alone or coiled around a staff, symbolizes healing. In Greek mythology, the caduceus with its two serpents and winged top is, according to Joseph Campbell, the symbol of Hermes, an androgyne who is “the patron, also, of rebirth and lord of the knowledges beyond death” (Narby, 1998: 187). However, with the rise of rationalism and patriarchy around the 5th century B.C., “Zeus, who was at first represented as a serpent, defeats the serpent-monster Typhon with the help of his daughter Athene (‘Reason’), thereby guaranteeing the reign of the patriarchal gods of Olympus; concomitantly, he brings Aesculapius back to life . . . and gives him a staff with a *single* serpent wrapped around it” (Narby, 1998: 187). The staff of Aesculapius with its single serpent is now the more common symbol of Western medicine, appearing on the American Medical Association’s logo (American Medical Association web site). It seems reasonable to hypothesize that the second, missing serpent that disappeared from medical symbolism with the rise of patriarchy represents all

that has been repressed in the healing modalities of the West. This includes all that is considered to be “other” in Western culture, including nature, the body, the intuitive, and the feminine. The fact that it sometimes resurfaces can be interpreted as a sign that although repressed, it has not been destroyed. Safeguarding the diversity of medical knowledge of various cultures depends upon an appreciation of the complementarity of different forms of knowledge. This requires a transformation of the current economic model from one that emphasizes superiority, maximization, and competition, to one that recognizes interdependence, cooperation, and complementarity.

In many indigenous societies, a shaman is often initiated by overcoming disease. Illness is honoured for its transformative potential, rather than viewed as an enemy to be conquered. In a cosmology based on cyclical time, body animated by spirit, and the balanced optimization of all aspects of life, healing and illness are not opposed to one another, but rather, they are complementary features of the same reality. According to Mircea Eliade, “the primitive magician, the medicine man, or the shaman is not only a sick man; he is, above all, a sick man who has been cured, who has succeeded in curing himself. Often when the shaman’s or medicine man’s vocation is revealed through an illness or epileptoid attack, the initiation of the candidate is equivalent to a cure.” (Larsen, 1976: 60). While physical illness often serves as initiation, psychological distress can also be indicative of a call to shamanism. The initiate becomes “nervous, solitary, easily frightened, and with a proclivity for imitation and obscenities” (Larsen,

1976: 60). It is ironic that while shamanic knowledge is appropriated by Western pharmaceutical companies, the initiatory experience leading to its acquisition would be regarded as a pathology requiring medication.

An underlying drive for spiritual connection and growth is expressed in indigenous cultures by way of ritualistic spiritual transcendence and attaining wisdom by overcoming adversity. Transcendence is aided either through the use of hallucinogenic plants such as *ayahuasca* or through the use of monotonous drumming. The content of indigenous experience is intimately tied to the surrounding ecosystem and is chosen with a sense of balance that corresponds to the form with contains it. The style of interacting with plants such as *ayahuasca* is always one of respect for the wisdom it can share with them.

In the West, the spiritual is repressed in favour of an exclusive focus on materiality. Within the context of Western cosmology, this innate human drive toward wisdom becomes translated into quest for greater scientific knowledge and technological progress. In place of the conscious use of hallucinogenic plants, addiction has become widespread. And the shaman's monotonous drumming that allows access to spiritual wisdom is replaced by the monotony of sequencing the human genome. In place of spiritual transcendence, the goal of developing more powerful technologies is pursued in a style of exploitation and domination.

In indigenous societies, it is acknowledged that shamanism can be used to harm as well as to heal. While there is this same recognition regarding biotechnology within sectors of Western society, the danger is that it does not usually come from those with the power to chart its development. A cycle of death and rebirth is unconsciously sought even within the conscious narrative of continued progress through linear time. While scientists discuss the potential for continually improving the human species, the repressed aspect of this process is the death of humanity and its rebirth as a new species. The “end of the macrocosm” (Campbell, 1973: 374) is a common mythological theme in both Western and indigenous societies. While Western science envisions the final victory of humanity over nature and the promise of conquering death through the achievement of immortality, indigenous peoples such as the Inka prophesy a time of greater balance and a return to the Earth (Villoldo, 2001).

While only one aspect of existence forms the official narrative of Western culture, what has been repressed continues to exist unconsciously. Just as a DNA molecule requires both strands of the double helix, the elements that have been repressed are indispensable to the human species. Reason and nature, mind and body, male and female, self and other coexist as complementary aspects of the same reality. The orientation of modernism is to place these elements in opposition to each other and suppress that which is considered to be inferior. As a result, Western culture has repeatedly witnessed the resurfacing of the “other” that was repressed. In a culture that denies the cycles of death and rebirth, this

resurfacing has often occurred in the form of violent eruptions. In seeking to conquer death and denying it as an inherent part of life, Western civilization has unleashed unprecedented cycles of destruction.

3.4 The Biotech Myth: Conquering Mortality

Within the field of biotechnology, there are many dedicated researchers engaged in the honourable and compassionate pursuit of curing disease and alleviating human suffering. There are also, however, those with more ambitious goals which, if achieved, would radically transform the human experience and further distance a privileged group from the rest of humanity and the natural world. While the survival of entire cultures remains at risk, many biotech supporters, including prominent industry figures (West, 2000; Fischer and Jacobs, 2001 interviewing Dr. William Haseltine) dream of taming “the dragon of human mortality” (West, 2000). Although immortalists claim that the option of immortality as a “personal choice” (Immortality Institute, section 13) will not be restricted to the wealthy, a more detailed discussion (Immortality Institute, section 10) suggests this vision of supposed universality to be limited to the developed world. Achieving immortality would not exacerbate overpopulation, according to Robert Bradbury, founder and President of Aeveos Corporation and member of the Scientific Advisory Council for the Maximum Life Foundation, because “there is not an overpopulation problem in the developed countries . . . One of the most consistent findings of population research is that as a country reaches a certain level of affluence the population growth rate slows to around the replacement

level.” (Immortality Institute, section 10; Bradbury, 2002). According to Bradbury, however, population growth in poor countries will be curtailed by following a course of development that allows them to “move away from an agricultural base” (Bradbury, 2002) and attain a higher standard of living. There is evidence to suggest, however, that this form of development does not always result in greater affluence (Korten, 2001: 54 – 55), but rather can lead to increased disparities between rich and poor (Korten, 2001: 55), and exacerbate social problems by displacing small farmers (Korten, 2001: 55). If the quest for immortality is ever actualized, it seems unlikely that most of the world’s people would have the option of choosing it, for reasons of both cost and population control.

While modern science operates within a narrative of complete objectivity, this quest has strong mythological overtones, and parallels many aspects of the hero’s journey as articulated in Joseph Campbell’s *The Hero With a Thousand Faces* (1973). Although scientific method, the means of arriving at the goal of immortality, can be claimed to be objective, the goal itself is imbued with a specific set of values. The conquest of mortality is also the final conquest of the body, while the transcendence of physical death would ironically be accomplished at the cost of further isolating ourselves from the realities of the natural world. Indeed, the ultimate goal of some immortalists “is to shed our biological bodies” (Immortality Institute) by uploading the human mind into computer hardware. As electrical engineer Bart Kosko states, “Biology is not

destiny. It was never more than tendency. It was just nature's first quick and dirty way to compute with meat. Chips are destiny." (Immortality Institute). The drive for immortality is only the latest, and perhaps most audacious, attempt to conquer a natural world that is viewed as flawed, alienated from human experience, and in direct opposition to human aspirations.

A group of posthumanists called extropians foresee a world in which pain and death are eliminated (Gale, 1993). They claim that Nietzsche's ideas of a will to power supports their pursuit of immortality through biotechnology and the uploading of consciousness into synthetic brains (More, 1994). However, in *The Gay Science*, Nietzsche clearly distinguishes between two forms of will: one that is life-affirming, and the other that is life-denying (Steinhart, 1998). "Modern science is . . . nihilistic because its goal is to increase pleasure and decrease pain" (GS 12). According to Nietzsche, this is contradictory: one can experience pleasure and pain only to the same degree (GS 12). Science can create either a diminution of human pleasure and pain, or an increase in human pleasure and pain (GS 12). The exhausted man cannot tolerate pain (GS 370), and his "nihilistic science aims at diminution." (Steinhart, 1998). The extropians have misinterpreted Nietzsche: the painless, deathless world they envisage would be the outcome of a negative, life-denying will to power. The conquest of death will have been accomplished at the expense of fundamentally altering the nature of human life, and in the process distancing posthumans from all living beings that face the reality of death. The new species replacing humanity would be

alienated from its ancestors, while the need to control population growth would preclude more than a minimal introduction of new generations into the world. Their success at having subdued nature and distanced themselves from all other living beings in the past, present, or future would leave them completely isolated. Perhaps the ongoing improvement of physical capabilities would lend the illusion of a continuing evolution, but linear time will have been transformed into a kind of stasis, with humanity having devolved into the banality of Nietzsche's last man (Nietzsche, 1954).

William Haseltine, CEO of Human Genome Sciences, believes that humans should aspire to replicate the immortality of the DNA molecule: "our task is to couple individual immortality to the essential immortality of life itself" (Fischer and Jacobs, 2001: interview with Dr. William Haseltine). This parallels the mythological quest of Gilgamesh, the Sumerian king "who set forth to attain the watercress of immortality, the plant 'Never Grow Old.'" (Campbell, 1973: 185). Although initially successful in his quest, a serpent steals the plant, giving it, rather than Gilgamesh, the power of immortality through the sloughing of its skin. Returning to Jeremy Narby's association of the DNA molecule with the archetypal shamanic vision of double serpents, it is interesting to note that a central quest of the biotech myth is to replicate the immortality of DNA on a human level, taking back from the serpent the power that it usurped in the myth of Gilgamesh. As Joseph Campbell notes, however,

[t]he research for *physical* immortality proceeds from a misunderstanding of the traditional teaching. On the contrary, the basic problem is: to enlarge

the pupil of the eye, so that the *body* with its attendant personality will no longer obstruct the view. Immortality is then experienced as a present fact: "It is here! It is here!" (Campbell, 1973: 189).

The physical immortality of mythological tales is a symbol for the recognition of the eternal as it exists in each moment. In a culture that denies the spiritual realm, however, the literal quest for physical immortality is the predictable outcome of an identification with universal mythological themes. This parallel is no secret to William Haseltine, who states that

immortality has been a dream for humanity for as long as people have been conscious. We ascribe that dream to God and other figures in our history. But we did not believe until recently, except in myth, that it might be ours (Fischer and Jacobs, 2001 interviewing Dr. William Haseltine).

In a culture in which God has been proclaimed dead, the biotech myth involves the assumption by humanity of a role traditionally assigned to archetypal figures and deities.

The monomyth (Campbell, 1973: 3 – 46), or the common progression of mythological journeys describing the journey of "[t]he composite hero" (Campbell, 1973: 37), is comprised of three distinct stages: "a separation from the world, a penetration to some source of power, and a life-enhancing return." (Campbell, 1973: 35). The hero "and/or the world in which he finds himself suffers from a symbolical deficiency" (Campbell, 1973: 37) that can only be rectified by courageously embarking on a quest. Although mythological tales are told as literal physical adventures, they are representative of the journey of the soul and the search for eternal Self (Campbell, 1973: 29, 238): "the incidents are fantastic and 'unreal' they represent psychological, not physical, triumphs." (Campbell,

1973: 29). To the heroes of the biotech myth, however, the perceived deficiency is the existence of physical death: “aging and death represents (*sic*) two of the most immediate, hinders (*sic*) for total self-transformation and personal freedom.” (Immortality Institute).

Rather than recognizing the complementarity of life and death, immortality heroes aspire to the final conquest of death, as the circularity of life, death, and rebirth are replaced by a linear focus on the maximization of the human life span. This goal can be seen as the ultimate expression of the Western cosmological drives that were discussed in the previous section. Just as the developed world prospects for genetic material and knowledge that have been developed within the balanced framework of indigenous cultures respectful of the interrelatedness of all things, the biotechnological and pharmaceutical industries apply an unbalanced orientation based on maximization to the inherently balanced DNA molecule with its complementary strands.

In indigenous cultures, physicality is transcended through the shamanic experience, but is returned to in cyclical fashion. The spiritual is honoured, not in separation from nature, but as an inherent characteristic of it. However, the universal desire to transcend the human body manifests very differently as shaped by Western cosmology. Expressed through the lens of linear time, transcending the human body can only be achieved by its permanent, irreversible alteration. The element of unidimensional materiality leaves no other option for

transcendence than an attempt to escape the body's limitations through its mechanical manipulation and improvement. And an emphasis on maximization logically leads the biotech heroes to translate this desire for transcending the frailties and suffering of the body into a quest for perfect health and immortality.

The first stage of the hero's journey is the departure (Campbell, 1973: 49 – 95), or "call to adventure" (Campbell, 1973: 49), in which "[t]he herald or announcer of the adventure . . . is often dark, loathly, or terrifying, judged evil by the world; yet if one could follow, the way would be opened through the walls of day into the dark where the jewels glow." (Campbell, 1973: 53). This herald, often assuming the form of a serpent (Campbell, 1973: 52), appears in dreams when "the psyche is ripe for transformation." (Campbell, 1973: 55).

There is danger in the hero's journey, but it is only by advancing beyond established bounds "that the individual passes, either alive or in death into a new zone of experience." (Campbell, 1973: 82). As a result of this expansion beyond the ego, the hero glimpses the eternal Self:

The hero whose attachment to ego is already annihilate passes back and forth across the horizons of the world, in and out of the dragon, as readily as a king through all the rooms of his house. And there-in lies his power to save: for his passing and returning demonstrate that through all the contraries of phenomenality the Uncreate-Imperishable remains, and there is nothing to fear. (Campbell, 1973: 93).

The "secular character" (Campbell, 1973: 92) of the hero is shed so that nothing but the Self remains:

[M]en whose function it has been to make visible on earth the life-fructifying mystery of the slaying of the dragon have enacted upon their own bodies the great symbolic act, scattering their flesh, like the body of Osiris, for the renovation of the world. (Campbell, 1973: 93).

Indeed, with kings assuming the role of the archetypal hero, the practice of ritual regicide was common in antiquity (Campbell, 1973: 94). In a tyrannical system, however, or “the merchant empire, wherein each is out for himself” (Campbell, 1973: 94), the king more typically refuses to sacrifice himself, substituting instead several of his subjects (Campbell, 1973: 94).

The biotech myth of immortality parallels this initial stage of departure and separation from the world on a physical level, leading to values and goals in total contradiction to the archetypal lessons of mythology. The mythological separation from the world manifests as a literal rejection of both nature and the spiritual, while the eternal Self is translated into physical immortality with a corresponding failure to transcend the bounds of the ego. The danger in this particular journey is assumed not only by proponents of the immortality myth, but also by all of humanity, as the risks of genetic engineering are still far from certain (Rifkin, 1998). However, the heroes of immortality persevere in the face of opposition that questions the advisability of answering the call of the DNA herald. Far from facing personal death in order to transcend to the Self and contribute to the regeneration of the world, the quest for physical immortality is an attempt to banish the spectre of death in favour of everlasting physical life. In addition, in a “merchant empire” (Campbell, 1973: 94), the profits accruing from the biotech revolution are often earned at the expense of the indigenous peoples.

As discussed earlier, it seems unlikely that all of humanity would share in the option of attaining physical immortality, making the realization of the quest a mere local victory, and therefore more typical of fairy tales than the truly expansive scope of mythology (Campbell, 1973: 37).

The second stage of initiation (Campbell, 1973: 97 – 192) is one in which the hero “penetrates to some source of power” (Campbell, 1973: 35) by facing trials and the possibility of annihilation, a physical death that symbolizes the death of the ego (Campbell, 1973: 105 – 109). This begins with the meeting with the goddess, which “represents the hero’s total mastery of life; for the woman is life, the hero its knower and master.” (Campbell, 1973: 120). The task here is to “win the boon of love (charity: *amor fati*), which is life itself enjoyed as the encasement of eternity.” (Campbell, 1973: 118). The journey continues on to atonement with the father in which the hero gains “a better balanced, more realistic view of the father, and therewith of the world” (Campbell: 1973: 130), a step that requires “an abandonment of the attachment to ego” (Campbell: 1973: 130). This paves the way to the apotheosis (Campbell, 1973: 149 – 171), in which the hero realizes that “time and eternity are two aspects of the same experience-whole, two planes of the same nondual ineffable; i.e., the jewel of eternity is in the lotus of birth and death” (Campbell, 1973: 152). Just as life and death are complementary aspects of existence, so too are time and eternity: there is no contradiction between the eternal that exists in each moment and the reality of the passage of time. The

fundamental task at this stage of the hero's journey is the reconciliation of opposites, with an acknowledgement of their complementarity.

In parallel with the archetypal journey, proponents of the biotech myth also attempt to master life by forcing its maximization through time. The eternal aspect of life is translated into physical immortality, while the desired outcome of the meeting with the goddess is the conquest of death. However, "[o]ne can experience an unconditional affirmation of life only when one has accepted death, not as contrary to life but as an aspect of life." (Campbell, 1991: 188). While immortality advocates envision a time when there would be no reason to fear death because it will have been literally conquered, the archetypal hero's journey is an inner quest to overcome the fear of death by recognizing that it exists in conjunction with the eternal.

The "better balanced, more realistic view of . . . the world" (Campbell: 1973: 130) that results from atonement with the father is absent in this version, as immortality heroes attempt to change the world in order to conform to the desires of the ego. The goal of immortality for one segment of the human family is inherently unbalanced within the context of the endangerment of indigenous cultures. The continued exploitation of indigenous peoples by pharmaceutical and biotechnology corporations cannot possibly lead to a state of balance. Indeed, one of the real tasks of the contemporary hero "is to recognize the

lineaments of God in all of the wonderful modulations of the face of man.” (Campbell, 1973: 390).

In the biotech myth, the apotheosis takes the form of the literal achievement of god-like immortality by man. In place of the reconciliation of opposites, death is conquered by the achievement of eternal life. Far from recognizing the coexistence of life and death as two complementary aspects of the whole, immortality advocates aim to maximize life, while eliminating death entirely. While there has been much discussion regarding the advisability of achieving immortality (see, for example, Kass, 2001), an equally compelling issue is that the quest itself distracts segments of Western culture from the real issue of the search for the eternal aspect of the Self. Just as the energy and resources that are expended to save the genes of indigenous peoples represent an opportunity cost to the more important task of saving the cultures themselves, transforming the true goal of the hero's journey into a quest for physical immortality “threatens – already threatens – human happiness by distracting us from the goals toward which our souls naturally point.” (Kass, 2001).

The third, and final stage of the hero's quest is the “life-enhancing return” (Campbell, 1973: 35) in which the wisdom that has been gained during the journey is shared with others. (Campbell, 1973: 193). At this stage, the individual “no longer tries to live but willingly relaxes to whatever may come to pass in him; he becomes, that is to say, an anonymity.” (Campbell, 1973: 237). Since the

hero has experienced the rebirth of the Self through the death of the ego (Campbell, 1973: 243), change is no longer feared (Campbell, 1973: 243).

In the biotech version of the return, immortality heroes envision the enhancement of life through its extension. However, it is doubtful whether the immortality that advocates hope will have been gained in place of wisdom will be widely shared. Like the archetypal hero, the hero of physical immortality will finally be able to relax to his fate, and will no longer have any reason to fear change. Contrary to the archetypal hero of mythology, however, the absence of fear will have been accomplished not through the wisdom of accepting life and death as complementary aspects of the whole, but by radically transforming the whole experience of life through the conquest of death. If the immortality project succeeds, the life aspect of the duality of life and death will have been maximized at the expense of repressing the death aspect. However, given that what has been repressed resurfaces in unexpected form, the consequences of achieving immortality, even if it is attainable, are highly unpredictable. As Campbell points out, "No matter what the system of thought you may have, it can't possibly include boundless life. When you think everything is just that way, the trickster arrives, and it all blows, and you get change and becoming again." (Campbell, 1991: 275).

If, on the other hand, linear time is not taken to its logical conclusion, but is rather balanced with a circular view of time, the future could look very different. While

biotechnology has been developed within the context of Western cosmology as an extreme expression of the modern project, it does not necessarily have to be bound by it. Just as the content of indigenous knowledge has been appropriated and altered to fit the form of Western cosmology, changing the form around the content of the existing Western technologies would allow them to be expressed in a different style. The end does not justify the means, but the genie that has already escaped the bottle can be transformed in such a way as to transcend the negative aspects of its history.

3.5 Bridging the Gap between Indigenous and Western Science

A basic characteristic of modernism is its denial of any interdependence between Western culture, other peoples, and the natural world. As a result, a dangerous instability is created: as the level of technological sophistication increases, it also becomes less grounded. In addition, an underlying assumption of the superiority of Western society, as discussed in section 3.3, encourages the drive to assimilate all other modes of being into the dominant culture. This stance has become increasingly unsustainable, necessitating a renewed recognition and exploration of non-modernity as the supporting ground for the innovations of modern science. Contrary to the arrogance of assuming that all other modes of knowledge exist as raw materials for the benefit of the technologies of the developed world, Western technology and society can only survive by recognizing their dependence on nature and other cultures.

There have been developments in philosophical and scientific thought within the developed world that are starting to bridge the gap between Western and indigenous cultures. Some of these similarities between indigenous and recent Western scientific thinking could potentially serve as a template for the integration of Western medicine and indigenous modes of healing, which could also be supported by the increasing interest and acceptance in alternative modes of healing within Western society. Rather than insisting on the superiority of allopathic medicine and Western culture, there is the potential to recognize that each culture has a unique role to play within the human family, a sentiment that is reflected in indigenous mythology and the symbolism of the medicine wheel (see, for example, Little Bear and Hummex, 1998).

An “ecological postmodernism” (Spretnak, 1999: 73) shares much in common with indigenous modes of thought:

Instead of perceiving ourselves as social ‘atoms’ colliding and combining with other discrete ‘atoms’ in a human society that uses and projects concepts onto its background matter (nature), we perceive an unbroken continuity of cosmos / Earth / continent / nation / bioregion / community / neighborhood / family / person. These are the extended boundaries of the self. Our field, our grounding, and our being is the cosmos. Moreover, we finally slough off the modern obsession with escaping from nature and realize that all human endeavor is derivative of the Earth community, not the other way around. . . . Ecological postmodernism, then, replaces groundlessness with groundedness, supplanting freedom *from* nature with freedom *in* nature. (Spretnak, 1999: 72).

Disciplines such as ecopsychology and ecology implicitly share in the precepts of ecological postmodernism. While ecopsychology makes the link between ecological and human health (Worcester, 2000), ecology views the natural world

as an interconnected web of life (Capra, 1999). Deep ecology, in particular, parallels indigenous belief in assigning intrinsic, spiritual value to nature, and “does not separate humans – or anything else – from the natural environment” (Capra, 1999: 7). This is opposed to “shallow ecology”, which is focused on protecting nature for the sake of safeguarding its instrumental value to human beings (Capra, 1999: 7). In both, however, the importance of biodiversity and interconnectedness is recognized.

Recent Western scientific advances, such as the development of quantum physics and chaos theory, “parallel the vision of the world long held in indigenous spiritual traditions” (Cajete, 2000: 16) in their emphasis on uncertainty and the interdependence and relationships that exist within systems. The rise of quantum physics in the 1920s challenged the previous view of atomic particles as discrete, solid entities by showing that the interrelationships among them were fundamental, rather than incidental, aspects of their existence (Capra, 1996: 30). In addition, quantum physics demonstrated that “the solid material objects of classical physics dissolve at the subatomic level into wavelike patterns of probabilities.” (Capra, 1996: 30). Although these findings many decades ago represented a serious challenge to the then-prevailing view of subatomic particles as separate “building blocks” (Capra, 1996: 30), an atomistic orientation is still discernable in the widespread characterization of DNA as one of “the basic building blocks of life.” (Genentech, 1997). In Western society, this atomistic view mirrors an emphasis on individualism (Cajete, 2000: 287); the existence of

private property rights is consistent within this context. Indigenous thought, on the other hand, shares with quantum physics an appreciation for the interconnectedness of the whole (Cajete, 2000: 287): “[r]ather than people insisting upon individual rights and freedoms, they acknowledge their obligations and relationship to society and to the earth.” (Peat, 1994: 47).

In indigenous science and belief, the unpredictability of chaos is complementary to the predictability of order:

Order and chaos are like the two brothers in the stories told by the Iroquois people. When one of the brothers produce something, the other creates its opposite; when one of the brothers products order, the other will turn this order upside down. Non-Natives interpret these brothers as “good” and “evil” and see an image of the Western picture of the battle between God and the Devil in their eternal confrontations. Yet to Native people this loses the deeper meaning of the stories, for both brothers are necessary, and each must be acknowledged. To have one brother without the other would be to create disharmony in the world, for order cannot exist without chaos, nor chaos without order. (Peat, 1994: 176).

Chaos theory explores those aspects of the universe that cannot be described by the orderly, predictable mechanics of Newtonian physics. Apparent chaos “can give rise to ordered structures, to subtle and beautiful patterns” (Capra, 1996: 123). Order emerges from chaos and leads back to it again in this interplay between two complementary aspects of being. Within the indigenous worldview, chaos is represented by the figure of the trickster (Cajete, 2000: 17), “the sacred fool whose antics remind us of the essential role of disorder in the creation of order.” (Cajete, 2000: 17). Indeed, life itself depends upon this duality: Ilya Prigogine’s theory of dissipative structures demonstrates that living organisms are autopoietic, or self-organizing, structurally open systems that operate far from

equilibrium (Capra, 1996: 169). The mechanism of Newton's universe "held no room for the trickster" (Peat, 1994: 175), while the second law of thermodynamics refers to closed systems in which dissipation is a source of disorder and order is defined as equilibrium. However, in open systems dissipation and nonequilibrium are the conditions for an elevated form of order (Capra, 1996: 89). Indeed, "an organism in equilibrium is a dead organism." (Capra, 1996: 181). The findings of chaos theory echo the indigenous view that "balance lies in flux, transformation, and chance." (Peat, 1994: 174). These mutually reinforcing paradigms suggest the immortalists' vision of conquering death to be misguided: "the dream of eliminating uncertainty through control of nature, which is the underlying philosophical premise of Western science, must give way to the reality of moving creatively with the flow of events, which is the true reality of the universe." (Cajete, 2000: 16).

The reality of interdependence and corresponding importance of cooperation that is acknowledged by many indigenous cultures is also being validated by recent discoveries in the field of biology that challenge the Darwinian view of survival through competition. Microbiologist Lynn Margulis has concluded that "nucleated cells have evolved through a long-term symbiosis, the permanent living together of various bacteria and other microorganisms." (Capra, 1996: 242). Although the larger cells may once have been killed by the ancestors of these invading bacteria, which died along with the cells they invaded, "some of the predators did not kill their hosts outright but began to cooperate with them, and eventually

natural selection allowed only the cooperators to survive and evolve further.”

(Capra, 1996: 242). Physicist Fritjof Capra concludes from this that:

[a]ll larger organisms, including ourselves, are living testimonies to the fact that destructive practices do not work in the long run. In the end the aggressors always destroy themselves, making way for others who know how to cooperate and get along. Life is much less a competitive struggle for survival than a triumph of cooperation and creativity. (Capra, 1996: 243).

From an economic perspective, the Darwinian view of evolution would seem to affirm the inevitability, as well as the adaptive value, of the exploitive tendencies of pharmaceutical and biotechnology corporations toward indigenous peoples. However, while the predatory quality of the developed world’s economic system is justified by an evolutionary theory that emphasizes competition over cooperation, the more recent evolutionary paradigm suggests the free sharing of knowledge by indigenous peoples to be more adaptive. And indeed, it is not difficult to extend Margulis’s theory to economic reality: it stands to reason that damaging both biological and cultural diversity in the name of economic growth and scientific progress by failing to recognize our interdependence with nature and other cultures is ultimately a self-destructive act.

In contradiction to the beliefs of most other cultures both past and present, the modern scientific elite conceives of the Earth as “an inanimate rock hurtling around the sun in accordance with mechanical laws” (Sheldrake, 1994: 149). In 1969, however, James Lovelock presented the Gaia hypothesis, which conceptualizes the Earth as a living being (Sheldrake, 1994: 149 – 163; Capra, 1996: 100 – 110), at a scientific meeting in Princeton (Capra, 1996: 103). The

Gaia hypothesis, named after the Greek goddess of the Earth (Capra, 1996: 103), parallels the indigenous belief in Mother Earth. This conceptualization is supported by the fact that the Gaia system possesses the autopoeitic qualities that characterize living systems (Capra, 1996: 214): it is self-bounded, self-generating, and self-perpetuating (Capra, 1996: 214- 215).

A biotechnology informed by an appreciation for complementarity, context, holism, and the recognition of its dependence on other cultures and the natural world does not need to be regressive. Indeed, the presence of these attributes in various postmodern scientific disciplines suggests that the balance of reintegrating what has been repressed by modernism is not inconsistent with continued scientific progress. What is required, however, is a certain degree of restraint with a view to the balanced optimization of benefits instead of a race toward maximum technological mastery at any cost. The well-known myth of Icarus is instructive here: while Daedulus, who built wings for both himself and his son Icarus, advocated the balance of flying “the middle way” (Campbell, 1991: 161), Icarus lost himself in his excitement and flew too high, melting the wax in his wings and falling into the sea. As Joseph Campbell points out, this is not a condemnation of technology, but rather cautions that it should be used wisely: in balance and with moderation. (Campbell, 1991: 161).

It is possible to envision biotechnology being used with restraint out of compassion for people who are suffering, as well as with an attitude of respect

and honour for the shamans, Western scientists, plants and animals that contribute to its development. The inequities inherent in the imposition of Western intellectual property rights on other cultures would be replaced by a more equitable sharing of benefits. The need for the experimental use of animals would be “increasingly replaced with toxicological models using genetics, expert systems, and computer simulations” (Coates, 1997: 91). With a new respect for the integrity of all living beings, the idea of taking cell lines from other human beings without their fully informed consent would be unthinkable. An appreciation of nature’s cyclical aspect would lead to a greater acceptance of death as a necessary aspect of life and rebirth. The focus would no longer be on conquering human disease and death by eliminating them as enemies, or on maximization as expressed in a quest for immortality. Illness and death would coexist with life as necessary aspects of it, but this does imply that illness would be succumbed to when it occurs. Rather, healing would be sought within the context of a balance that includes illness and death as part of the cycle of life. Respect for the inherent wisdom of nature would be valued over the maximization of corporate profits, leading to a de-emphasis on the development of transgenic animals and genetically modified crops. A desire to distance ourselves from nature would be replaced by an acceptance of our place in it, and a respect for its diversity.

Just as a cosmology exclusively based on linearity, maximization, and physicality would lead to a static existence bound by an immortal body, one that combines

linearity with circularity would lead to a more balanced future. The focus would no longer be on conquering human mortality through linear time, but rather on the infinite regenerative potential of nature's cycles. The linearity of time only tells part of the story: the astronauts returned from space after all, and often with a deeper respect and appreciation for the Earth. The imbalances and sense of alienation caused by modernism and the corresponding rapidity of technological development call for Western culture to become more grounded within the broader context of the non-modern. Perhaps, as Teilhard de Chardin believed, time can be perceived as a teleological spiral, merging its circular and linear aspects. Like the double helix of DNA and the double serpents of shamanic visions, living in balance in the spiral of time implies the recognition and coexistence of complementary dualities. Evolving in a balanced, sustainable way only becomes possible with the reintegration of all that has been repressed.

CHAPTER 4

TOWARD COMPLEMENTARITY: CORRECTING AN IMBALANCE IN THE INTERNATIONAL SYSTEM

Actualizing the complementarity of cultures and systems of medicinal knowledge depends upon successfully addressing the imbalance that currently exists in the international system. This process must begin by acknowledging and respecting the accomplishments of indigenous peoples. Cultural survival is intrinsically valuable, however it is also important to recognize the specific ways in which indigenous thought and belief balance and complement the excesses of a modern society engaged in an exponential rate of technological growth and development. As the imperativeness of safeguarding the diversity of human life is increasingly recognized, greater respect and humility will be accompanied by increased prudence and restraint in imposing the norms of the developed world on indigenous cultures.

In the current international system, developing countries' populations must pay inflated prices for monopolistic pharmaceutical products while receiving little or no compensation for their contribution to Western medicines, while multinational corporations mine the bodies of indigenous peoples for genetic material. In a balanced system that recognizes the complementarity of cultures and forms of medicinal knowledge, protection would be extended to indigenous cultures in a way that respects their beliefs and traditions, while the patenting of human cell

lines would be rejected along with other laws that presently support the commodification of life.

TRIPs currently “requires every WTO Member to introduce its own patent system if it does not have one already and set minimum standards for Members to follow. The WTO’s dispute settlement procedure creates a strong mechanism for compliance, including the power to impose trade sanctions against Members that fail to abide by its binding decisions.” (CEAS, 2000: 5). The heavy-handedness and bias of this position needs to be tempered by acknowledging the right of developing countries to choose public health care policies that best reflect their requirements.

Legal systems, like economies, are constantly developing and evolving, and may therefore contain deficiencies and imbalances that require adjustment. In the developing world, the IPR issue is part of the larger globalization debate involving the threat to cultural diversity, as well as to biological diversity. The perception of indigenous knowledge as *res nullius* is clearly unjust and misguided. The implementation of the international property rights regime in its current form has been driven by powerful corporate interests intent on moulding the system to make it compatible with the goal of profit maximization. However, the acknowledgement that traditional communities should be allowed to retain rights to their traditional knowledge leads to the difficult question of how the current imbalance in the international economic and legal system can be rectified.

Several possible policy alternatives have been discussed, including giving indigenous peoples the freedom to resist the concept of ownership (Murtado, 1998), allowing biodiversity-rich communities to form cartels (Vogel, 2000), enhancing public goods (Brush, 2001: 529), working toward enabling local innovation (Gudeman, 1996:188; WIPO, 2001: 212), encouraging villages to register their traditional plants (Clarke and Inouye, 2002: 50), and recognizing existing systems of rights (Dutfield, 1999: 4; Dove, 1996: 60-1).

While each approach has its merits, a concern for global justice dictates that individual indigenous communities be allowed the freedom to choose whether and how they wish to share their medicinal knowledge with the developed world. Indeed, different groups may opt for a wide range of strategies. A good starting point would be to recognize existing indigenous systems of rights, as advocated by Dutfield (1999: 4), and Dove (1996: 60-1). Similarly, developing countries must be allowed the same freedom enjoyed by the developed world to implement those policies most conducive to meeting their development and public health care needs. It is only by evolving from an ethos of conquest toward a recognition of complementarity that the preservation of cultural diversity, and the corresponding survival of traditional knowledge in a world sorely in need of sustainable solutions, will be preserved.

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