THE RIGHTS OF THE SHAMAN

Brian L. Altonen

Geog 507: Culture & Conservation
Winter 1996/7

This Draft completed 9/23/97

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Introduction

In 1982 the Commission on National Parks and Protected Areas's *Bali Action Plan* included the "management" of "traditional wisdom" and a further investigation of "the role of traditional societies in the management of living resources" (IUCN Commission on National Parks and Protected Areas, Objective 5, Activity 5.5, in McNeely, 1990). Since then, traditional wisdom has become nearly synonymous with intellectual property. At the Uruguay Round of the GATT in 1987, the application of intellectual property right issues to developing countries, developed countries, and multinational corporations led to a rapid development of economic and political affairs now being faced by both sets of countries.

The relation of intellectual property to native plant medicines was driven home when China tried to illegally obtain inside information on the production of Taxol from the Pacific Northwest Yew tree from an FBI agent informant. This case along with several other corporate espionage cases resulted in a rewriting of the *American Espionage Act* and its passage in October 11, 1996, to prevent the selling of trade secrets to foreign companies (Anonymous, 1997). Now that this issue has come to involve the natural resources of non-indigenous peoples, both the developed and developing countries have begun to take another look at natural resource rights and intellectual property issues faced by all nations.

The legal issues regarding indigenous cultures and know-how are being put to the test regarding the sharing of developed country intellectual property rights. The past accessions of such things as the discovery of new medicines, new food sources, and new resources, without compensating the source of this knowledge, have led to debates in court. As intellectual property rights become barriers to free trade and the development of developing countries, many of their underlying policies are being re-tailored to meet the needs of all nations. Developing countries have the right to now benefit equally from the intellectual property-technology transfers they are involved in. Whether or not the needs of these countries can be met depend upon their basic technological infrastructure. Whether or not adequate compensations are made in regard to traditional knowledge of natural resources may depend on whether or not the economic status of current developed countries is improved through reciprocal technology trade.

In 1992 the *Global Biodiversity Strategy*, a biodiversity-conservation conference, set the following goals: 1) to develop a greater understanding of the role of human life in ecosystems; 2) to produce greater incentives to slow the loss of biodiversity; and 3) aid in the development of sustainable uses of biodiversity requiring the application of both traditional and modern knowledge. The last of these had as its objectives "correct imbalances in the control of land and resources that cause biodiversity loss," "expand and encourage the sustainable use of products and services from the wild for local benefits," and "ensure that those who possess local knowledge related to genetic resources benefit appropriately when it is used" (World Resources Institute, The World Conservation Union, United Nations Environment Programme, 1992, p. 83, 86, 93). The last of these objectives led to the writing of Action 41, designed to "promote recognition of the value of local

knowledge and genetic resources and affirm local people's rights" (ibid, p. 20).

The signers of this plan recognized that intellectual property right protection is narrow due to the lack of political and economic power on behalf of the indigenous cultures. This inequality they blamed on the removal of farmers and herbalists from the formal market systems of distant, developed countries, thereby leading to a reduction in their economic force and political voice.

The same arguments about inequality can be made about indigneous groups. According to indigenous groups, the compensation they receive for intellectual property has resulted in little improvment in their economic status. Therefore, they are now asking for better monitoring of contracts made between them, their developing country, the various developed country teaching institutions involved in the information quests, and the multinational corporations which patent and market the new discoveries. Without an agreement to initiate some sort of security action on behalf of foreign investors and business agents, the access to these valuable natural resources might be outrightly refused by farmers and herbalists, and the rights to any information or intellectual property regarding the use of these living and genetic resources on native lands could be denied. Since this issue erupted a couple of years ago, groups from both sides have been in a state of unrest (ibid, p. 94).

Another outcome of the *Global Biodiversity Strategy* has been an improvement in the economic potential of natural resources in some of the more rapidly developing countries for both indigenous peoples and foreign entrepreneurs. However, the objectives designed to "strengthen the capacity of off-site conservation facilities to conserve biodiversity, educate the public, and contribute to sustainable development," has led to questions concerning the moral and political issues of seed banks, germplasms, and the human genome project. The "Actions" designed to

carry out these objectives were based on the property rights of "raw" genetic material; they are to: 1) "strengthen crop and livestock genetic resource conservation, and implementing the Global Initiative for the Security and Sustainable Use of Plant Genetic Resources"; 2) "develop the world's collections of cultures of microrganisms as an ex situ network"; and 3) "fill major gaps in the protection of plant genetic resources" (ibid, p. 138, 140, 141).

In *The Convention on Biological Diversity and Intellectual Property Rights* which took place the same year, the articles passed dealt with the remaining intellectual property goals, such as by assuring appropriate reciprocity, benefits in conservation, intellectual property, environmental protection, research and development, and international financial assistance. This convention also further detailed the various forms of intellectual property at stake, including databases and publications covered by copyright or trade secret rights, contracts and licensure which cover sustainable use and harvesting practices in accordance with traditional cultural practices, the use of petty patent and trade secrets, a country's or nation's sovereignty over its genetic resources and its right to close the doors to research, public domain issues, and the scope of IPR as it relates to knowledge of plasmid type, plant extract type, or animal genotype. Article 25(2)(c) in particular mentions the issues regarding the meshing of developed country and developing country technologies for conserving and producing sustainable use strategies and increasing their know-how and use while remaining under protection of the intellectual property rights (Gollin, 1993, pp. 289-302).

These developments now taking place in intellectual property right issues, with legislation designed to recognize indigenous cultures and developing countries, begs the question: "What are the rights of the Shaman?"

Intellectual Property Rights

The Shaman has four basic rights: 1) the right to personal knowledge borne as intellectual property; 2) the right to natural resource use, exploration, and exploitation; 3) the right to practice indigenous medicine; and 4) the right to possession of one's personal human genetic-borne DNA and the products thereof. The task of future development programs involving indigenous peoples will be to blend these rights with the other international agreements already in place.

For the shaman, the public perception of his or her knowledge is integral to defining intellectual property rights. By accepting one's legal rights to his or her intelligence, we assign certain rights to this person as a patent holder regarding the use of this knowledge as an invention and copyrightable material. In theory, irregardless of previous researchers and discoverers who also made use of similar knowledge, once an individual makes claims to that knowledge, he or she has sole rights to using it and can prevent others from obtaining substantial income due to use of similar information, by designing similar patents, or by the misuse of the another individual's discovery (Jondie, 1989; Lechtenberg, 1989; Broome, Jr., 1994).

The shaman may also chose to retain some of the economic power of his or her medical knowledge, assuming he or she has the know-how to do so. What usually prevents this from taking place is the lack of know-how and experience required for determining whether or not a form of intellectual property from indigenous peoples needs to be protected. Were the need for education in indigenous cultures not lacking and their technological advancements equivalent to those of developed nations, we might find instead indigenous cultures behaving much like societies in developed countries. In other words, the availability of common food items could be in control of indigenous patent

holders, medicines could either be scarce and quite expensive, and popular garden and field crops might be reproducible only as patented plants grown in green houses atop levelled tropical rainforests. However, this scenario does not exist and so we are left to judge the outcome of events in environmental history as consequences of the exploitations by the non-indigenous peoples.

Since intellectual property is the primary resource for much of the endeavors now taking place in developing worlds, the economic policies and methods of exploitation have to be explored. How a shaman's rights might be carried out in the future depends upon the culture's education and economic status, the acceptance of United Nation and World Health Organization decisions, the legal strategies being put to use, and the relation of each of these to certain culturally-defined religious, philosophical, and moral goals. All of these issues will influence the legal actions now taking place between developing and developed countries in regard to: maintaining trade secrecy of important products (in this case plant medicines); attitudes toward the human genome project due to moral, and ethical considerations; the political decisions which are made due to self-determination policy, isolationist issues, and future global development plans. Since intellectual property rights are generally viewed as subordinate to the agreements made through the Paris Convention, the Berne Convention, the Patent Cooperation Treaty, and the International Convention for the Protection of New Varieties of Plants (UPOV), the employment of such legal actions as trade secrecy, contracts, and licensure are typically the most commonly ones employed (Gollin, 1993).

Assuming developed countries and multinational corporations support the bulk of the development projects taking place in and around indigenous peoples, the shaman will in a few years be able to copyright, trademark, or patent his or her findings. How will this goal relate to

long term indigenous goals and the philosophy upon which they base their lifestyle?

The shaman may have his or her medical knowledge published. This in effect would remove the acceptable practices carried out by anthropologists, historians and the like, many of whom designed their lifestyles based upon the incomes generated by these endeavors. Many of the same economic benefits may in turn now be to indigenous peoples, or at least their developing country's economic system. The copyright laws in existence are already designed for international use, thereby making such a process on behalf of the shaman much easier to carry out. Examples of uses for this legal power include copyrighting a writing about tribal history, a shaman's biography, the facts about certain indigenous plant medicines, etc.

The disadvantage to taking this route for generating income is that its earnings are short-lived. Even though the copyright extends beyond the lifespan of the shaman, it usually serves as a short term income source. In the long run, this method of securing income often becomes one of limited use to indigenous peoples, except to serve as some form of advertising of their existence should they also depend upon the tourism industry. An additional disadvantage to this is that once this information is published, the attached knowledge of ethnobotanical uses enters the public domain and can be used by any individual, herbal medicine cottage industry, or large scale pharmaceutical industry to generate an income (McGowan, 1991; King, 1991; Wesaw, 1995).

The chief draw back of this method of securing income, in both developed and developing countries, is the increased chances for overharvesting that may result. The shaman who publishes his or her knowledge also reliquishes control of any subsequent harvesting of traditional medicine sites. Such actions in turn could produce outcomes similar to those which took place in the past, such as with with American

Ginseng (*Panax quinquefolia*), American Goldenseal (*Hydrastis canadensis*), the various snakeroots (i.e. a number of Orchids, and India's *Rauwolfia serpentina*), and most recently, a valuable cancer drug overharvested by the National Cancer Institute in 1986. Finally, the shaman who shares this knowledge with a particular group of people or company, not only relinquishes trade secrecy rights by the introduction of this knowledge into the public domain, but might also lose access of these plants due to any contracts made with the harvesters, and by the addition of the same to conservation and seed bank programs which are accessible to biotechnology firms. Therefore, in the long run, relying solely on copyright and the income generated by writing will not improve a shaman's or culture's long term development, but instead serve more as a stepping stone towards a moderate modernization (McCaleb, 1997, p. 235).

Natural Resource Rights

A shaman may decide to take advantage of this unique knowledge and use it to produce his or her own line of patent medicines. This action would be similar to those carried out by numerous foreign investors, who locate an unpatented plant product, and then market its use as a food or medicine under a given name. To accomplish, a business name may need to be secured for use on the label, followed by a petty patent with the product name and recipe, and perhaps as well a trademark and artistic copyright on the label.

A draw back to this method of securing rights is that only the company name, product name, product label, and trademark are protected. Any other company may market a similar recipe, with plant uses to boast about in their advertising, catalogue, or descriptive literature. Thus the major disadvantage to this marketing technique is its lack of uniqueness, except in company, trade mark, and perhaps artistic copyright.

Like the limits the shaman had to face with publishing his or her knowledge, this marketing activity usually has limited income potentials. Its distribution typically does not extend too far beyond the borders of whatever cultures are closely tied to the development of the country. Multinational and large scale drug companies would be the chief competitors for this form of marketing. For example, a line of shaman herbal extract products produced by the shaman or medicine man has little marketing potential globally when compared to the marketing activities of larger pharmaceutical companies. Some of these companies in fact may even carry out similar product development with the aid of the shaman along with the broad support of numerous companies in the medical world of developed countries. Therefore, at best, the marketing activities of a single shaman may only result in improving the public awareness of the culture and perhaps improve that region's tourism

industry. As for the rights of the shaman once again, the culture's trade secrets have been revealed through the publication of recipes on the label and other companies may now pick up this knowledge for their own use, with or without permission from the inventors, and in some cases without a contract stating the amount of money that will trickle back to the indigenous people as a reward for this information (Personal Communications, 1995).

This latter outcome has been the main problem with research projects carried out by developed countries and multinational drug companies on native lands. The various drug research programs have not produced the economic outcome that either the researchers or indigenous people had hoped for. Therefore, to lessen responsibility directed toward indigenous cultures, the creation of a new identification and harvesting system has been carried out by some of these research programs. The creation of specially-trained para-taxonomists, many not born in the regions they are extracting resources from, has resulted in improved harvesting techniques, but a reduction in the hiring of indigenous peoples as they are being replaced by developing country urban residents. This work has not only exempted indigenous people from participating in their economic development projects, it has also opened new paths for horticulturalists to enter rain forests and return to developed nations with new products to propagate and sell. In the long run, the income produced by this marketing attempt rarely benefits the people from whom the knowledge first came (Personal Communications, 1997).

Another route the shaman may take is to turn to the patent laws. Four patent procedures are typically in use by developed countries marketing medicinal plant products: Petty Plant Patent Act, Plant Variety Patent Act, and Utility Patent (Jondle, 1989; Bennett, 1994; Burchfiel, 1995). After considerable research on behalf of the shaman or the shaman's legal advisor, the following might be

considered applicable: Plant Patent Act, Plant Variety Patent Act, Plant Gene Patent, and Utility Patent.

Of these options, the most popular one involves the use of contracts, licensure and petty patents, which takes place whenever a company files for a patent on a recipe and then contracts with indigenous peoples to identify, gather, and perhaps produce part of this product from their resources. This is one of the most popular routes taken by entrepreneurs, and includes everything from the marketing of coffee beans and nuts from Brazil, to the selling of baskets and fabrics from Southeast Asia, to the patenting of a unique herbal remedy from Africa by German and Italian companies. This in fact has been the chief method of manufacture and sales of tropical rain forest products since the initiation of this practice during the colonial years, and accelerated during the late nineteenth century due to technological and horticultural developments, as well as the late twentieth century due to increased public awareness of ecological and environmental issues and their relation to alternative medicine (Mays, *et al.*, 1997).

Ironically, the purchase of many of these products produced with the support of indigenous peoples may be of little benefit to these people. Throughout the nineteenth century, the patent law has existed primarily for the benefit of developed countries. Therefore, most petty patents in use are designed for marketing and use in the countries which have patented them. These countries usually have a strong industrial base and a stable economy which can be used to maximize the benefits of these natural products for both the producer and the indigenous people. And although the co-signing of some form of licensure or marketing and development contract may take place, the actual benefits returned may be very little and company-generated altruisms lacking.

Natural resource policies involving developed countries were revitalized by the passing of the Plant Protection Act

[PPA] in 1930. PPA requires that the plants covered be reproduced by asexual means. Thus it infers the need for an adequate horticultural setting for one to carry out the task of plant creation and reproduction. One major application of PPA for tropical plants relates to species which are slow to reproduce naturally. Such examples include the orchids, one of the most heavily exploited families of tropical plants recently made available to developed countries by means of PPA patents in combination with newer biotechnology and genetic engineering skills. Therefore, in the shaman's setting, since reproducability of a plant covered by PPA must take place through asexual means, it can be one of the most difficult options for a shaman to take. For now, PPA cannot be applied to the tropical setting or commune unless the shaman has actively and aggressively already learned this method of propagation either by traditional means, and/or by a certain degree of persistence in learning these new technologies. In its present state, PPA allows for the patenting any new and unique natural products obtained elsewhere, which in turn are then produced by horticulturualists who previously lacked the knowledge of the plant's natural products, much less their existence (Bent, 1989; Bentley, 1989; Williams and Weber, 1989).

The shaman might also consider the use of the 1970 Plant Variety Patent Act for securing medicinal plant rights and improving local income. In this case, the uniqueness of the plant as a marketable horticultural product is what is usually taken advantage of. This protection may be related the production of specific agricultural crops essential to cultural survival and income, or to crops that are sellable as unique decoratives and horticultural specimens. The chief requirement is that these products be produced by selective breeding of natural specimens, until a desirable end product is made. Like with PPA, this practice of creating a patent requires know-how, skills, and technology, the last of which is usually lacking in developed countries

and therefore becomes the deciding factor as to whether or not this method is put to use (Bent, 1989; Bentley, 1989).

In actuality, this process of producing new plants has a long history in traditional societies. But since many developed societies have already cashed in on the outcome of these farming practices (i.e. by patenting certain strains of them, such as with corn and beans), these common food and medicine crops are not admissable as PVPA materials unless they undergo further genetic change. A valid argument against this option is that an increased dependence on monculture may result. Were developing countries or indigneous groups to get involved in such practices, these processes could further reduce the genetic biodiversity of the region and increase monocultural dependency, possibly resulting in a dependency on natural products patented by multinational corporations by developing countries or cultures.

Most recently, this view of natural resource rights has become highly important to the survival of marginal income based farm-dependent families and communities still active in developed countries, whose crops compete with the bioengineered varieties of the same original crop strain. This has even resulted in court orders from multinational corporations demanding that the originators of their bioengineered strain cease growing their native cultivar (Shiva, 1997a; Vandermeer, 1997). Due to the ethical and moral issues at stake with any sort of transformation taking place in nature, the acceptance of bioengineering by traditional peoples will remain unlikely in the near future (World Resources Institute, The World Conservation Union, United Nations Environment Programme, 1992, p. 60).

The PVPA was written to overcome the limitations placed of the 1930 PPA by its legal restriction for use only with asexually-reproduced non-root-generated plants. Both PPA and PVPA have their own limitations as well. Since PPA and PVPA were written for horticultural and agricultural use,

each Act involves plant products that bear visual differences, such as the unique decorative nature of a horticultural plant or the unique fruit- or vegetable-bearing quality of an agricultural product. The goal of PPA and PVPA is the protection of end products that are physically definable and phenotypic in nature. Until the 1980s, plants which bore important chemical traits invisible to the naked eye could not be covered by these patents. Since chemical traits are due to plant genetic sequences, the option of patenting plant and animal genetics became the next step in the development of bioengineered natural resource products.

In recent years, the use of biotechnology-produced phenotypes led to the initiation of a patent system applicable to the marketing of know-how regarding plant, animals, and their reproduction and breeding. For plants, the legal codes employed may sometimes be taken simply as extensions of PPA, PVPA, but in most cases as examples of Utility Patent. Most animal patents filed prior to 1980 were of microscopic lifeforms, In recent years, biotechnology research have enabled scientists to produce various forms of patentable zooa, including mice, fish, farm animals, and livestock (Ihnen & Jondle, 1989).

In progressive, more educated countries, in spite of their traditional teachings some indigenous peoples have chosen to try producing and marketing either specific strains, hybrids, or clones of their fish and land animals. The breeding and marketing of salmon, trout, and tilapi have become the most common of these projects (Richardson, 1993, p. 76). In some cases, indigenous peoples have received the financial support from the National Science Foundation for work in university settings and research laboratories. As a comparison, these same events have not taken place between indigenous people and many of their land animals.

The most useful patent tool to a shaman is the utility patent (Bennett, 1994, p. 178; Williams and Weber, 1989, p.

96-8). Whether or not this method of marketing could be used to secure income for his or her people depends upon the creation and acceptance of an international utility patent law. With a utility patent, one need only secure the rights to a specific use of set of related uses for a plant of a specific type. For example, a utility patent may be placed on trees in use for the research and marketing of the Yew trees for its taxol. This patent in turn might also exempt other countries, like China, from producing the same products from the same natural source. As another example, a utility patent may be secured for a newly discovered plant compound responsible for molluscicidal effects; such was the case with one of India's Euphorbs, in which the chemsitry was not known to the chemical industries, and yet had a long history attached to the knowledge of its use locally in the drinking water.

To file for utility patent, a product usually has to be non-obvious in the country which patents it. It has to have some sort of unique use not conceived before by another individual *within the same legal system*. Its patentable use also has to be reproducible by others in the field. An additional requirement involves the publishing of this knolwedge, thereby allowing others to make use of it once they receive permission from the utility patent owner in the form of seeds or cuttings. Thus a shaman's use of a particular plant for medicine, if that use is news to the developed or developing world, could in theory become a utility patent. It would then be up to the shaman to replicate this plant, in order to provide adequate supplies of plant or seed for future researchers to make use of. Utility patent also has the advantage, although very little, of lasting one year longer than other patents (18 versus 17 years). The utility patent does not cover all uses for a plant, just a specific use. Since the plant descriptions in a utility patent can be of somewhat generic in nature, these

uses may involve more than one species of plants in some cases.

Utility patent is of no use to plants from which the product has multiple uses, such as an oil for use in cosmetics, medicines, and foods. A utility patent can only be secured for one specifc use at a time for each of these broad categories of uses. The Canola/TM seed oil, for example, is a specific oil of low-erucic acid content, and is therefore consumable and marketed as being healthier than most food oils. This marketing of the oil could be applied to Canola's food use through utility patent. This patent does not however prevent the oil from being used to make fuel products, cosmetics, etc.

In theory, a shaman can file for a utility patent on a single type of medicinal use for his or her plants. Those who wish to participate in this use must then obtain their natural products from the shaman. If they use it to treat another malady, such as the use of a cancer drug for treating depression, then that new use may be patented by another, and the plant gathered freely without the shaman's permission.

The limiting factor behind utility patenting medicines stems from their multiple uses, their varied effectiveness (not always replicable by others in the field), and the question as to their novelty. Since utility patents are filed for novel, important discoveries, as judged by the developed world court systems, a local court system situated nearby an indigneous group might not term such a discovery novel (Cannon, 1994).

Unfortunately, most developing and undeveloped countries lack the legal codes required to produce a utility patent law. These countries grant few if any such rights to their residents, and usually try to maintain the primary rights to use and exploitation (if they so choose) of any discovered good or product. To date, legal restrictions and patent laws regarding the use of intellectual property and

natural resources is scarce, if not absent, in nearly all developing countries.

Even if the passage of such a law were the case, education status and economic development may still prevent developing nations and indigenous groups from progressing enough to make use of this legal power for securing their rights to their intellectual property and natural products. This suggests an alternative reason might exist for that the current rise in popularity of tropical rainforest products by multinational companies. The increased interest may in fact be a measure taken by multinational companies to prevent other developing countries from catching up in biotechnology and economic power, such as through the "assimilation" of traditional plants and their genetic traits by means of utilizing the various patent opportunities. Perhaps multinational companies are hoping to take advantage of these opportunities before their future competitors decide to follow suit.

With the advent of various biodiversity and conservation projects, the shaman could no longer remain the sole owner of important information regarding the healing power of plant materials. Local cultures could no longer have exclusive rights to the trade and use of their natural products. In addition, should the same events now taking place continue into the future, the information that is gathered and placed in public domain will further disseminate the knowledge of these once-traditional uses for natural products into industrialized societies. In turn, the survival of these resources may come to depend more on human behavior, and less of their unique traits and genetic diversity.

Integrative Health Care Rights

Most of the intellectual property rights-related issues covered have so far focussed on the problems with introduction indigenous knowledge into the "global information village" and vice versa (Moisy, 1997). Ideally, the best outcome of such information dissemination would be to allow the inventors of this knowledge to benefit the most from it. This in fact is one of the opinions expressed by foreign policy people and politicians, and as a result, the United Nation's "development activities" have been scrutinized (Eberstadt, 1997), the impact of technology and globalization on indigenous peoples has been questioned (Rothkopf, 1997), and the "new world order" as it relates to "the culture of secrecy" and espionage are being addressed (Moynihan, 1997).

With the modernization of indigenous peoples, a possible outcome of current international events taking place, one of the most satisfying results of these changes could be how the shaman's trade skills and intellectual properties are integrated into the biomedical programs now being initiated in many developed countries. The methods of healing traditionally used by the herbalists, midwives, medicine men, and shamans of developing countries could be fused with medical technology to creat a less expensive, more acceptable method, and perhaps more efficient and curative method of health care. This re-design of health care programs might also benefit developed countries, by integrating similarly less expensive forms of health care into the rural and suburban communities of lower economic status. A number of different pluralistic medicine programs have been underway, suggesting this method of improving health care might work (Leslie, 1978; Sussman, 1981; Oswald, 1983; Pederson & Baruffati, 1985; Anyiham, 1987; Adair *et al.*, 1988).

In 1971, a successful plan was initiated in Rwanda known as *La Centre de recherche sur la pharmacopee et la*

medicine traditionelle (CURPHAMETRA). This project repesents one of the first interdisciplinary, university-community based programs dedicated to such a cause. CURPHAMETRA's primary goals was the production of regular biomedical drugs from indigenous medicine derived medicinal plants. This blending of traditional and modern medicine however has also resulted in a multicultural medical program, which even United States biomedical programs have begun to pay attention to (Levin & Coreil, 1986; Gesler, 1992). Medicines are employed both in traditional fashion, such as teas, liniments, elixirs, essential oil extracts, etc., and in purified forms such as colchicine from *Gloriosa simplex*, and Berberine from *Thalictrum rhychnocarpum* (Puyvelde, 1996, pp. 261-262).

Another important example of integrative medicine began in the Ucayali region of Peru as *Federacion de Comunidades Nativas del Rio Madre de Dios y Affluentes* (FENAMAD). Set up in the late 1970s to help deal with the unhealthy living conditions of indigenous groups, the *Aplicacion de Medicina Tradicional* program [AMETRA: Application of Traditional Medicine] was initiated and an integrative indigenous medicine-biomedicine health care program designed to treat the Shipibo-Conibo. This program has since been expanded and a parallel program, AMETRA 2001, initiated in 1985. Since its origin, the indigenous peoples immediately benefitting from this program have included the Arawak, Harakmbut, Pano, Quechua, and Tacana. The end results have been the construction of community health centers, the establishment of medical gardens, the development of an integrative medical program, an improved public health education program, and rapid community development (Alexiades and Lacaze D., 1996, p. 342-344, 356).

Since the initiation of these programs, numerous other attempts have been made to integrate indigenous medicine with biomedicine, meeting the needs of two opposing groups. They accomplish this by allowing the continued cultural

practices of medicine, such as the practiced of the shaman or medicine man, the herbalists, spiritual healers, local midwives, etc. Secondly, by allowing biomedicine into the local setting alongside the shaman, a portion of the World Health Organization's and various *Global Biodiversity Program* goals have been reached. This freedom of medical practice is an important political step taken in multicultural acceptance that in many ways is akin to the rights given to a group to practice its own religion.

We can contrast this work with two other projects of United States origin. The first involves the introduction of American biomedicine to developing countries, thereby resulting in a reduction in traditional practices at the expense of improving lifespans and and reducing infant mortalities within rapidly developing countries like Middle America and Vietnam (Schendel, 1968; Ruhe, Hoover, and Singer, 1988). The second involves the successful production of several rapidly developing Native North and Middle American groups which make use of community-based health care systems (Jacobs and Reed, 1994, p. 96-100).

Examples of less effective programs include the the Belize Ethnobotany Project (BEP) initiated in 1988 by the New York Botanical Garden [NYBG] and the support of Belize officials. BEP underwent an ambitious endeavour with the Ix Chel Tropical Research Foundation, the Belize Center for Environmental Studies, and the Institute of Economic Botany at NYBG to document the ethnobotanical diversity of Belize. Whereas the immediate goal was simply to research and document the medicines of numerous cultures, including the Mopan, Yucatec, Maya, Ladino, Creole, East Indian and various local colonial religious sects, in recent years, this work has led to the development of an "ethnobiomedicine" program of benefit primarily to the United States (Balick *et al.*, 1996).

A number of over-the-counter herbal medicines by the name of "Rainforest Remedies" were then manufactured using

this information (i.e. by contracts, licensures and/or petty patents). This success has since led to plans for the development of extraction laboratories within the forest setting, which in the long run might jeopardize the stability of this tropical ecosystem. The negative results of this drug work focus on the lack of significant medicinal plant findings. Since this research began, the National Cancer Institute [NCI] has sponsored studies of about 2600 plant specimens which in the end produced few pharmacological results and even lesser income for the indigenous people (Balick *et al.*, 1996; Mays, *et al.*, 1997; Moran, 1997).

The NCI work can be contrasted with that of Shaman Pharmaceuticals, Inc. [SPI], a company which offers some form of reciprocity for indigenous involvement relative to the degree of their productivity and the efficacy of their medicines. SPI relies heavily upon indigenous knowledge for its pharmacal leads, which have included leads on potential antiviral medicines such as the recently trademarked Provir/TM and Virend/TM used to treat respiratory synctial virus infections (King, 1992; King, 1996; Conte, 1996, p. 97). In order to balance the benefits received from information sharing and the resulting production of several patentable prescription drugs, SPI initiated the California non-profit organization called Healing Forest Conservancy [HFC]. HFC's goal in turn is to document, conserve, and prevent the endangerment or extinction of potentially important ethnopharmacology sources.

To further reciprocate the indigenous people for the benefits of their medical knowledge, HFC and SPI laid out future economic plans designed to return a part of the companies' income from these medicines to the indigenous groups where the intellectual properties first evolved. These returns are expected to come about five to ten years after the harvesting begins, but SPI and HFC have tried to reduce this waiting period and increase the likelihood that

some form of compensation is returned to the groups (Conte, 1996, pp. 99-100; King, 1996, p. 66).

The long term outcomes of these projects remains to be seen. An important question to ask is 'should mistakes be made, who will be responsible for the failure or a medicine or a detrimental side effect?'

Since an important part of understanding how and why a medicine works can involve the involvement of human reasoning and understanding with the knowledge as to why the plant works, the cross-cultural inter-philosophical analyses of medicines which SPI carries out may be ineffective. This reasoning could also explain why some earlier studies by other companies failed to uncover the actual biomedical reason the medicine was used. Perhaps the reason for the effects of these highly effective indigenous medicines related more to a psycho-physical healing effect, such as through mood, hormones, the autonomic nervous system, and blood cell release, leaving the non-indigenous researcher with a biomedical explanation for why a healing took place in a native, but not in a later case study (Weiner, 1977). We can in turn also make use of this reasoning to explain the failures of such medicines as amygdalin (Laetrile/TM) and maytansine for cancer.

Genome Rights

Traditional arguments against science include accusations that scientists infringe upon nature as if they were the creator of life, all of this with the goal of improving their economic status and intellectual property. A related controversy stems from the argument that the intellectual property and survival know-how of these researchers in developed countries might be directly related to these researchers own past family genetic traits, life style patterns, and personal characteristics (Murray, 1991). These debates have allowed some researchers to argue that genes and genotypes are themselves examples of well-defined intellectual properties. Whereas this eugenics argument has been made in favor of certain non-indigenous peoples in developed countries, the same argument can now be made in favor of the shaman.

To successfully argue genotype as a valid intellectual property right, one has to demonstrate a relation between genotype, survival, well-being, and know-how. This genetic-based correlation can then be argued as a property right which is unique and unshared by other cultures. These characteristics, and more, are possessed by the shamans of nearly every indigenous culture, and even though many of these genotypes may in fact be shared between cultures, the fact that their life style traits often differ, are often quite unique, and are culturally-defined, suggests that specific parts of their genome might be responsible for behaviors normally not shared interculturally, but instead are based on interactions between people and their environment.

A little more than a century following Pasteur's yeast culture patent, the door for the future patenting of organisms and genotypes by means of the utility patent was re-opened when Chakrabarty received a patent for a new bacterial organism in 1980 for its ability to digest oil-

spills. This was followed by the Human Leukemia Cell Patent in 1984, and the first animal gene patent made by several Harvard researchers who effectively transferred a human cancer gene into a mouse (known colloquially as the "Harvard mouse"). Quite recently, a collection of human genotypes were submitted for patent by the National Institute of Health. At first these patents were denied, but are currently undergoing reconsideration (O'Shaugnessy, 1994, p. 68).

The shaman's genotype is important to consider in light of these Germplasm and Human Genome Projects recently initiated. Since the publishing of *The Bell Curve* by Herrnstein and Murray in 1994, the issues of eugenics and dysgenics (genes which bear diseases and other examples of life's worst issues) have once again become popularized. Part of the reason for this revival in genics was the rising concern with environmental issues as they relate to malaise, disease, extinction, and biodiversity. Since these same issues define the roles of environmental researchers, the genics-environment relation has to also be reviewed in parallel with the development of gene bank prjects for the storage of "germplasms" of endangered ecosystems.

Thus the human race is faced with important political and moral issues regarding the definition and application of intellectual property rights regimes. Do our genes carry the same rights as plant or animal genes?

The same arguments once made for phytogenetic property rights are now being argued for the fate of specific indigenous peoples' genetic properties which define them as shamans who "continued to know and innovate with medicinal plants" (Shiva, 1997). Indigneous peoples are right now beginning to lose control of their rights to their genetic make-up.

In a lecture at Colorado Springs, Vandana Shiva made a passing note on this and its attached moral issue:

> "If you want to hear other ghastly stories about ... ownership and creation? . . . they have now taken out a patent . . . on indigenous peoples' cell lines, all of them owned by the commerce ministry's department of the United States: a Panamanian Indian, a Hugga-hai [sp?] from Papua New Guinea . . . a patent on the umbilical chord blood . . . a patent on this hormone in our wombs . . ." (Shiva, 1997a).

Currently, specific plant and animal genotypes can be patented if their DNA sequences are known (Bent, 1989; Bentley, 1989). The remaining question thus becomes: how is human DNA defined in regard to any relation noted to exist between nucleic acid sequences, ingeniusness, and intellectual property? Is it the knowledge of the biochemistry of the DNA sequences or the intelligence attached to the cultural understanding of the traits borne by these sequences, even without any direct knowledge of the sequences themselves, which places DNA at the heart of one's own intellectural property?

This most recent intellectual property right issue has led several indigneous groups to voice their opinions on the World Wide Web. In 1993, the Mataatua of New Zealand held a conference on IPR in which they announced *The Mataatua Declaration of Cultural and Intellectual Property Rights of Indigenous Peoples* (Commission on Human Rights, 1993). In 1995, the Inter American Commission on Human Rights, Organization of American States wrote up a similar *Draft of the Inter-American Declaration of the Rights of Indigenous Peoples*. The strongest statement against the human genome project was made quite recently by the Alaska Native Knowledge Network in their writing entitled *Declaration of Indigenous Peoples of the Western Hemisphere regarding the Human Genome Project*:

> "[W]e the Indigenous Peoples and organizations participating in this meeting from North, Central, and South America reject all programs involving genetic technology.
>
> "We particularly oppose the Human Genome Diversity Project which intends to collect and make available our genetic materials which may be used for commercial, scientific, and military purposes.
>
> "We oppose the patenting of all natural genetic materials. We hold that life cannot be bought, owned, sold, discovered, or patented, even in its smallest form." (Alaska Native Knowledge Network, 1997, p. 1)

The fact remains, human genes are only in part responsible for an individual's life, well-being, and death, and how each of these events happens. They produce and control the traditional life patterns definitive of a society and its culture, and the practices of the individuals who comprise these cultures. But, traditional life is defined neither by the genetic make-up of individuals, nor by the know-how of that individual's society and culture. Traditional life and its essences of life and survival are represented by a merging of these two traits of being. Thus, we are as dependent on our genetic make-up and its expression of itself for our life patterns just as much as we are dependent on our interactions with nature and each other (even the outcomes of which are assisted by our genetic make-up).

This sum of expressivity of human genomes is what defines mankind. It serves as a unique source of intellectual property as the human genome teaches us whatever we need to know to overcome such natural obstacles as walking at high elevations or scouting major cold water channels by kayak. Examples of this personal knowledge of self can also include knowledge of the types of foods to eat and foodways, types of living activities to perform, behaviors needed to carry out the events preceding a marriage and mating, and numerous other activities required for long-term personal and cultural survival.

Regardless of whether or not we know the genetic reasons why we bear these skills, we become better capable of making the accomplishments we need to make due to a personal knowledge of self and our own abilities and inabilities. Since these features of the human race are partially defined by genetic and socio-cultural make-up, and are what led contemporary researchers to establish the human genome project, the human genome project serves to uncover reasons for physical, mental, and emotional well-being, early decease and longevity, which are neither patentable nor copyrightable. In essence, these studies seek not only to find the cause for life-threatening diseases, but also the reasons for life itself, which many traditional people feel is an answer better left undiscovered, but taught instead as the wisdom of nature or our Creator.

Conclusion

In recent years, a number of indigenous groups have undergone substantial legal, political and economic development. These advancements could have the effect of converting developing countries into additional threats to ecology which already exist in developed countries. On the other hand, some world economists suggest that developing countries will not catch up with developed countries, and that considerable efforts will therefore need to be made by developed countries to financially support and stabilize the developing nations' economies so as to reduce the stresses each one will place on our natural resources. The result of these actions will have to be a reduction in the high mortality, high reproductive, and high impoverishment rates the developing countries have to face. Economists also argue that in the impoverishment/environment degradation events taking place globally are in fact due to this lack of development of the developing countries, and the lack of support multinational companies have provided for developed countries (McDonald, 1995).

Just how intellectual property comes into this picture is through the last required set of political activities. International political activities, such as those between the United Nations and developing countries are already taking place. "Politically correct" multinational business operations however are a scarcity due to the lack of legislation between countries involving the various forms of intellectual property being acquired.

The effects of this inequality between nations and companies are made clear by a study of environmental degradation and the roles which the World Bank and the United Nations Development Programs have played in overseeing the developing countries. Dobell notes that the "rich get richer" as a result of international policy. In spite of World bank and United Nations claims otherwise, Dobell shows how very little income has been generated by

the enterprising groups and companies involved in international endeavors. The chief reason for this inequality Dobell claims is the lack political overseers. In spite of the developments taking place these past few years, including projects focussed on indigenous groups and natural resources, few benefits now actually trickle down and benefit the sources of the intellectual property from which this knowledge came. The poorest two-thirds of global economy still make about 5.6% of the global earnings and developing countries make 11.7%, while developed countries continue to prosper by earning about 82.7% of the total world's income (Dobell, 1995, p. 231).

To the shaman, assuming he or she is aware of this economic inequality taking place, the decision made regarding whether to retain or release intellectual property must take into account the economic goals of his or her people, along with any self-imposed self-governing policies that may exist. One argument against the retention of the shaman's knowledge claims that by delaying the publication or uncoverage of his or her medicine, we are also delaying the distribution of medical knowledge which could prevent the needless suffering to continue for many people dying from their afflictions. This argument is in error, for, as claimed by economists researching the medicinal plant research, the current methodology in use for proving a shaman's claims is rarely effective and the chances for making the successful discovery of a drug are quite low.

Therefore, the most direct impact of these intellectual property debates has been the polarization of indigenous and non-indigenous cultures in developed and developing nations. During such arguments, four issues receive the most political attention: the ownership of intellectual property already documented in historical, anthropological, scientific, and religious writings; the ownership and application of medical knowledge, medicines, and the techniques for their use; the ownership of natural resources

which exist in indigenous land and their genetics; and ownership of human individual- and culturally-defined genome packages. Due to these issues, numerous conferences and meetings have been held by the United Nations, The World Health Organization, and indigenous groups. As the former two continue their efforts to balance out the major changes taking place in developing countries, various indigenous groups have begun their own plans as they attempt to define and balance their physical, economic, and spiritual goals, with these various intellectual property issues now at stake.

As this polarization continues, we might expect to see the goals of indigenous groups become representative of a body of knowledge vastly different from that of various National representatives and the United Nations. Such political disputes, should they continue into the next century, could also result in the generation of two unique value systems, and for each major economic, political, or cultural issue, two views regarding the best outcome of each. One could morally argue that since the international political systems (defined by the United Nations) are separate and detached from the goals of indigenous cultures, that therefore the biodiversity goals now underway demonstrate a lack of respect for traditional cultures and values. This form of bioprospecting has been termed "biopiracy" by contemporary political activist writers (Shiva, 1997).

Thus the answer to the question 'What legal rights does a shaman or indigenous group have to intellectual property?' remains as uncertain as a century ago when these legal rights barely existed. Should indigenous groups continue their application of both the well-established national and international legal systems? If so, many developed nations could then argue that by so doing, these nations or indigenous groups also wish to adhere to the restraints

posed by the United Nations regarding their definition as a culture and not independent nations.

On the other hand, if the indigenous peoples wish to become part of the global marketplace, and to copyright, trademark, and patent the uses of their traditional natural resources and know-how, then indigenous peoples have to surf the technology like everyone else. This means get an education, learn science and technology, protect your knowledge, market your products, and ultimately, overcome the current limitations that now exist in most developing (or undeveloped) countries and indigenous cultures. Otherwise, the Soma, panaceas, and wild "livestock" will be of little value as they are replaced by marketable, patentable plant and animal varieties, clones, or hybrids.

Shamanic knowledge was and remains, perhaps, the best kept trade secret. Now, the exploration of such societies is responsible for revealing these secrets and putting them into the public domain. With the modernization and westernization of a once-traditional society, versus its extinction, introducing this knowledge into the public domain may be the best inevitable outcome for a global information network being funded by a global economy. Therefore, the best outcome of the shaman's intellectual property might perhaps be that it is not for sale and not owned, but like everything else exists as a part of global intelligence.

References

Achterberg, Jeanne, and Larry Dossey (Co-Chairs.) Mind-Body Interventions. In Brian M. Berman (Chair), *Alternative Medicine. Expanding Medical Horizons. A Report to the National Institutes of Health on Alternative Medical Systems and Practices in the United States. Prepared under the auspices of the Workshop of Alternative Medicine, Chantilly, Va. September 14-16, 1992.* Washington, D.C.: U.S. Government Printing Office. pp. 3-43.

Adair, John, Kurt W. Deuschle, and Clifford R. Barnett. 1988. *The People's Health. Medicine and Anthropology in a Navajo Community.* Albuquerque: University of New Mexico Press.

Alaska Native Knowledge Network. 1997. *Declaration of Indigenous Peoples of the Western Hemisphere regarding the Human Genome Project.* <URL:http://zorba.uafadm.alaska.edu/ankn/declaration.html>. Dated 9/6/97.

Alexiades, Miguel N., and Didier Lacaze D. 1996. FENAMAD's Program in Traditional Medicine: An Integrated Approach to Health Care in the Peruvian Amazon. In Michael Balick, Elaine Elisabetsky, and Sarah A. Laird (ed.). *Medicinal Resources of the Tropical Forest. Biodiversity and its Importance to Human Health.* (New York: Columbia University Press), pp. 340-365.

Anonymous. 1997. For Pills, Not Projectiles. *The Economist.* July 12th-18th, 1997. pp. 22-23.

Anyiham, C. 1987. Availability, accessability, acceptability, and adaptability: four attributes of African ethno-medicine. *Social Science and Medicine* vol. 25, pp. 803-811.

Balick, Michael J., Rosita Arvigo, Gregory Shropshire, and Robert Mendelsohn. 1996. Ethnopharmacological Studies and Biological Conservation in Belize. In Michael Balick, Elaine Elisabetsky, and Sarah A. Laird (ed.). *Medicinal Resources of the Tropical Forest. Biodiversity and its Importance to Human Health.* (New York: Columbia University Press), pp. 326-333.

Bennett, Virginia C. 1994. Plant Biotechnology. In Kenneth D. Sibley (Ed.). *The Law and Strategy of Biotechnology Patents* (Boston: Butterworth-Heinemann) pp. 171-185.

Bent, Stephen A. 1989. Patenting Genes that Encode Agriculturally Important Traits. In C.W. Stuber (Ed.). *Intellectual Property Rights Associated with Plants*

(Madison: Crop Science Society of America, Inc.) pp. 109-122.

Bentley, Orville G. 1989. Implications of Plant Patenting for Science, Technology, and Agriculture. In C.W. Stuber (Ed.). *Intellectual Property Rights Associated with Plants* (Madison: Crop Science Society of America, Inc.) pp. 171-174.

Broome, Jr., David E. 1994. Ownership of Tangible and Intellectual Property. In Kenneth D. Sibley (Ed.). *The Law and Strategy of Biotechnology Patents* (Boston: Butterworth-Heinemann) pp. 49-60.

Brown, Katarina. 1995. Medicinal Plants, Indigenous Medicine and Conservation of Biodiversity in Ghana. In Timothy Swanson (Ed.), *Intellectual Property Rights and Biodiversity Conservation: an interdisciplinary analysis of the values of medicinal plants* (New York: Cambridge University Press) pp. 201-231.

Burchfiel, Kenneth J. 1995. *Biotechnology and the Federal Circuit.* Washington, D.C.: The Bureau of National Affairs, Inc.

Cannon, James R. 1994. Novelty and the Public Domain. In Kenneth D. Sibley (Ed.). *The Law and Strategy of Biotechnology Patents* (Boston: Butterworth-Heinemann) pp. 75-91.

Commission on Human Rights, Sub-commission of Prevention of Discrimination and Protection of Minorities, Working Group on Indigenous Peoples, 19-30 July 1993. *The Mataatua Declaration of Cultural and Intellectual Property Rights of Indigenous Peoples. June 1993. First International Conference on the Cultural & Intellectual Property Rights of Indigenous Peoples, Whakatana, 12-18 June 1993 Aotearoa, New Zealand.* Commission on Human Rights.

Conte, Lisa A. Shaman Pharmaceuticals' Approach to Drug Development. 1996. In Michael Balick, Elaine Elisabetsky, and Sarah A. Laird (ed.). *Medicinal Resources of the Tropical Forest. Biodiversity and its Importance to Human Health.* (New York: Columbia University Press), pp. 94-100.

Dobell, A. Rodney. 1995. Environmental Degradation and the Religion of the Market. In *Population, Consumption, and the Environment. Religious and Secular Responses.* Harold Coward (ed.). Albany: State University of New York Press. pp. 229-250.

Eberstadt, Nicholas. 1997. The United Nations' "Development Activities." *World Affairs* Vol. 159, no. 4, pp. 151-157.

Gesler, Wilbert M., and Thomas C. Ricketts (eds). 1992. *Health in Rural North America*. New Brunswick: Rutgers University Press.

Gollin, Michael A.. 1993. Annex 3. The Convention on Biological Diversity and Intellectual Property Rights. In In Walter V. Reid, Sarah A. Laird, Carrie A. Meyer, Rodrigo Gamez, Ana Sittenfeld, Daniel H. Janzen, Michael A. Gollin, and Calestous Juma (Eds.). *Biodiversity Prospecting: Using Genetic Resources for Sustainable Development* (World Resources Institute) pp. 289-302.

Herrnstein, Richard J. and Charles Murray. 1994. *The Bell Curve. Intelligence and Class Structure in American Life*. New York: The Free Press.

Ihnen, Jeffrey L., and Robert J. Jondle. 1989. Protecting Plant Germplasm: Alternatives to Patent and Plant Variety Protection. In C.W. Stuber (Ed.). *Intellectual Property Rights Associated with Plants* (Madison: Crop Science Society of America, Inc.) pp. 123-144.

Inter American Commission on Human Rights, Organization of American States. 1995. *Draft of the Inter-American Declaration of the Rights of Indigenous Peoples. Draft approved by the IACHR at the 1278 session held on September 18, 1995*. <URL:http://zorba.uafadm.alaska.edu/ankn/iachr. html>. Dated 9/6/97.

IUCN Commission on National Parks and Protected Areas. *The Bali Action Plan. How to Enable Protected Areas to meet the Needs of the 1980s*. In McNeely *et al*. 1990. Conserving the World's Biodiversity. IUCN, WRI, CI, WWF-US, and the World Bank, Washington, D.C. pp. 140-146.

Jacobs, Jennifer, and John Reed (Co-chairs). 1994. Herbal Medicine. In Brian M. Berman (Chair), *Alternative Medicine. Expanding Medical Horizons. A Report to the National Institutes of Health on Alternative Medical Systems and Practices in the United States. Prepared under the auspices of the Workshop of Alternative Medicine, Chantilly, Va. September 14-16, 1992*. Washington, D.C.: U.S. Government Printing Office. pp. 183-206.

Jondle, Robert J. 1989. Overview and Status of Plant Proprietary Rights. In C.W. Stuber (Ed.). *Intellectual*

Property Rights Associated with Plants (Madison: Crop Science Society of America, Inc.) pp. 5-16.

Khalil, Mohamed. 1995. Biodiversity and the Conservation of Medicinal Plants: Issues from the Perspective of the Developing World. In Timothy Swanson (Ed.), *Intellectual Property Rights and Biodiversity Conservation: an interdisciplinary analysis of the values of medicinal plants* (New York: Cambridge University Press) pp. 232-253.

King, Steven R. 1991. The Source of our Cures. *Cultural Survival Quarterly*, Summer 1991, pp. 19-22.

King, Steven R. 1992. Pharmaceutical Discovery, Ethnobotany, Tropical Forests, and Reciprocity: Integrating Indigenous Knowledge, Conservation, and Sustainable Development. In Mark Plotkin and Lisa Famolare (ed.). 1992. *Sustainable Harvest and Marketing of Rain Forest Products.* (Washington, D.C.: Conservation International), pp. 231-238.

King, Steven R. 1996. Conservation and Tropical Medicinal Plant Research. In Michael Balick, Elaine Elisabetsky, and Sarah A. Laird (ed.). *Medicinal Resources of the Tropical Forest. Biodiversity and its Importance to Human Health.* (New York: Columbia University Press), pp. 63-74.

Lechtenberg, Victor L. 1989. Intellectual Property Rights. In C.W. Stuber (Ed.). *Intellectual Property Rights Associated with Plants* (Madison: Crop Science Society of America, Inc.) pp. 51-58.

Leslie, Charles. 1978. Pluralism and Integration in the Indian and Chinese Medical Systems. In Arthur Kleinman, Peter Kunstadter, E. Russell Alexander, and James L. Gate (eds). *Culture and Healing in Asian Societies. Anthropological, Psychiatric, and Public Health Studies.* Boston: G.K. Hall, Co. pp. 235-251.

Levin, Jeffrey S., and Jeannine Coreil. 1981. 'New Age' Healing in the United States. *Social Science and Medicine* vol. 23, no. 9, pp. 889-897.

Mays, Thomas D., Kate Duffy-Mazan, Gordon Cragg, and Michael Bond. 1997. A Paradigm for the Equitable Sharing of Benefits Resulting from Biodiversity Research and Development. In *Biodiversity and Human Health.* Francesco Grifo and Joshua Rosenthal (eds.). Washington, D.C.: Island Press. pp. 267-280.

McCaleb, Robert S. 1997. Medicinal Plants for Healing the Planet: Biodiversity and Environmental Health Care. In

Biodiversity and Human Health. Francesco Grifo and Joshua Rosenthal (eds.). Washington, D.C.: Island Press. pp. 221-242.

McGowan, Janet. 1991. Who is the inventor? *Cultural Survival Quarterly*, Summer 1991. p. 20.

McNeely, Jeffrey A., Kenton R. Miller, Walter V. Reid, Russell A. Mittermeier, and Timothy B. Werner. 1990. *Conserving the World's Biological Diversity*. Washington, D.C.: International Union for Conservation of Nature and Natural Resources, World Resources Institute, Conservation International, World Wildlife Fund-US, and the World Bank.

Moisy, Claude. Myths of the Global Information Village. *Foreign Policy*, Number 107. pp. 78-87.

Moran, Katy. 1997. Returning Benefits from Ethnobotnaical Drug Discovery to Native Communities. In *Biodiversity and Human Health*. Francesco Grifo and Joshua Rosenthal (eds.). Washington, D.C.: Island Press. pp. 243-263.

Moynihan, Daniel Patrick. 1997. The Culture of Secrecy. *The Public Interest*, Number 128, pp. 53-72.

Murray, Charles. 1997. IQ and Economic Success. *The Public Interest*, Number 128, pp. 21-35.

O'Shaughnessy, Brian P. 1994. Patentable Subject Matter. In Kenneth D. Sibley (ed.). *The Law and Strategy of Biotechnology Patents*. Boston: Butterworth-Heinemann. pp. 61-74.

Oswald, I.H. 1983. Are Traditional Healers the Solution to the Failures of Primary Health Care in Rural Nepal. *Social Science and Medicine* vol. 17, no. 5, pp. 255-257.

Pedersen, Duncan, and Veronia Baruffati. 1985. Health and Traditional Medicine Cultures in Latin America and the Caribbean. *Social Science and Medicine* vol. 21, no. 1, pp. 5-12.

Puyvelde, Luc Van. 1996. The Rwanda Experience in Enhancing and Commercializing the Use of Traditional Medicinal Plants. In Michael Balick, Elaine Elisabetsky, and Sarah A. Laird (ed.). *Medicinal Resources of the Tropical Forest. Biodiversity and its Importance to Human Health*. (New York: Columbia University Press), pp. 261-265.

Richardson, Boyce. 1993. People of Terra Nullius. Betrayal and Rebirth in Aboriginal Canada. Seattle: University of Washington.

Rothkopf, David. 1997. In Praise of Cultural Imperialism? *Foreign Policy*, Number 107. pp. 38-52.

Ruhe, C.H. William, Norman W. Hoover, and Ira Singer. 1988. *Saigon Medical School. An Experiment in International Medical Eduction. An Account of the American Medical Association's Medical Education Project in South Viet Nam, 1966-1975.* American Medical Association.

Schendel, Gordon. 1968. *Medicine in Mexico. From Aztec Herbs to Betatrons.* Austin: University of Texas Press.

Shiva, Vandana. 1997a. *Biopiracy. The Plunder of Nature and Knowledge.* Lecture presented to University of Colorado at Boulder. Program taped and aired by Alternative Radio. Replayed 13:00 to 13:30 hrs, September 19, 1997, on WPBS, FM 91.5, Portland, Oregon.

Shiva, Vandana. 1997b. *Biopiracy. The Plunder of nature and Knowledge.* Boston: South End Press.

Sibley, Kenneth D. (Ed.). 1994. *The Law and Strategy of Biotechnology Patents.* Boston: Butterworth-Heinemann.

Sussman, Linda K. 1981. Unity in Diversity in a Polyethnic Society: the Maintenance of Medical Pluralism on Mauritius. *Social Science and Medicine* vol. 15B, pp. 247-260.

Swanson, Timothy. 1995. Diversity and Sustainability: Evolution, Information, and Institutions. In Timothy Swanson (Ed.), *Intellectual Property Rights and Biodiversity Conservation: an interdisciplinary analysis of the values of medicinal plants* (New York: Cambridge University Press) pp. 1-16.

Swanson, Timothy. 1995. The Appropriation of Evolution's Values: an Institutional Analysis of Intellectual Property Regimes and Biodiversity Conservation. In Timothy Swanson (Ed.), *Intellectual Property Rights and Biodiversity Conservation: an interdisciplinary analysis of the values of medicinal plants* (New York: Cambridge University Press) pp. 141-175.

Swanson, Timothy (Ed.). 1995. *Intellectual Property Rights and Biodiversity Conservation: an interdisciplinary analysis of the values of medicinal plants.* New York: Cambridge University Press.

Vandermeer, John. 1997. Biodiversity Loss in and around Agroecosystems. In *Biodiversity and Human Health.* Francesco Grifo and Joshua Rosenthal (eds.). Washington, D.C.: Island Press. pp. 111-127.

Walden, Ian. 1995. Preserving Biodiversity: the Role of Property Rights. In Timothy Swanson (Ed.), *Intellectual Property Rights and Biodiversity Conservation: an interdisciplinary analysis of the values of medicinal plants* (New York: Cambridge University Press) pp. 176-197.

Weiner, Herbert. 1977. *Psychobiology and Human Disease.* New York: Elsevier.

Wesaw, Marchell J. 1995. Finders Keepers? Adulteration of Native American Cultures in the Name of Profit. *Cultural Survival Quarterly,* Winter 1995. pp. 8-10.

Williams, Jr., Sidney B. and Kenneth A. Weber. 1989. Intellectual Property Protection and Plants. In C.W. Stuber (Ed.). *Intellectual Property Rights Associated with Plants* (Madison: Crop Science Society of America, Inc.) pp. 91-108.

World Resources Institute, The World Conservation Union, United Nations Environment Programme. 1992. *Global Biodiversity Strategy. Guidelines for Action to Save, Study, and Use Earth's Biotic Wealth Sustainably and Equitably.* In consultation with Food and Agricultuire Organization, United Nations Education, Scientific and Cultural Organization.

APPENDIX