TRIPS, indigenous knowledge and the bio-rush

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"Everything under the sun, made by man, is patentable provided it meets the basic requirements of novelty, inventiveness and utility." - US Supreme Court

"The new genetic commerce raises more troubling issues than any other economic revolution in history." - Jeremy Rifkin The wheel is one of the great inventions of humankind; both the original invention and its spin-offs have greatly benefited human beings for generations. It is difficult to imagine the consequences if human society had conceived of the patent system at the time the wheel was invented. Imagine the situation if the inventor of the wheel insisted on sole monopoly over the invention, claiming royalty for it and controlling all future developments involving the innovation. Such an idea would surely be unacceptable to the present generation. From time immemorial the wheels of innovation have been set in motion by necessity, creativity and/or the natural human desire for achievement.

Recognition by peers and society served as both motivation and reward. Yet today, the patent system, ostensibly set up to protect the rights of the inventor over the invention, is sought to be justified on the grounds that this is the way to reward the originator of the innovation. It appears that neither the joy of discovery nor service to society nor, indeed, public recognition are considered sufficient rewards in the modern age. The rich biological resources of the global South have created a rush amongst the different research houses of the North,[1] which are in a hurry to be the first to obtain patents over them. The fact that the patent systems of industrially developed countries generally do not take community knowledge into account is the basic cause of much of the conflict between the North and the South [2] over patents.

This so-called divide between North and South has been exacerbated by the Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPS). In an effort to bring the patent laws of different countries under the umbrella of the World Trade Organisation (WTO), TRIPS has completely ignored the diversity characterising various patent systems that existed prior to its arrival on the scene. TRIPS, GATT and all that TRIPS is one of the agreements to which countries belonging to the World Trade Organisation (WTO) are signatories. Prior to the formation of the WTO, the General Agreement on Trade and Tariffs, 1947 (GATT) served as the basis for rules relating to free trade (in goods only). In 1985 a new round of trade negotiations began at Panta Del Este, Uruguay, which concluded in 1994 at Marrakesh, Morocco, with the formation of the WTO and a package of agreements under it. Among the several detailed agreements under the WTO

umbrella are GATT (which outlines the general rules for trade in goods), GATS (which concerns rules for trade in services) and TRIPS (which relates to trade in intangible property). In addition, the Doha Convention that took place as a part of the review of the above agreements.

The patent laws of different countries vary in principle, ideology and priorities. The paper submitted by India to the Council for Trade-Related Aspects of Intellectual Rights makes this quite clear. According to the document, "International IPR regimes recognise formal systems of knowledge only. Informal systems—eg the shrutis and smritis in the Indian tradition, and 'grandmothers' potions' the world over get scant recognition. To create systems that fail to address this issue can have severe adverse consequences on mankind, some say even leading to our extinction."[3] The use of intellectual property as a tool of so-called free trade has drawn flak from developing countries because the attempt introduces the concept of property rights over knowledge shared by entire communities. To the industrially developing and least developed countries of the South, it is anathema to commercialise traditional knowledge, which has evolved over centuries and which has traditionally been shared freely from generation to generation within communities.

Further they deplore the modus operandi of large multinational corporations (MNCs), which first obtain information about the utility of various products of nature from local communities and then claim intellectual property rights over this knowledge by registering patents for products and/or processes ostensibly created in their laboratories even though they have merely made extractions, harvested tissues or isolated genes from the natural product. The real question is whether or not such a product or process is indeed innovative, novel and non-obvious enough to warrant a patent. In fact, can it be called an invention at all? Developed countries contend that the isolation of a chemical component from the original plant and its use as bio-pesticide, medicine or new variety of plant should rank as an invention because it is different from what exists in the natural state. This argument has enraged the South, which objects to patent protection for certain extractions of plants[4] and genes on the grounds that such patents lack novelty in view of their prior existence in nature. They argue that so-called discoveries are being patented under the pretext that mere extraction and isolation from the whole (whether plant or animal) constitutes something new.

Meanwhile, the North continues to profit from this arrangement. Is TRIPS then promoting knowledge piracy from the South and has it, in a way, opened the door to the patenting of plants and animals? Some sections of the South certainly believe so. For instance, the African Group within the WTO has demanded that patents on life forms be prohibited under the TRIPS agreement as they are contrary to the moral and cultural norms of their societies.[5] If the TRIPS agreement does not take into account the existence of indigenous knowledge, the North does not consider any knowledge system which is not properly documented according to their own definitions and norms or well-known within their society and culture . For example, the United States of America does not recognise the undocumented prior knowledge that exists in other countries, and readily grants patents to innovations based on knowledge prevalent in other countries. Article 27.3 (b) of TRIPS provides that member countries may exclude certain subject matters—mainly animals, plants and biological processes—from the patent regime. But it

makes a distinction between animals and plants, on the one hand, and micro-organisms on the other, allowing patent protection for the latter.

This exception has been exploited by the North, which chooses to view the micro-organisms that constitute parts of plants and animals as separate from the whole. By effectively providing broader patent protection through this exception, the whole—i.e plants and animals—have been brought under the patent regime through the back door. One of the objectives of TRIPS was the transfer of technology, presumably to benefit all. However, the South contends that the TRIPS regime has led to the misappropriation of its biological resources, with products and processes based on knowledge from the South patented in the North without any benefit to the former. In fact, they argue, only the North has gained from TRIPS.

This article attempts to look at the role of various aspects of the issue – such as the distinction between invention and discovery, the question of patents over genes, and the non-recognition of indigenous knowledge about the use of medicinal plants that has led to pillaging of bio-resources from the South. Part A of the article looks at the question of whether or not the patent protection provided to micro-organisms has broadened the scope of patents to such an extent that even discoveries that do not qualify as inventions have been patented. Part B evaluates the efficacy of TRIPS as an instrument that can be used to provide protection to the traditional knowledge base of the South.

A. Patenting 'discoveries' Under normal circumstances, things that are already in existence are not patented; only inventions are supposed to be patented. However, patent laws framed in accordance with the TRIPS agreement and the national patent laws of many WTO member countries do not explicitly define or distinguish between inventions and discoveries. For example, the UK Patent Act of 1977 excludes discoveries, scientific theories and mathematical methods from the patent regime.[6] However, Article 27(1) of TRIPS provides that patents shall be made available for any inventions—product or process—in all fields of technology provided that they are new, involve an inventive step and are capable of industrial application. The agreement fails to define terms like 'new,' 'inventive step' and 'industrial application', leaving the door open for interpretations that suit the interests of the more dominant member states. The principal question in this context is: what can be patented—i.e., what is the legitimate subject matter of patents? According to Article 27.3(b), "M embers may exclude from patentability plants and animals other than micro-organisms, and essential biological processes for the production of plants or animals other than non-biological and microbiological processes. However, members shall provide for the protection of plant varieties either by patents or by an effective sui generis system or by any combination thereof." Clearly, according to TRIPS, micro-organisms must be provided patent protection. But the Article fails to provide an exhaustive list of subject matters that cannot be patented. This has led to a broad reading of the provision by some of the developed countries, especially the US. The 1952 US Patent Act imposes only four requirements for patentability—ie, "the claimed subject matter must (i) have some practical utility, (ii) be either a process or a physical embodiment of the invention, (iii) not be disclosed, with limited exceptions, in prior art, and (iv) not be obvious based on prior art."[7] According to Linda J Demaine and Aaron Xavier Fellmeth, in their article 'Reinventing the Double Helix', this has led courts to conclude that a patent applicant need not invent the subject matter claimed (eg,

he/she may merely have discovered a pre-existing DNA sequence or protein), as long as the precise subject matter was unknown before the applicant discovered it.[8] US patent laws do not clarify whether discoveries are patentable.

It is important to draw a distinction between discovery of things already in existence and discovery of things that were not in existence prior to the discovery.[9] In other words, the discoverer might have found a thing already in existence but unknown to the world, but this does not qualify for the novelty requirement. On the other hand, an invention is, by definition, a new creation, consciously sought and successfully reduced to practice by the inventor.[10] For example, if I consciously seek to obtain purified tungsten out of naturally occurring tungsten oxide, then the purified tungsten that I create could be regarded as patentable under this definition. Interestingly, US courts had denied a patent for the above product about half a century ago, viewing it as a mere discovery.[11] But since the 1980s there has been considerable change in the approach of US courts, which now seem to extend patent protection to discoveries, blurring the distinction between invention and discoveries that they used to make earlier. A discovery (ie, unearthing what is already in existence but was unknown until the act of discovery) would not satisfy the inventive step or non-obviousness criteria which are necessary for a subject matter to be eligible for patenting. Article 27.3(b) does not precisely outline the subject matter that can be patented. This allows scope for interpreting discoveries as patentable if they fulfil the utility criterion. If the agreement had explicitly excluded discoveries from being patented, developed countries could not have extended patent protection to non-inventions, especially in the area of biotechnology. Biotech patents and discoveries US courts have tried to apply certain tests to arrive at a conclusion about whether or not a product or process is patentable. For instance, they have on occasion followed the purification doctrine to determine patents. According to this doctrine, "Naturally occurring phenomena are not patentable subject matter, both for reasons of policy and because such discoveries fail to fulfil the essential requirement of creative or ingenious mental step up. If the identification of a natural substance could not give rise to a patent on the substance, making minor alterations to that substance would not create patentability."[12] In other words, the mere purification and isolation of a DNA molecule or a protein does not amount to an invention because nothing new is created, since the claimed biochemical previously existed in nature, albeit in a different form.[13] Despite this doctrine, however, the United States has granted a number of patents to products which constitute a mere purification or isolation of a gene or a DNA. In the instance of the neem patent, for example, the big question that follows from the above is: how can an extract from the neem tree be patented? W R Grace, the company that owns the patent, does so only on the basis of the identification and extraction of the specific chemical in the neem tree (azadirachtin) which gives the tree its pesticidal properties. Thus a mere extraction was patented even though it existed in a different form in nature and despite the fact that the isolation and purification of the chemical did not lead it to perform a new or different function. Usually a change in the physical form of a product (eg, granules to powder, solid to liquid) or a minor chemical conversion (eg, conversion to salt, base, acid, hydrate, ester, or addition or removal of a protection group) would not amount to any material change in the subject matter.[14]

The respective characters of the natural substance and the claimed product have to be assessed with the aim of determining whether or not they are substantially different. If the

characters are not substantially different, the claimed product is unpatentable because it already exists as a natural substance and there is nothing new in the claimed product.[15] DNA and the issue of patentability A recombinant DNA is actually an imitation of the naturally transcribed gene. A product that is an imitation of the original cannot be patented.[16] According to Ned Hettinger, the isolation of a gene is not the same as the invention of a gene. Placing a gene or several genes into an embryo and allowing the organism to develop is an alteration, not a creation,[17] since no substantial transformation is involved. Accordingly, a recombinant DNA should technically not be patented. Yet a cell line from a woman was patented in the United States : "In 1993, a patent claim was on the cell line of a 26-year-old Guayami woman from Panama. Her cell line is of interest because some Guayami people carried a unique virus which was useful in AIDS and leukaemia research. Protest by international groups and the Guayami General Congress led to the withdrawal of the patent claim in November 1993."[18] Although the patent was withdrawn, it is important to deal with some of the questions raised by the case: How is a cell line extracted, isolated and purified from a woman different from the cell line that exists within her? What is new about the extracted cell line that it can be patented? Does it perform any function different from those of the naturally occurring cell line?

Prior to the 1980s the US Supreme Court had clearly stated that the "invention requirement demands that the applicant who modifies a product of nature create a new product, the function of which is not the same as the natural product from which the invention derives." [19]However, from 1980 onwards US courts have relaxed the requirements, thereby enabling the grant of patents over genes, cell lines, etc. Each DNA sequence has only one biological function—ie, translation into proteins. Each gene codes a protein. Thus, the single biological function of each DNA sequence is inherent in the sequence. The discovery that a particular DNA sequence produces a particular protein and the isolation of such a sequence is not by any standards a substantial transformation since the purified DNA sequence performs the same function as the natural DNA even if it is inserted into the genome of a new species. Thus, there is nothing new to be patented in a recombinant DNA. It is, in effect, no different from extracting vitamin C from lemon juice or getting purified tungsten by burning out oxygen from the naturally occurring tungsten, neither of which have been granted patents because no invention is involved in such claims.[20]

It can, therefore, be said that isolated and purified, but naturally occurring, bio-chemicals are unpatentable on the ground that no invention is involved in view of the fact that the purified version does not depart significantly and/or functionally from what occurs in nature.[21] However, the United States Patent and Trademark Office (USPTO) recently established guidelines for issuing patents which emphasise the utility criterion and encourage MNCs to patent even the slightest modification. It has completely ignored comments from different groups and developing countries that had urged it not to issue patents for genes on the grounds that genes are not inventions.[22] In fact, the document states that "when Congress enacted the patent statutes, it specifically authorised issuing a patent to a person 'who invents or discovers' a new and useful composition of matter, among other things… Thus, an inventor's discovery of a gene can be the basis for a patent on the genetic composition isolated from its natural state…"[23] In the process, the new guidelines suggest that discoveries may also be patentable. This has made it possible

for discoveries (as opposed to inventions) to be patented since even slight alterations of naturally existing materials can be seen as meeting the utility criterion. The problem with discoveries being patented is that, to begin with, there is just a thin line between invention and discovery and, then, in the instance of life forms, the line is even more blurred.

The failure of TRIPS and individual countries to clearly distinguish between invention and discovery has worked to the advantage of MNCs, with the resulting ambiguity leading to the grant of patents to a variety of so-called discoveries. B. Facilitating misappropriation Prior to the TRIPS agreement, there was no uniformity in the patent laws of various member countries; in fact, some countries did not have any patent legislation in place. India's patent regime excluded from patentability discoveries and subject matters relating to agriculture, pharmaceuticals etc, which were considered public goods placed above private rights.[24] Life forms were also excluded from the Indian patent system.

The glaring differences between the TRIPS agreement and the existing patent legislation of countries like India were largely responsible for the friction between developed and developing countries over IPR. Developing countries of the South allege that, by allowing discoveries to be patented, TRIPS has permitted the misappropriation of traditional knowledge, which has resulted in Northern MNCs profiting from the biological resources of the South. In the landmark Chakrabarthy[25]case, in which a patent was granted for the first time over a life form, the US Supreme Court ruled that the creation of an oil-eating microbe is patentable. This precedent triggered a spate of broader patents. For example, a patent has been issued over an animal (eg, the Harvard Onco mouse—so named because the scientists had genetically modified a mouse to be susceptible to cancer, which is useful in cancer research)[26].

Patents have also been granted over plants, like the Mexican Enola bean, basmati rice and extracts from neem. This means that other signatories to the TRIPS agreement may have to provide protection to these patents as the agreement extends patent protection to micro-organisms and non-biological processes. Patent protection over a genetically modified organism would cover patents over plants and animals. For example, a patent granted by the USPTO in 1994 to Agracetus, a biotechnology company, effectively covers all transgenic soya beans. Moreover, species patents such as this one are so broad that they can be effectively used to block competition and further improvement in the same species.[27] Cashing in on indigenous knowledge Multinational companies of the North have obtained information from indigenous people in the South regarding the use of plants with medicinal value, and have then gone on to simply identify the exact chemical components responsible for the medicinal value in their labs and to then acquire patent over them. For example, the US timber importer, Robert Larson, observed the use of the neem as a bio-pesticide in India and began importing neem seeds to his company headquarters in Wisconsin.[28] Over the next decade, he conducted tests on extracts from neem and finally received a patent for extracting azadirachtin (a chemically active substance) from neem, which he later sold to the MNC, WR Grace.[29] The indigenous knowledge developed over centuries, passed on from one generation to another, is recognised by some developed countries like the United States as 'prior art' only if it has been recorded in writing. This has enabled research institutes to obtain information from

indigenous people and patent their knowledge by merely identifying and isolating particular chemicals or giving scientific names to age-old practices.

Moreover, TRIPS does not protect indigenous knowledge, thus enabling MNCs to earn huge profits without paying even a penny to the people who are the sources of the original information. Indigenous and local communities lack the means to obtain intellectual property protection over their innovations. Although the significant amounts of biological resources used and maintained by indigenous people are useful to industry and to the world community, there is no effort to provide protection to this knowledge.[30] Moreover, the North disregards such knowledge as unscientific and, consequently, their laws do not permit the patenting of such knowledge.[31] Patents should not be provided when such knowledge is merely transformed and presented in a scientific manner. For example, Lord Hoffman had said, "It was not necessary for an active substance to be identifiable or reproducible for it to have been made available to the public."[32] He gave the example of Amazonian Indians who had known for centuries that the cinchona bark can be used to treat malarial and other fevers. It was only in 1820 that quinine was isolated and extracted from the bark. According to him, the Amazonian Indians who believed that the effect of cinchona was due to the spirit of the bark could 'know' about quinine even though they did not know the chemical by name, nor its chemical structure. If one were to take a cue from this, it would follow that plant and animal products, including herbal preparations, lack novelty even if there is no prior public knowledge of the presence of a particular active substance that produces the desired results.[33]

Thus it can be said that most indigenous people know about the utility of the biological resources in their region and use them for various purposes. It would be unfair to award patents over products based on such indigenous knowledge without due credit being given to the original holders of such knowledge. It is totally unjust to allow multinational companies to exploit such knowledge in order to reap rich rewards for themselves without enabling any benefit to flow back to the indigenous people who possessed the knowledge in the first place. Developing countries are, therefore, justified in demanding a review of Article 27.3(b) and asking for indigenous knowledge to be protected under the TRIPS agreement. The African Group, in its joint communication to the WTO, has urged that the following modifications be made to the agreement: Inclusion of provisions to prevent bio-piracy as well as to protect traditional knowledge;[34] Recognition of the right of traditional communities or traditional practitioners to decide whether or not to commercialise their knowledge; [35]

Inclusion of a provision mandating prior informed consent from indigenous people for the use of their knowledge and preventing third parties from using, offering for sale, selling, exporting or importing their knowledge without such consent;[36] Inclusion of a provision guaranteeing full remuneration to indigenous communities for their traditional knowledge.[37] The views expressed by Latin American countries and India are more or less on similar lines.[38] 'Prior art' and TRIPS 'Prior art' is one of the means available to ascertain the novelty of a patentable invention. According to this, if the claim asserted in the patent specification already existed in the public domain, whether in written form or oral, then that is taken as prior art and the supposed invention fails to satisfy the novelty criterion. However, some countries do not recognise oral forms of prior art that are

prevalent in territories other than their own. For instance, the medicinal plant called Phillanthus niruri has been well-known and widely used to treat jaundice throughout southern India since time immemorial. However, the US patent office granted a patent to the extract of the plant on the grounds that it serves the utility requirement through its efficacy in treating Hepatitis B.[39]

In the case of neem extractions, many complex processes have been developed over a long period in India to make various products for specific uses, even if the ingredients were not given scientific names. Moreover, common knowledge about and use of neem was one of the primary reasons given by the Indian Central Insecticide Board for not registering neem products under the Insecticide Act, 1968. Dr R P Singh of the Indian Agricultural Research Institute asserts that the patented extract (the patent held by WRGrace for extraction of a stable solution of azadirachtin) is an ethanolic extract of the neem seed kernel, which they had extracted a number of years earlier but had not sought a patent for.[40] Thus, the process described by W R Grace, which leads to stable formulations, was well known in India at the time it was patented in USA. This fact was completely disregarded by the US Patent Act, which recognises the 'prior art' of foreign countries only in a recorded (written) form.

The TRIPS agreement says nothing about prior art, although it does require that patents be granted only to non-obvious inventions. Herein lies the problem. Since there is no uniformity in the patent laws of various countries, this omission has resulted in patents being granted by developed countries, especially the United States, over undocumented knowledge existing in other parts of the world. This anomaly has certainly led to the misappropriation of indigenous knowledge Conclusion The failure of the TRIPS agreement to distinguish between invention and discovery has encouraged developed countries to patent discoveries, and the absence of protection for traditional knowledge has allowed multinational companies to appropriate traditional knowledge, with little or no acknowledgement of the source of such knowledge. The patenting (owning) of life forms is anathema to the values of indigenous people. Multinational companies have capitalised on the situation by patenting such knowledge without much opposition from indigenous people, who have neither objected to the grant of such patents nor made an effort to demonstrate that the products or processes were well-known and widely practiced in their communities – possibly because, in most cases, they are not in a position to keep track of such developments all over the world. Moreover, the failure of the TRIPS agreement to recognise community knowledge as a form of property right has compounded the problem. Indigenous knowledge is not well situated to stake a claim against the modern patent system, mainly because it is hardly ever documented. The non-recognition of such undocumented knowledge as 'prior art' means that the patents granted in recent years prevail over centuries-old traditional indigenous knowledge. Developing countries are, therefore, justified in demanding protection for indigenous knowledge under the agreement in order to prevent further misappropriation of indigenous knowledge.

Endnotes: [1]The term North is used here to refer to industrially developed countries in the global North, which are not as rich in biodiversity as the industrially developing countries of the global South. The terms North and South have been commonly used by

academicians and activists writing on issues relating to TRIPS and indigenous knowledge – eg, Vandana Shiva, the Third World Network, GRAIN, RAFI, etc. 'North' has also been interchangeably used with West, western system, etc. 'North' refers not only to industries and transnational corporations based in the so-called developed countries but also the governments of these countries—eg, The National Institute of Health in the USA has been in joint research with private corporations. [2] 'South' refers to developing countries as well as industrially underdeveloped countries. The TRIPS agreement classifies WTO member countries as developing and least developed countries. While using the same classification here, the term South is also being used to refer to the governments, indigenous communities, NGOs and activists of the countries of the South who have supported the cause of the 'South.' [3]Communication from India (1999), Review of the Provisions of Article 27.3(b), (IP/C/W/161). http://docsonline.wto.org/GEN_ viewerwindow. asp?D:DDFDOCUMENTS/T/IP/ C/W161.D [4]E.g., extractions from the Neem plant [5]Joint Communication from African Group (2003), Taking forward the review of Article 27.3.(b of the TRIPS Agreement, (IP/C/W/404) http://www.ige.ch/E/jurinfo/pdf/IP-C-W-404.pdf, (accessed on 10-08-2003) [6].Cornish, W.R (2001), Intellectual Property, Patents, Copyright, Trade Marks and Allied Rights, First Indian Reprint, Universal Publications, Delhi, pg 177. [7]Demaine,L.J & Fellmeth, A.X. (2002), Reinventing the Double Helix: A Novel and Non-obvious Reconceptualisation of the Biotechnology Patent, 55 Stanford Law Review 303-462, pg 310 [8]ibid , pg 310 [9]ibid, pg 370 [10]ibid, pg 370 [11]General Electric Co. v De Forest Radio Co, cited in Demaine,L.J. & Fellmeth, A.X. (2002), Reinventing the Double Helix: A Novel and Non obvious Reconceptualisation of the Biotechnology patent, 55 Stanford Law Review 303-462, pg 340 [12]Demaine,L.J & Fellmeth, A.X. (2002), Reinventing the Double Helix: A Novel and Non obvious Reconceptualisation of the Biotechnology patent, 55 Stanford Law Review 303-462. [13]ibid [14] ibid , pg 405-406. [15].Demaine, L. J & Fellmeth, A. X, Natural Substances and Patentable Inventions, http://www.science mag.org/ cgi/content/ full/300/ 5624/1375?ijkey=E37.td4LbRZJ.&keytype=… (accessed on 25/08/2003) [16] ibid [17]Hettinger, N (1995), Patenting life: Biotechnology, intellectual property and environmental ethics, Boston College of Environmental Affairs Law Review, 289. [18]Debra Harry (1995) Patenting Of Life and Its Implications For Indigenous Peoples, http://www. rz.uni-frankfurt.de/~ecstein/gen/iatp/ipr-info7.html [19] Funk Brothers Seed Corporation v Kalo Inoculant Co. (333 U.S. 127 (1948).; American Wood Paper Co. V Fiber Disintegrating Co [90 U.S. (23 Wall.) 566 (1874)] cited in Demaine,L.J & Fellmeth, A.X. (2002), Reinventing the Double Helix: A Novel and Non obvious Reconceptualisation of the Biotechnology patent, 55 Stanford Law Review 303-462, pg 409. [20]Demaine,L.J & Fellmeth, A.X. (2002), Reinventing the Double Helix: A Novel and Non obvious Reconceptualisation of the Biotechnology patent, 55 Stanford Law Review 303-462 [21]Demaine,L.J & Fellmeth, A.X.,(2002) Reinventing the Double Helix: A Novel and Nonobvious Reconceptualization of the Biotechnology Patent, Stanford Law Review 303-462 [22]Federal Register/Vol. 66, No.4 , www.uspto.gov/web/offices/com/ sol/notices/utilexmguide.pdf [23] ibid [24] Section 3 of the Indian Patent Act 1970 [25] (1980) 110 S.Ct 2204 [26] [1990] E.P.O.R 501 [27] GRAIN (2000) Of patents and Pirates: Patents on Life: the final assault on the

commons, www.grain.org/publications/pirates-en.cfm, (accessed on 10/8/03). [28] Shiva , V.,(1996) Protecting our Biological and intellectual Heritage in the age of Bio piracy [29] ibid, [30] Brush, S. & Stabinsky, D. (eds) (1996), Valuing Local Knowledge: Indigenous People and Intellectual Property Rights, Island Press, Washington DC [31] Koon, O.C., Intellectual Property Protection of Traditional Medicine and treatments in Malaysia in Micheal, Blackeney, (eds) (1999), Perspectives on Intellectual Property Rights, Intellectual Property and Ethno biology, Vol 6, Sweet and Maxwell, London, pg 162-163. [32] ibid, pg 166 [33] Koon, O.C., Intellectual Property Protection of Traditional Medicine and treatments in Malaysia, see Micheal, Blackeney, (eds) (1999), Perspectives on Intellectual Property Rights, Intellectual Property and Ethno biology,Vol 6, Sweet and Maxwell, London, pg 166 [34] Joint Communication from African Group (2003), Taking forward the review of Article 27.3.(b) of the TRIPS Agreement, (IP/C/W/404) http://www.ige.ch/E/jurinfo/pdf/IP-C-W-404.pdf. [35] Joint Communication from African Group (2003), Taking forward the review of Article 27.3.(b of the TRIPS Agreement, (IP/C/W/404) http://www.ige.ch/E/jurinfo/pdf/IP-C-W-404.pdf. [36] ibid [37] ibid [38] Submission by Bolivia, Brazil, Cuba, Dominican Republic, Ecuador, India, Peru, Thailand Venezuala (2003), The relationship between the TRIPS Agreement and the Convention on Biological Diversity and the Protection of the Traditional Knowledge, (IP/C/W/403). [39]Shiva , V(1996) Protecting our Biological and intellectual Heritage in the age of Bio piracy [40] ibid