

Literature survey on intellectual property rights and sustainable human development

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The broad aim of the TRIPS and Development Capacity Building Project is to improve the understanding of TRIPS-related issues among developing countries and to assist them in building their capacity for ongoing as well as future negotiations on intellectual property rights. Activities undertaken as part of the Project include:

- Production of a Policy Discussion paper to inform and encourage policy discussion on the impact of intellectual property rights on development with particular focus on the TRIPS Agreement.
- A Resource Book aimed mainly at negotiators and policy-makers from developing countries providing a step-by-step elaboration of the issues pertinent to the on-going as well as future negotiations in TRIPS and intellectual property related matters in general.
- A web-based portal to matters concerning IPRs and Development (<http://www.ictsd.org/iprsonline/>)

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NB This literature survey does not claim to be definitive. Readers are encouraged to submit, or suggest, additional literature to the compiler for inclusion in revised versions.

Introduction

Intellectual property rights have never been as much in the news as they are today. Several controversies have arisen. For example, drug companies have been accused of taking advantage of their patent rights by charging exorbitant prices for essential medicines such as AIDS drugs. Indigenous peoples and advocacy groups supporting their rights condemn corporate 'biopirates' for making money out of their knowledge and claiming patent rights for 'inventions' essentially identical to knowledge acquired from tribal healers. Concerns are raised that patenting plants, animals, genes and gene fragments is not only unethical but may also be stifling innovation. Many developing countries complain about the pressure they feel is being imposed on them to introduce western-style IPR regimes before they feel they are ready for them, and worry that this situation places them at a serious disadvantage in an era of rapid technological change. And while the global trend is towards ever stronger intellectual property right protection, increasingly determined efforts are made to buck the trend, as exemplified by Napster and the Open Source and Free Software movements.

During recent decades, the evolution of developed country IPR regimes has been characterized by three phenomena:

- a) *The widening of protectable subject matter.* The parameters of protectable subject matter have been widened, and there has been a tendency to reduce or eliminate exceptions. Examples include the extension of copyright and patent protection to computer programs, the application of patent protection to cover business methods, life-forms, cell lines and DNA sequences, and the removal of exclusions on product patents for drugs.
- b) *The creation of new rights.* Examples of new systems of rights created during the twentieth century include plant breeders' rights, rights to layout-designs of integrated circuits, and rights related to copyright such as performers' rights.
- c) *The progressive standardization of the basic features of IPRs.* For instance, patent regulations increasingly provide 20-year protection terms; require prior art searches and examinations for novelty, inventive step or non-obviousness, and industrial application; assign rights to the first applicant rather than the first inventor¹; and provide protection for inventions in all industries and fields of technology.

These developments in IPR law, all of which began in Europe or North America, are spreading to the rest of the world, and at an accelerating pace. Consequently, national IPR regimes throughout the world are becoming increasingly held to harmonized minimum standards of protection, which, however, remain a long way from uniform law. Prior to the TRIPS Agreement, the main IPR conventions played the biggest role in the world wide adoption of national IPR systems sharing common standards, while still allowing these systems to vary widely.

It should not be assumed, though, that the developments referred to above were introduced gradually over time even in the developed world. In fact, many of the examples given above were introduced into national IPR regimes quite recently. For

example, until the 1960s several West European countries (e.g. France, Belgium and Italy) still granted patents on the basis of registration. Moreover, the bar to patentability of pharmaceutical products in several developed countries was lifted only in the 1960s or 70s. And other important expansions in protectable subject matter are even more recent (e.g. the patenting of animals and DNA sequences, and the sui generis protection of integrated circuit layout-designs). And at the same time, a few developing countries moved in the reverse direction. For example, in the late 1960s and early 1970s Brazil and India passed laws to exclude pharmaceuticals as such from patentability (as well as processes to manufacture them in Brazil's case).

One could argue – as many do – that these trends are necessary responses to technological change. While there is probably much truth in this, there is no reason to suppose that the appropriate response should *always* be to strengthen existing rights, reduce or eliminate exceptions, or to create new ones. Such approaches may indeed be necessary in certain cases where the IPR systems available are inappropriate for new types of creative product or become inadequate for protecting existing types because, for example, new technologies make mass-copying easier. In other cases, weakening rights might be a more appropriate response to some instances of technological change. For example, in some industries there may be a fall in the average life-cycles of new products, and in others, average research and development costs for an industry might decline. And it is possible that overprotection might stifle innovation. More fundamentally – and this will be elaborated upon below – it is far from self-evident that the existence of strong IPR protection is a precondition for the transformation of developing country economies into developed ones.

What are intellectual property rights (IPRs)? IPRs are legal and institutional devices to protect creations of the mind such as inventions, works of art and literature, and designs. They also include marks on products to indicate their difference from similar ones sold by competitors. Over the years, the rather elastic IPR concept has been stretched to include not only patents, copyright, industrial designs and trademarks, but also trade secrets, plant breeders' rights, geographical indications, and rights to layout-designs of integrated circuits. Of these, patents, copyright and trademarks are arguably the most significant in terms of their economic importance, their historical role in the industrialization of Europe and North America, and their current standing as major pillars of the international law of intellectual property rights.

Patents provide inventors with legal rights to prevent others from using, selling or importing their inventions for a fixed period. Applicants for a patent must satisfy a national patent-issuing authority that the invention described in the application is new, useful and that its creation involved an inventive step or would be non-obvious to a skilled practitioner.

Copyright gives authors legal protection for various kinds of literary and artistic work. Copyright law protects authors by granting them exclusive rights to sell copies of their work in whatever tangible form (printed publication, sound recording, film, broadcast, etc.) is being used to convey their creative expressions to the public. Legal protection covers the expression of the ideas contained, not the ideas themselves. The right usually lasts for at least the life of the author.

Trademarks are marketing tools used to support a company's claim that its products or services are authentic or distinctive compared with similar products or services of competitors. They usually consist of a distinctive design, word, or series of words placed on a product label. Normally trademarks can be renewed indefinitely, though in most jurisdictions this is subject to continued use. The trademark owner has the exclusive right to prevent third parties from using identical or similar marks in the sale of identical or similar goods or services where doing so is likely to cause confusion.

Like many other systems of economic regulation, intellectual property rights have a history going back centuries. But the main IPRs like patents and copyright took their modern forms in the nineteenth century at a time when Europe and North America were in the midst of rapid industrialization.

Over the years, patents have been granted for a variety of public policy purposes such as to encourage the immigration of craftsmen, to reward importers of foreign technologies, to reward inventors in general, to create incentives for further inventive activity, to encourage the dissemination of new knowledge, and to allow corporations to recoup their investments in research and development. Each of these justifications is as legitimate as the others. Nonetheless, as with other forms of intellectual property, justice-based arguments for stronger and better-enforced rights are also frequently deployed, and such claims can carry strong moral force. After all, many people would consider it immoral for somebody to copy an inventor's useful new gadget or a writer's new novel and claim it as his or her own.

Patents for inventions have their origins in Renaissance Italy. The Republic of Venice passed a patent law in 1474, whose underlying purpose was to attract foreign engineers with the incentive of a 10-year monopoly right to their 'works and devices'.²

The next significant legislative development in patent law came in 1624 with the English Statute of Monopolies.³ In reality, its true purpose was to prohibit monopolies rather than to promote invention, and in passing the law the government hoped to encourage continental craftsmen to settle in the country. Monopoly grants were declared illegal *except* 'the true and first inventor or inventors' of 'any manner of new manufactures within this realm' as long as 'they be not contrary to the law, nor mischievous to the state, by raising prices of commodities at home, or hurt of trade, or generally inconvenient'. Such inventors could acquire a patent or grant allowing up to 14 years' monopoly protection. Strict novelty was not required since courts interpreted the purpose of granting patents as being to introduce new trades to England whether or not they were 'novel' elsewhere in the world. It should be noted in this context that at this time England was less advanced technologically than both France and the Netherlands. The Statute was amended several times but remained in force until 1977 when Britain adopted the standards of the European Patent Convention including its requirement of absolute (i.e. global) novelty.

Soon after independence, the United States enacted two patent laws. While the first (in 1790) rejected the English practice of awarding patents to importers of foreign inventions, the second (in 1793) forbade aliens from applying for patents. As a net importer of technology, the U.S. saw no reason to allow patent rights to be enjoyed equally by U.S. nationals and foreigners.

But a third law, the 1836 Patent Act⁴, was arguably the first modern patent law. It required all applications to be examined by the government patent office for novelty and usefulness. Although this law did not discriminate between U.S. and foreign inventors with respect to the examination or the extent of rights granted, foreign applicants had to pay much higher fees, especially if they were British. Such discrimination was abolished in 1861 for nationals of countries whose laws were non-discriminatory towards Americans.

The German Patent Act of 1877 was also an examination system.⁵ In common with most countries today, it was possible to except inventions deemed contrary to public order or morality. Patenting of inventions regarding luxuries, medicines, articles of food, or chemical products was prohibited.

Some European countries managed without a patent law for much of the nineteenth century. Switzerland had a patent system only from 1799 to 1802, not re-establishing it until 1888. The Netherlands prohibited patents from 1869 until 1912. Japan's first patent law dates back to 1888, but foreigners were not allowed to file applications until 1899.

As with patents, copyright's origin is Renaissance Italy, although the most famous early copyright law is probably the English Statute of Anne of 1710.⁶ Early copyright law was associated with the interests of domestic printers rather than authors, and to some extent also with censorship. While its intent was both to prevent unauthorized printing, reprinting and publishing of books and writings and to encourage 'learned men to compose and write useful books', the Statute of Anne was primarily the outcome of a campaign by an association of printers (the Company of Stationers) to reassert its control over the English book trade, rather than a law to uphold the rights of authors. Nonetheless, for the first time in a statute, it did recognize that authors could be proprietors of their works. This law provided a time-limited right to print and reprint books whose titles were entered in the register book of the Company of Stationers. According to the economic historian, Paul David (see below), 'copyright law, from the beginning, has been shaped more by the economics of publication than by the economics of authorship'. Nevertheless, copyright law in continental Europe displayed much more concern for the artistic integrity of authors than did the Anglo-American copyright regulations.

As with patent law, it is not until the nineteenth century that copyright law took its modern form. During this century, the protection term increased, the law began to accumulate a wider range of subject-matters, and international agreements began to proliferate with the result that national standards became more harmonized, and opportunities to secure stronger protection of creative works in more countries were greatly enhanced. These trends have continued. With respect to subject-matters, for example, U.K. copyright law had by 1988⁷ been stretched to include literary and dramatic works (including computer programs), musical works, artistic works, sound recordings, films, broadcasts, cable programmes, typographical arrangements, and computer-generated works. And protection was not only economic in nature, but – following continental tradition and the requirements of the Berne Convention for the Protection of Literary and Artistic Works – included authors' moral rights. Moral rights include the right of authors to be identified as such (the 'right of paternity'), and to object

to having their works altered in ways that would prejudice their reputation ('the right of integrity').

Historically, national copyright laws have generally been less friendly towards the interests of foreigners than have patent laws. This is because while granting rights to foreigners was sometimes considered to benefit the country by encouraging the introduction of protected technologies, allowing foreigners to protect their literary and artistic works does not provide such obvious economic advantages.

In spite of such a long history, the extent of recent public interest in intellectual property rights throughout the world is probably unprecedented. Perspectives on IPRs can differ sharply. International debates have become highly polarized and adversarial. It is believed by some that strong IPR protection and enforcement is indispensable in a modern industrial *and* post-industrial economy. Others, if their rhetoric is anything to go by, consider that IPRs are just another device by which the rich make themselves richer and the poor poorer, and are probably unnecessary to foster innovation anyway. Many governments accept the need to ratchet up their IP systems to transform their traditional 'old' industry-based economies into 'new' knowledge-based industrial, and even *post*-industrial, economies. But others see stronger IPRs as an especially pernicious manifestation of globalization. 'Globalization' according to many such critics means – among other unpleasant things – developed countries and their corporations forcing their expensive (and in some accounts inappropriate) products on developing countries and controlling markets, while failing to keep their promises to throw open their borders to developing country exporters.

In spite of the fact that so much has been written on intellectual property rights, there is still tremendous uncertainty about their effects on innovation, creativity and economic development, and therefore how policy makers should go about designing welfare enhancing IPR systems. Indeed, the conclusion of Fritz Machlup's classic 1958 study of the patent system continues to challenge IPR economists today:

No economist, on the basis of present knowledge, could possibly state with certainty that the patent system, as it now operates, confers a net benefit or a net loss upon society. The best he can do is state assumptions and make guesses about the extent to which reality corresponds to these assumptions.

The present state of knowledge has undoubtedly surpassed that of Machlup's time, at least for the developed countries. But for developing countries the situation continues to be extremely unclear. Nonetheless, there is much to be learned from the literature on intellectual property rights, and this guide is aimed to help policy makers and other interested people to take advantage of this literature as effectively as their busy time allows.

The Literature Survey

Guide to the literature survey

The literature on intellectual property rights dates as far back as the era of the classical economist such as Adam Smith and even beyond. Not surprisingly, then, the volume of literature on the subject that has accumulated over the years is immense, and a survey of this kind can only cover a small fraction of what actually exists.

In more recent times, one can notice that interest in the subject of intellectual property rights has spread from the law and economics departments of universities to disciplines which traditionally did not consider IPRs as being of relevance. The intellectual property literature has proliferated and expanded, attracting the interest of researchers in such fields as sociology, anthropology and ethnobiology, international relations and political science, and moral and legal philosophy. In addition, IPRs have become integral to the work of NGOs and international organisations concerned with development and trade. Therefore for a literature survey on IPRs to be at all comprehensive, a very wide net indeed needs to be cast.

The survey focuses on writings published since 1995. However, particularly significant earlier texts are also included. The references are arranged by the following subject areas:

1. General texts
2. Public health
3. Agricultural development, food security and nutrition
4. Education
5. Business and industrial development
6. Biotechnology
7. Information and communication technologies, and media
8. Technology transfer and direct foreign investment
9. Administration and enforcement
10. Trade and competition
11. The TRIPS Agreement
12. Traditional knowledge
13. Music, folklore and entertainment
14. Biodiversity and the environment
15. Human rights

It is not always easy to place works within these categories since many of the writings cover two or more topics. Indeed, many of the best writings are those having a broad scope. Key texts are marked with an asterisk. This does not signify that unmarked texts should be considered as being in some way inferior. Rather, for busy development practitioners and policy-makers who are unfamiliar with the subject of intellectual property rights, the most profitable return on a limited time investment is likely to be gained by focusing on those selected texts. It is worth pointing out that some of the most interesting studies on different aspects of intellectual property may be found in works that are not primarily about IPRs. A good example of this is the Braithwaite and Drahos volume (“General texts”).

Each section starts with an introduction, which provides some background, explains the key issues involved – with analysis where this might be helpful – and briefly reviews some of the most important writings. The observant reader will discover the seemingly arbitrary placement of certain writings that are listed in one section but referred to in another. This is probably unavoidable in a literature survey which stresses informativeness rather than a strict logical orderliness that is hardly attainable or even desirable with complex and multi-faceted topics like intellectual property rights and sustainable development. It will also be noticed that the quantity of references included in each section varies widely. In some cases, this is a reflection of how long the topic in question has been written about and also how technical it is. Thus, the TRIPS section is fairly small, and most of the writings are by legal scholars. However, the controversial nature of some of the newer topics (e.g. traditional knowledge, biotechnology, and the environment) has attracted the attention of an extremely broad range of individuals and organisations, not just in the IPR ‘heartlands’ of Europe and North America, but in the other continents too. The result is a sudden proliferation of literature.

1. General Texts

These general texts are a mixture of textbooks, reference books and other publications that cross so many categories that it would be misleading to place them in any specific one. Almost certainly the finest legal textbook available on intellectual property rights is the Cornish book. It is a useful both as a guide for lay readers and a reference work for IPR specialists. The David article is a superb survey of the changing history of intellectual property rights since the fifteenth century as well as a review of the economic literature on IPRs. In spite of the breadth of coverage and depth of analysis, the article reminds us how little we actually know about the development effects of intellectual property rights, especially at the international level. The volume containing the David article includes several other useful papers and is recommended. The Drahos edited volume is an excellent anthology of journal articles published between 1962 and 1997.

The writings

General

Abbott, F., T. Cottier and F. Gurry (1999) *The International Intellectual Property System: Commentary and Materials*. The Hague, London and Boston, Kluwer Law International.

Voluminous (two volume) resource book set on the international IPR system. It provides an integrated perspective including history, economics and social implications and contains excerpts of articles by other authors, court cases and legal materials.

Boyle, J. (1996) *Shamans, Software and Spleens: Law and the Social Construction of the Information Economy*. Cambridge, Harvard University Press.

Author uses his legal background to construct a social theory of the information society. Central to the analysis is a critique of the notion of authorship upon which Western IPR are founded. This notion is blamed for the restriction of information and stifling of innovation under existing IPR regimes.

* Braithwaite, J. and P. Drahos (2000) *Global Business Regulation*. Cambridge, Cambridge University Press.

Based on interviews with 500 international leaders in business and government, this book examines the role played by global institutions such as the WTO, WHO, OECD, IMF as well as various NGOs and significant interviews, the authors develop a theory of globalisation that draws the links between key mechanisms, actors and principles. The authors cover a range of critical areas of regulation including contract, IPRs, trade and competition, drugs, food and environment.

* Cornish, W. R. (1999) *Intellectual Property: Patents, Copyright, Trade Marks and Allied Rights*. London, Sweet and Maxwell.

Definitive textbook on intellectual property rights. The new edition takes account of new developments in areas such as database protection rights, rights in performances, biotechnological patents, internet copyright, parallel importing and UK and EU trademark law.

* David, P. (1993) "Intellectual property institutions and the panda's thumb: patents, copyrights, and trade secrets in economic theory and history". *Global Dimensions of Intellectual Property Rights in Science and Technology*. M. B. Wallerstein, R. A. Schoen and M. E. Mogue. Washington, DC, National Academy Press: 19-61.

A concise but thoroughly comprehensive overview of the history and economics of patents, copyrights and trade secrets. In conclusion the author argues that proposals to establish a uniform international regime of IPR protection are not practical, even though careful economic analysis would indicate that there may be considerably more points of agreement between the interests of the technologically advanced and the developing countries than has often been supposed.

Drahos, P. (1996) *A Philosophy of Intellectual Property*. Aldershot and Brookfield, Dartmouth.

Are IPRs like other property rights? More and more of the world's knowledge and information is under the control of IPR owners. What are the justifications for this? What are the implications for power and for justice of allowing this property form to range across life? Can we look to traditional property theory to supply the answers or do we need a new approach? The author addresses these questions and argues that what lies at the heart of intellectual property are duty-bearing privileges. We should adopt an instrumentalist approach to intellectual property and reject a proprietarian approach - an approach which emphasises the connection between labour and property rights.

* Drahos, P. (1997) "States and intellectual property: the past, the present and the future". *From Berne to Geneva: Recent Developments in Copyright and Neighbouring Rights*. D. Saunders and B. Sherman. Brisbane, Australian Key Centre for Cultural and Media Policy and Impart Corporation: 47-70. [<http://138.77.20.51/Impart/drahos.htm>]

Following a brief description of the history of the relationship between states on the issue of intellectual property (territorial, the international and the global periods), the author then identifies three types of consequences that flow from the globalisation of intellectual property rights: efficiency, distributive and sovereignty. The subsequent sections develop the onus argument that since the economic benefits of a global intellectual property regime are uncertain at best and there are some clear costs, the onus lies on those who wish to globalise the institutions of intellectual property to provide some evidence as to why this should be done. The author concludes by describing eight strategies for implementing the conclusion of the onus argument.

* Drahos, P. Ed. (1999) *The International Library of Essays in Law and Legal Theory. Second Series: Intellectual Property*. Aldershot, Dartmouth.

Multidisciplinary anthology of articles on intellectual property rights. The articles are arranged into six sections as follows: economics of intellectual property; the psychology of appropriation; intellectual property and liberalism; the international politics of intellectual property; intellectual property scepticism; and against intellectual property scepticism.

Dreyfuss, R., D. L. Zimmerman and H. First, Eds. (2001) *Expanding the Boundaries of Intellectual Property: Innovation Policy for the Knowledge Society*. Oxford, Oxford University Press.

This book focuses on the question of how much control innovators should be given over their works. It is an issue of increasing importance in the new knowledge-based economy. One view is that broad and powerful rights give the creators the ability to trade information and push the frontiers of knowledge forward faster; the opposing view is that increased power over information will freeze development and chill intellectual interchange. The volume consists of five sections: expanding the public domain; the growth of private ordering regimes; the claims of the public domain; implementing innovation policy for the information age; and views from the bench.

Gerhart, P. M. (2000) "Why lawmaking for global intellectual property is unbalanced". *European Intellectual Property Review* 22(7):309-313.

The author argues that the machinery of law-making in international intellectual property is not designed to give us a global system that comes anywhere near a socially optimum system. He suggests that corporate consumers (such as health insurance companies that pay for patented drugs) should form coalitions to shape intellectual property policy so as to ensure a more balanced system.

Kinsella, N. S. (1998) "Editorial: is intellectual property illegitimate?" *Patent Bar Association Intellectual Property Law Newsletter* 1(2): 3.

Patent lawyers take for granted the legitimacy of having a patent system, and intellectual property lawyers in general would probably be surprised to know that the legitimacy of IPR laws historically has been, and continues to be, the subject of some controversy, at least in theoretical or academic circles. The author reviews some of the historical and contemporary justifications for and criticisms of IPRs and argues that IPR lawyers should be prepared to question and reflect on these widely-held justifications.

May, C. (2000) *A Global Economy of Intellectual Property Rights: The New Enclosures*. London, Routledge.

This book considers the political construction of intellectual property at the international level, and how it is linked to the economics of knowledge and information in the contemporary global political economy. It examines disputes about the ownership of knowledge resources - as in the cases of GM foods, the music industry and the Internet - and the problematic nature of the TRIPS Agreement. The author argues that solutions exist in the form of political moves to establish the social availability of information, and in reattaching property to the innovating individual. At present the balance in international IPRs between public good and private reward is more often than not weighted towards the latter.

Maskus, K. E. (2000) *Intellectual Property Rights in the Global Economy*. Washington DC, Institute for International Economics.

This book provides a comprehensive economic assessment of the effects of stronger IPRs

through the TRIPS Agreement. The author presents findings on the potential effects of stronger global IPRs, including likely impacts on foreign direct investment, technology transfer, and pricing under enhanced market power.

Moore, A. D., Ed. (1997) *Intellectual Property: Moral, Legal, and International Dilemmas*. Lanham and Oxford, Rowman and Littlefield Publishers.

Anthology dealing with the ethical, philosophical, legal, and practical issues surrounding the ownership of intellectual property.

Roffe, P. (2000) "The political economy of intellectual property rights – an historical perspective". *Governance, Development and Globalization: A Tribute to Lawrence Tshuma* J. Faundez, M. E. Footer and J. J. Norton (eds.). London, Blackstone Press: 397-413.

This paper deals with the expansion of the intellectual property system and with its controversial evolution going back to Renaissance Italy. The authors focuses on such periods as the 1970s when there was a reformist movement that resulted in the weakening of IPR standards in many countries, and the TRIPS era, which began in the early 1990s, and pushed IPR standards in the opposite direction.

Samuelson, P. (1999) "Challenges for the World Intellectual Property Organization and the Trade-related Aspects of Intellectual Property Rights Council in regulating intellectual property rights in the information age." *European Intellectual Property Review* 21(11): 578-591.

WIPO and the TRIPS Council face considerable challenges. To surmount them, they must pay more attention to economic thinking, attain greater information about technologies, become receptive to new intellectual property paradigms, and recognise that intellectual property is a component of intellectual capital, not an end in itself.

Steidlmeier, P. (1993) "The moral legitimacy of intellectual property claims: American business and developing country perspectives". *Journal of Business Ethics* 12:157-164.

Private property forms a bedrock of the business/society relationship in a market economy. In one way or another most societies limit what people can claim as property as well as the extent of the claims they can make regarding it. In the international arena today IPRs are a focal point of debate. Many developing countries do not recognise the monopoly claims of patents and copyrights asserted by business as legitimate. This paper reviews contemporary areas of dispute and then presents and tasks facing the construction of a fair IPR regime.

Vaver, D. (1991) "Some agnostic observations on intellectual property." *Intellectual Property Journal* 6: 125-153.

The oft-made claim that intellectual property laws are socially and economically necessary to encourage individual creativity and innovation appears, on examination, to be long on assertion and short on proof. This article looks at the history and operation of the copyright and patent laws, noting their paradoxes, inconsistencies and shortcomings. It seeks to refocus inquiry about these laws, rejecting conclusory analyses based on the

character of these laws as a form of property.

Vaver, D. (2000) "Intellectual property: the state of the art". *Law Quarterly Review* October: 621-637.

This paper is a critical discussion on the state of the art in intellectual property – what the law of IP looks like today, and what some of its current difficulties are. It finds that IP has become ever more important in everyday business life, that the subject matter of IPRs has increased enormously, and that IPRs have become more intense and all encompassing. The authors argues that the recent expansion of IP has come to be more an end in itself than a means to the end of stimulating desirable innovation.

* Wallerstein, M. B., M. E. Mogee and R. A. Schoen, Eds. (1993) *Global Dimensions of Intellectual Property Rights in Science and Technology*. Washington DC, National Research Council.

A collection of papers which provide a multidisciplinary look at IPRs in an age of rapid growth in science and technology. The book offers an update on current international IPR negotiations and includes case studies on software, computer chips, optoelectronics, and biotechnology. The book also covers modern economic theory as a basis for approaching international IPRs; US intellectual property practices versus those in Japan, India, the European Community, and the developing and newly industrialising countries; trends in science and technology and how they affect IPRs; and the pros and cons of a uniform international IPR regime versus a system reflecting national differences.

Weil, V. and J. W. Snapper, Eds. (1989) *Owning Scientific and Technical Information: Value and Ethical Issues*. New Brunswick and London, Rutgers University Press.

Collection of 15 essays many of which are by eminent IPR scholars that survey the current IPR system in the United States. They describe several important historical precedents, explore ongoing controversies in computer science and biotechnology, and offer critiques of leading moral and legal theories about the ownership of knowledge.

* The World Bank (1999) *World Development Report - Knowledge for Development*. New York, Oxford University Press.

The report focuses on knowledge in the context of economic, social and cultural development. Chapter 2 ("Acquiring Knowledge") argues that developing countries need not only to tap the global stock of knowledge but also to attract direct foreign investment and fund R&D aimed at adapting foreign technologies to local conditions. The chapter considers the pros and cons of strong IPR systems in pursuit of such aims.

World Intellectual Property Organization (1998) *Intellectual Property Reading Material*. Geneva, WIPO.

Guide to IPRs arranged according to seven chapters: Introduction; Fields of intellectual property protection; The role of intellectual property in development and WIPO's development cooperation programme; Enforcement of IPRs; International

treaties and conventions on intellectual property; Administration and teaching of intellectual property; and Technological and legal developments in intellectual property.

Copyright

Vaver, D. (1996) "Rejuvenating copyright". *Canadian Bar Review* 75: 69-80.

The law of copyright has become a potent and wide-ranging instrument. This paper argues for a fundamental reassessment of domestic and international law. The protectionists' cry of 'to each cow its calf' has produced an incoherent system many ordinary people find unacceptable. Questions such as what specific activities deserve encouragement, what stimulus should be offered, and who should benefit and in what proportions need to be asked and answered.

Woodmansee, M. and P. Jaszi, Eds. (1994) *The Construction of Authorship: Textual Appropriation in Law and Literature*. Durham and London, Duke University Press.

An interdisciplinary collection of essays that address questions of collective and collaborative authorship. Other topics include moral theory and authorship; copyright and the balance between competing interests of authors and the public; problems of international copyright; and musical sampling and its impact on fair use doctrine.

Yen, A. C. (1992) "The interdisciplinary future of copyright theory". *Cardozo Arts and Entertainment Law Journal* 10(2): 423-437.

There are two conflicting copyright theories. The first is the view that copyright exists to provide economic incentives for the production of creative work; so there is a compromise between authors and consumers. The second is the natural law theory, which postulates a moral right for creative people to benefit from the fruits of their labour. The U.S. Supreme Court tends to support the economic argument alone. Analysts also generally explain concepts like originality and the idea-expression dichotomy in economic terms. The author is opposed to this view, arguing that considerations of justice and fairness are essential to a complete copyright theory.

Patents

Doern, G. B. (1999) *Global Change and Intellectual Property Agencies*. London and New York, Pinter.

This book examines changes in, and relationships among, four national and international intellectual property agencies: the patent offices of the USA, UK, Canada and Australia; the European Patent Office; and the World Intellectual Property Organization. The author traces institutional changes that have affected the core trade-off in IPR policy. These are examined in relation to two broad clusters of interests concerned with protection versus dissemination: the former dominated by big business and the IPR professions and the latter by much more dispersed interests.

Ganguli, P. (2001) *Intellectual Property Rights: Unleashing the Knowledge Economy*. New Delhi, Tata McGraw Hill.

The book, written by an Indian business IPR consultant, provides a detailed and practical exposition of patent law including the practicalities of using patent systems.

Machlup, F. (1958) *An Economic Review of the Patent System: Study of the Subcommittee on Patents, Trademarks and Copyrights of the Committee on the Judiciary, United States Eighty-fifth Congress, Second Senate*. Washington DC, United States Senate.

Classic economic study on the patent system. The oft-cited conclusion continues to challenge IPR economists today: “no economist, on the basis of present knowledge, could possibly state with certainty that the patent system, as it now operates, confers a net benefit or a net loss upon society. The best he can do is state assumptions and make guesses about the extent to which reality corresponds to these assumptions”.

Macdonald, S. (2001) “Exploring the Hidden Costs of Patents”. Quaker United Nations Office. Occasional Paper 4. [<http://hostings.diplomacy.edu/quaker/new/doc/OP4.pdf>]

This focuses on the costs rather than on the benefits of patents. The author argues that the greatest cost of all seems to be borne by society as a whole in terms of damage done to innovation, which he considers curious given that the fundamental purpose of the patent system is to encourage innovation for the benefit of society as a whole.

Merges, R. P. (1996) *Patent Law and Policy: Cases and Materials*. Charlottesville, Va, Michie.

Fully comprehensive and voluminous (1,300 page) guide to patent law with emphasis on United States law. The book includes summaries and transcripts of important cases such as *Diamond v Chakrabarty*. The book analyses the basic concepts of patent law such as novelty, utility and enablement, and benefits from being a multidisciplinary work taking in history and economics as well as law.

2. Public Health

Patents are extremely important for pharmaceutical companies. Monopoly protection of a commercially successful drug can provide huge returns that more than make up for the required investment in discovery and development. Several surveys indicate that pharmaceuticals is one of the few industrial sectors in which patents are effective means to capture returns from R&D.

But in the last few years, earlier controversies about the relationship between patents and the prices of essential drugs and their availability have been revived, both in developing and developed countries, and these have become especially heated. In particular, a number of governments and health and development non-governmental organizations (NGOs) have condemned pharmaceutical companies for taking advantage of their patent monopolies in two ways. First, by charging high prices for treatments for diseases that heavily affect poor people that are unable to afford them. Second, by putting pressure on developing country governments to prevent the local manufacture or importation of cheaper copied versions of the drugs produced in countries where either they cannot be patented or where the patents are not respected.

Many of these issues have been brought to the fore by the current HIV/AIDS pandemic. This is now one of the most serious public health crises afflicting developing countries, especially in Africa. Kenyan adults aged 15-49 and 78,000 children, for example, are believed to be infected by the virus. All of these people are destined to die in the next few years unless they can be treated with anti-retroviral drugs. Yet very few of those affected receive these treatments. For example, as the Oxfam report explains, only two per cent of affected Kenyans has such access.

High prices for AIDS drugs are not the only factor limiting patients' access to them. Poor people often live far away from clinics and hospitals. Also, many countries are short of medical practitioners trained to prescribe anti-AIDS drugs to patients in the appropriate combinations and dosages. Nonetheless, high prices obviously have a profound impact on the ability of poor people to acquire them. And, at least in principle, patent monopolies can place the companies holding them in a strong position to set prices at high levels.

One widely-suggested solution is either for a local firm to be allowed to copy the patent 'recipe', or for the government to import cheaper copied drugs. Such competition would lead to price reductions. But the research-based pharmaceutical corporations oppose this on the grounds that it conflicts with the TRIPS Agreement, and is unfair since it enables generic companies to 'free-ride' on their expensive research and development. The corporations are also concerned that if such copying is allowed, these counterfeit drugs will be exported to developed country markets where corporations make most of their profits. And they point out that 95 per cent of drugs on the World Health Organization essential drugs list can be legally copied either because the patents have expired or because they had never been patented. Critics counter that the welfare implications of having 5 percent of these drugs on-patent is still extremely serious, and that the WHO's list does not include every drug that could reasonably be classed as 'essential' anyway.

Admittedly TRIPS provides a safeguard in that use of a patent's subject matter without the patent holder's authorization in exchange for royalties (often referred to as compulsory licensing) is permitted even without prior negotiation 'in the case of a national emergency or other circumstances of extreme urgency or in cases of public non-commercial use'. And TRIPS also specifies that this must be 'predominantly for the supply of the domestic market'.

However, compulsory licensing in general is not necessarily a panacea. It may take a long time to conclude negotiations between the patent owner and the licensee, the patent specification may not provide sufficient information to copy the drug, many countries may lack chemists who can do the copying, and licensees may not necessarily be able to profitably sell the drug at a much lower price than that of the patent-holding firm. Moreover, the corporations generally dislike such measures.

As an alternative some have offered voluntarily to sell their drugs at heavily reduced prices in some markets. According to critics, though, while this is a positive development, many such revised price offers are still no lower than they would be if copying were permitted. Some corporations, though, have gone further by donating drugs.

While relaxing the international patent rules that restrict the manufacture and sale of generic versions of patented drugs is one possible way of increasing their availability, other options exist to widen access to treatments for diseases that affect the poor. These include not only the price cuts and donations some companies are already offering, but also tax incentives to encourage research on diseases that most seriously affect poor people, and a global fund to pay for such research, or to purchase essential drugs and supply them for free or at heavily-discounted prices.

While this is an issue that arouses strong emotions, governments, corporations, United Nations agencies and NGOs appear, at least in their public statements, to be committed to finding mutually-agreeable solutions. One possible solution is to set prices for drugs in developing countries that are more sensitive to widely varying abilities to pay for them. At the same time, however, pharmaceutical companies have made clear that they will not be willing to give up certain privileges without a fight. And they continue to warn that anything that significantly undermines the current global patent regime risks reducing commercial investment in drugs research on diseases affecting the poor to levels even lower than they are at present.

Apart from this controversy, it is important to be aware that pharmaceutical companies often use patents and also trademarks in attempts to restrict competition in some cases beyond the 20-year patent duration. 'Evergreening' refers to the use of IPRs in order to extend the monopoly or at least the market dominance of a drug beyond the life of the original patent protecting it. For example, firms might seek to obtain patents on new delivery methods for the drug, on reduced dosage regimens, or on new versions of the active compound or combinations that are more effective or that produce fewer side-effects than the original substance. Another possibility for those drugs that are metabolized by the body and thereby transformed into another substance that directly causes the therapeutic effect, is to patent also this latter chemical. It is true that companies other than the owner of the patent protecting the original substance may also

seek to acquire such patents. But in many cases these firms will prefer to license their patents to the first company, since the latter already enjoys the monopoly position and is therefore better placed to make commercial use of them.

Companies also use trademark law to extend their market power beyond the patented drug's expiry date. Patented drugs are usually marketed under their brand name rather than the generic name. Since generic producers cannot use this name, it is often very difficult for them to promote their alternative product effectively. Therefore, physicians may continue to prescribe the branded product even if it is more expensive than the generic version. In fact, in many countries physicians may not even know that alternatives exist.

It is important in this context to point out that the global market for pharmaceuticals is increasingly competitive. The quantity of new chemical entities has declined in recent years and many of the drugs entering the market are similar to existing ones in terms of their chemical structures and therapeutic effects. These are often referred to as 'me-too drugs'. There has been a marked trend towards consolidation in the industry driven by a large number of patent expiries relating to very profitable drugs coupled with the lack of new drugs coming on the market to replace them. Clearly, evergreening has its limits as a business strategy.

Finally, it should be understood that even without patents it would still be difficult for many poor people to acquire cures for the illnesses that disproportionately afflict them. 80 percent of the population of the developing world cannot afford to buy pharmaceuticals. Even in India, where pharmaceutical products cannot be patented (and will not have to until 2005), and with a large generic drug sector that has a lot of expertise in medicinal chemistry, the figure is only 10 percent lower than the developing country average. With respect to diseases that still do not have effective remedies (or for which the existing remedies are losing their effectiveness), the problem is that only 4.3 percent of pharmaceutical R&D expenditure is targeted at the health problems that mainly concern low and middle income countries.⁸ Most companies consider it unfeasible to spend large sums on developing remedies for poor people. In consequence many people in developing countries continue to rely mainly or exclusively on traditional remedies such as herbal formulations.

Lanjouw's paper on India is extremely well researched and goes a long way towards resolving the debate, at least in the specific Indian context. Watal (both papers) also analyses the India situation and looks at specific provisions in TRIPS which could be utilised to address such concerns.

The 'tragedy of the anticommons' situation presented by Heller and Eisenberg uses health biotechnology as a case study. The tragic result of this 'tragedy' may be fewer products for improving human health. This is a somewhat theoretical paper which is supported by anecdotal evidence, suggesting that rapid expansion in the range of patentable subject matter may be unwise and – in this context – have possibly serious health-related implications.

The papers by Abbott, Gollin and Watal all seek to identify solutions from within the IPR regime.

The writings

* Abbott, F. M. (2001) “The TRIPS Agreement, Access to Medicines, and the Doha Ministerial Conference”. Quaker United Nations Office. Occasional Paper 7. [<http://hostings.diplomacy.edu/quaker/new/doc/OP7%20Abbott1.pdf>]

This report analyses issues presented by the TRIPS Agreement and its present and prospective impact on access to medicines. It has two ultimate objectives. The first is to assist WTO Members in formulating recommendations regarding a possible Doha Ministerial Declaration on TRIPS and Public Health, or a near-term formal interpretation of TRIPS. The second is to raise issues that might more appropriately be the subject of a longer-term review of TRIPS.

Correa, C. M. (2001) “Some Assumptions on Patent Law and Pharmaceutical R&D”. Quaker United Nations Office. Occasional Paper 6. [<http://hostings.diplomacy.edu/quaker/new/doc/OP6.pdf>]

This paper argues that taking into account the important intervention of the public sector in pharmaceutical R&D, of the scope and objectives of a great part of private R&D, and of the nature of the measures that countries can adopt to improve current access to medicines, there are few grounds to conclude that the use of such legitimate measures as compulsory licensing by developing countries threaten in any significant way future R&D. Limitations on the use of such measures, which can save the life or improve the health conditions of a large part of the world population, cannot be reasonably justified on the risks posed to future R&D.

Dumoulin, J. (1998) “Pharmaceuticals: the role of biotechnology and patents”. *Biotechnology and Development Monitor* 35: 13-15. [<http://www.pscw.uva.nl/monitor/3505.htm>]

The world market for pharmaceuticals shows a clear division: products are developed for industrialised countries promising high profits whereas developing countries are still in need of basic health care. While advancements in biotechnology have a drastic impact on drug development in general, changes in IPR protection will especially influence the health care policies of developing countries.

Gollin, M. A. (2001) “Generic Drugs, Compulsory Licensing and Other Intellectual Property: Tools for Improving Access to Medicine”. Quaker United Nations Office. Occasional Paper 3. [<http://hostings.diplomacy.edu/quaker/new/doc/OP3%20.pdf>]

This paper suggests how IPR laws and practices can help improve access to medicine for people in developing countries. The intent is to provide a pragmatic context and concrete steps for achieving this goal. Three requirements for success become apparent from this analysis, all supporting negotiated approaches. First, improved access requires input from IPR professionals who can determine the extent to which IPRs pose a legal obstacle to obtaining access to particular drugs on a case-by-case basis. Second, developing

countries need to make available national-level IPR tools such as compulsory licensing to help provide leverage in negotiations. Finally, to actually make any particular medicine available in a given country, the drug must be supplied by a manufacturer, who should ideally be a domestic firm.

- * Heller, M. A. and R. S. Eisenburg (1998) “Can patents deter innovation? the anticommons in biomedical research.” *Science* 280 (1 May): 698-701.
[<http://www.sciencemag.org/cgi/content/full/280/5364/698>]

The ‘tragedy of the commons’ metaphor helps explain why people overuse shared resources. However, the recent proliferation of IPRs in biomedical research suggests a different tragedy, an ‘anticommons’ in which people underuse scarce resources because too many owners can block each other. Privatisation of biomedical research must be more carefully deployed to sustain both upstream research and downstream product development. Otherwise, more IPRs may lead paradoxically to fewer useful products for improving human health.

- * Lanjouw, J. O. (1998) “The Introduction of Pharmaceutical Product Patents in India: Heartless Exploitation of the Poor and Suffering”. Cambridge, MA, National Bureau of Economic Research. NBER Working Paper No. 6366.
[<http://www.oiprc.ox.ac.uk/EJWP0799.pdf>]

The report shows that it is too soon to draw any strong conclusions on the effects of India’s upcoming introduction of product patents for pharmaceuticals. In answer to the question posed in the title, the answer is probably “no”, if nothing else because the “poor” in India are too poor to consume pharmaceuticals. Moreover, of the drugs currently on the market, just under 10% are on-patent in Europe. Extrapolating this percentage into the future suggests that even if product patents result in significantly higher prices, much of the pharmaceutical market will not be affected. Considering only the part of the market that will be affected by the new regime suggests that the low incomes of India’s consumers and the lack of medical insurance will not ensure low prices, even with price controls. As to whether product patents will contribute to more R&D being done in India, given the centralised nature of R&D and fact that costs are not the primary concern there appears to be no compelling reason for them to locate in India even after product patents are available. Although stronger IPRs may make the Indian environment more appealing to MNCs as a location for R&D, it is unlikely that product patents will make a dramatic difference to their choices. There is more reason to think that the upcoming introduction of product patents will make a difference to the amount and type of R&D being done by Indian firms.

- Lanjouw, J. O. and I. M. Cockburn (2001) “New pills for poor people? Empirical evidence after GATT”. *World Development* 29(2): 265-289.

The protection of pharmaceutical innovations is being dramatically extended as much of the developing world introduces patent protection for new drug products. This change in IPRs may lead to more research on drugs to address developing country needs. The authors use new survey data from India, the results of interviews, and measures of R&D constructed from a variety of sources to determine trends in the allocation of research to products specific to developing country markets. There is some, although limited, evidence of an increase in the mid- to late 1980s which appears to be levelled off in the 1990s.

Oxfam (2001) *Patent Injustice: How World Trade Rules Threaten the Health of the Poor*. Oxford, Oxfam.

[<http://www.oxfam.org.uk/cutthecost/patent.pdf>]

Critique of the TRIPS Agreement and the practices of the transnational drug companies in maintaining high prices for essential drugs and for failing to conduct R&D relating to diseases that mainly affect the poor. The report provides a set of recommendations for reforming world trade rules on pharmaceuticals.

Watal, J. (2000) "Access to essential medicines in developing countries: does the WTO TRIPS Agreement hinder it?" Science, Technology and Development Discussion Paper No. 8. Cambridge, Center for International Development and Belfer Center for Science and International Affairs, Harvard University.

[www2.cid.harvard.edu/cidbiotech/dp/discussion8.pdf]

TRIPS could, in certain cases, lead to higher prices for patented medicines, including for important diseases such as HIV/AIDS. However, policy instruments available under TRIPS, such as compulsory licenses or government use, parallel imports and price controls, if designed with care, could attenuate such adverse effects on the affordable access to medicines considered essential.

Watal, J. (2000) "Pharmaceutical patents, prices and welfare losses: policy options for India under the WTO TRIPS Agreement." *The World Economy* 23: 733-752.

The objective of the paper is to simulate the maximum likely increase in pharmaceutical prices and decrease in welfare in India with the instantaneous introduction of product patents in the existing 22 patentable pharmaceutical markets. The author predicts that prices are likely to increase and welfare is likely to decrease in moving from current market structure to patent monopoly. But the extent of simulated price increase over the patented pharmaceutical segment differs widely depending upon the assumption made on demand functions.

3. Agricultural Development, Food Security and Nutrition

One of the biggest issues raised by current debates on IPRs – particularly in the context of their impact on developing countries – is the consequences that legislation protecting such rights may have for food security. The term ‘food security’ here applies to more than just ensuring that an adequate amount of food is cultivated or available through the market. It also embraces the question of whether people can afford to buy enough food to satisfy their basic nutritional requirements. If not – as is frequently the case throughout the developing world – one can argue that food security is missing.

What is the connection with IPRs? In the developed world, plant breeders have generally sought IPR protection for new plants – including new foodstuffs – through the system known as plant breeders’ rights (PBRs). The point at issue is whether the international acceptance of common standards of PBRs through the International Convention for the Protection of New Varieties of Plants, commonly known as the UPOV Convention⁹, initially developed to meet the conditions in the advanced industrialised countries, may have the effect of undermining the food security of communities in developing countries. Some NGOs argue that they may do this, firstly by encouraging the cultivation of a narrow range of genetically-uniform crops including non-food cash crops, with the possible consequences that people’s diets will become nutritionally poorer and crops will be more vulnerable to outbreaks of devastating diseases; and secondly, by limiting the freedom of farmers to acquire seeds they wish to plant without payment to breeders, and thereby impoverishing them further.

Before going further, it is necessary to explain about the UPOV Convention, which is administered by an intergovernmental organization closely linked to WIPO, the International Union for the Protection of New Varieties of Plants (UPOV).

To be eligible for protection, the plant variety must be novel, distinct, stable, and uniform (in UPOV 1991) or homogeneous (in UPOV 1978). To be novel, the variety must not have been offered for sale or marketed, with the agreement of the breeder or his successor in title, in the source country, or for longer than a limited number of years in any other country. To be distinct, the variety must be distinguishable by one or more characteristics from any other variety whose existence is a matter of common knowledge. To be considered as stable, the variety must remain true to its description after repeated reproduction or propagation.

UPOV 1978 defines the scope of protection as the breeder’s right to authorize the following acts: ‘the production for purposes of commercial marketing; the offering for sale; and the marketing of the reproductive or vegetative propagating material, as such, of the variety’. There is no reference in the 1978 version to the right of farmers to re-sow seed harvested from protected varieties for their own use (often referred to as ‘farmers’ privilege’). The Convention establishes *minimum* standards such that the breeder’s prior authorization is required for *at least* the three acts mentioned above. Thus, countries that are members of the 1978 Convention are free to eliminate farmers’ privilege. Even so, most of them uphold it by default if not explicitly.

UPOV 1991 extends protection from at least 15 years to a minimum of 20 years and

from the propagating part of the variety (the seed) to the whole plant. The later version is silent on the matter of double (i.e. both patent and PBR) protection whereas the earlier version stated that ‘member states may not protect varieties by both patent and special rights’. Even so, many countries expressly forbid the patenting of plant varieties, including most European countries.

The right of breeders both to use protected varieties as an initial source of variation for the creation of new varieties and to market these varieties without authorization from the original breeder (the ‘breeders’ exemption’) is upheld in both versions. One difference is that the 1991 version states that if a new variety is deemed to be *essentially derived* from a protected variety, the owner of the protected variety enjoys the same rights over the essentially derived variety as if the two varieties are identical.

With respect to farmers’ privilege, the 1991 version is more specific. Whereas the scope of the breeder’s right includes production or reproduction and conditioning for the purpose of propagation, governments can use their discretion in deciding whether to uphold the farmers’ privilege. According to Article 15 the breeder’s right in relation to a variety may be restricted ‘in order to permit farmers to use for propagating purposes, on their own holdings, the product of the harvest which they have obtained by planting ... the protected variety...’.

PBRs are justified on the basis that they encourage investment in plant breeding, the argument being that without legal protection there would be little incentive to breed new open-pollinated varieties (OPVs) of plants, especially crops such as wheat and rice that usually self-pollinate, and therefore remain genetically homogeneous through several generations. This is because breeders cannot otherwise legally prevent farmers and rival companies from selling second generation seed.

There is little dispute that in Europe and North America, the introduction of PBRs has led to increased private investment in plant breeding, and to the production of more varieties of food crops. In practice, however, breeders have shown the greatest interest in crops (such as maize) that are relatively easy to hybridize, rather than in OPVs that can be protected by PBRs. This is because, although the first generation of hybrid seed is extremely productive, such ‘hybrid vigour’ does not extend to harvested seed. As a result, farmers need to buy fresh seed for each planting season.

One consequence of TRIPS is that WTO member countries – including developing countries – must provide IPR protection for plant varieties, either in the form of patents, or through a ‘sui generis’ (i.e. of its own kind) system. In principle, the sui generis provision allows countries to develop their own system for protecting plants. In practice, the UPOV Convention is likely to be the most widely used model, as it is the only plant variety protection system that exists in international IPR law.

But concern has been raised that the UPOV system was drawn up mainly by European countries, and is designed to accommodate the specific characteristics of the capital-intensive large-scale commercial agricultural systems that generally prevail in that continent. As a result, it is often argued (for example in the Gaia Foundation’s GRAIN report), that the system is unsuitable for most developing countries. Among such critics, the current system of IPR protection for plants has raised concerns over its impact on

food security in three areas.

(a) *UPOV and research priorities.* The first of these is that PBRs generally do not encourage breeding related to minor crops with small markets. This is because the returns on their research investment will be quite small. Rather, they encourage breeding targeted at major crops with significant commercial potential. Moreover, protected varieties of plants may not even be food crops. In Kenya, for example, about half the protected new varieties are foreign-bred roses cultivated for export.

In fact, many resource-poor farmers cultivate minor food crops that enable them to meet the nutritional needs of rural communities much better than if major crops such as wheat, rice and maize alone are cultivated. In the hills and valleys of Nepal, for example, villages may grow more than 150 crop species and plant varieties.¹⁰

It is possible, then, that PBRs may become responsible for a trend whereby traditional diverse agro-ecosystems, containing a wide range of traditional crop varieties, are replaced with monocultures of single agrochemical-dependent varieties, with the result that the range of nutritious foods available in local markets becomes narrower. Admittedly this trend is a global phenomenon whose beginning predates the introduction of PBRs. Nevertheless it is one that the existence and increasingly widespread use of PBRs has indirectly encouraged.

(b) *UPOV, genetic uniformity and vulnerability to crop disease.* The second issue concerning food security is the danger introduced by the fact that the UPOV PBR rules require individual plant varieties to be genetically uniform. The mass-cultivation of uniform varieties based on a narrow range of breeding material can result in outbreaks of devastating diseases. This happened with the potato crop in Ireland in the 1840s, and the United States in the 1960s and 1970s with wheat and maize respectively.

Again, it is often pointed out that many such disease outbreaks predated the introduction of PBRs to the affected countries. Despite this, critics argue that PBRs encourage the genetic uniformity that can potentially increase the dangers of such outbreaks occurring.

(c) *UPOV and the interests of poor farmers.* The third issue is that in most developing countries, a large proportion of the population depends on agriculture for employment and income. Many of these farmers are small-holders for whom seed saving, across-the-fence exchange and replanting are common practices. This is especially in countries – such as many of those in Africa – where neither the public or private sectors play a significant role in producing or distributing seed. Although the UPOV system allows on-farm replanting, its rules restrict farmers' freedom to buy seed from sources other than the original breeders.

Seed companies argue in response that farmers do not have to purchase PBR-protected seed just because it is available. They point out that the farmers are free to continue cultivating non PBR-protected seed – including traditional local varieties – if they so wish. Therefore their basic freedoms are unaffected by PBRs.

Wherever the truth lies, the 'sui generis' clause in TRIPS does give governments a certain amount of freedom to tailor their PBR systems to address such concerns. Thus

while, as we saw earlier, an increasing number of developing countries are joining UPOV, some countries are devising alternative PBR systems that aim in part to strengthen food security. They do this, for example, by allowing farmers to acquire PBR-protected seed from any source and requiring protected varieties to display qualities that are genuinely superior to existing varieties.

It is noteworthy that the debate has broadened in the past few years to the extent that non-governmental development agencies (e.g. ActionAid and CIDSE) have added their critical voices to those of advocacy groups that have focused more specifically – and for much longer – on this area, such as Rural Advancement Foundation International (now called ETC Group) and Genetic Resources Action International.

The three Crucible Group books are perhaps the most useful starting point since they are very concise and lay out the issues, various arguments and policy options in a balanced manner giving the readers the opportunity to make up their own minds. The Herdt article is extremely useful, presenting the views of a scientist working at the Rockefeller Foundation, a public institution closely associated with the Green Revolution and still a major agricultural research donor.

The writings

Barton, J. H. (1998) “Acquiring protection for improved germplasm and inbred lines”. *Intellectual Property Rights in Agricultural Biotechnology*. F. H. Erbisich and K. M. Mareid (eds.). Wallingford and London, CAB International: 19-30.

This chapter explores the IPR issues involved in traditional breeding and in moving from natural material to the improved lines that are marketed themselves or used as parents of a hybrid. The chapter begins with a review of access to unimproved germplasm and the implications of the Convention on Biological Diversity. It then considers relevant forms of IPR protection as applied in the USA. These include the plant variety protection system, the regular patent system and trade secrecy. The chapter concludes with a description of enforcement.

Barton, J. H. and W. E. Siebeck (1992) “Intellectual Property Issues for the International Agricultural Research Centres: What are the Options?” *Issues in Agriculture* No. 4. Washington DC, Consultative Group on International Agricultural Research (CGIAR).

Contains recommendations to the IARCs in the context of the trend within the agricultural research community to protect intellectual property.

* Baxter, B., S. Mayer and A. Wijeratna (1999) “Crops and Robbers: Biopiracy and the Patenting of Staple Food Crops. Preliminary Findings of an ActionAid Investigation”. London, ActionAid. [http://www.actionaid.org/about_us/pub.html]

This paper shows that as a result of genetic engineering and a change in the world's patent regime, ‘biopiracy’ is taking place on staple food crops important to the South. Plant genetic material is moving into private ownership – against the wishes of many

Southern countries. The world's agri-business and biotechnology industry own most of the patents on staple food crops. Patents on rice, wheat, sorghum, cassava, maize, millet, potato, soybean and wheat are falling into company hands. The higher prices of patented seeds and accompanying royalties are likely to outweigh any possible benefits of GM plants to poor farmers. This raises questions for food security. Of grave concern to ActionAid is evidence that biotechnology patents are being granted which could allow companies based in the North to substitute crops grown in the South. With advances in mapping the 'genome' (or entire genetic code) of the world's staple food crops, this trend to patent is set to continue. We are in the midst of an explosion of activity in this area. Despite some work by the public sector, it is clear that private corporations are racing to complete the majority of this 'mapping'. Never in history has so much information about the genetic make-up of plants been available. If patents are granted on 'prize' genes from staple food crops, the losers are likely to be poor farmers in the South.

Bhat, M. G. (1996) "Trade-related intellectual property rights to biological resources: socioeconomic implications for developing countries." *Ecological Economics* 19: 205-17.

TRIPS has been denounced by developing countries, which have relied heavily on indigenous biotechnology from several decades in the area of high-yielding seeds, bio-pesticides and fertilisers, herbal medicines and household consumables. This study analyses the social, economic and preservation implications of TRIPS for biological resources. Establishing IPRs to products derived from genetic resources is necessary but not sufficient for bioprospecting and the long-term survival of these resources. Developing countries must also develop suitable institutions and policies governing the use of their resources and enabling local communities to receive benefits of biodiversity conservation and prospecting.

Buttel, F. H. and J. Belsky (1987) "Biotechnology, plant breeding, and intellectual property: social and ethical dimensions." *Science, Technology, & Human Values* 12(1): 31-49.

Provides an overview of the development of the seed industry in the USA, particularly in relation to public plant breeding institutions that have both supported and competed with private sector efforts. Also discusses major types of IPR arrangements pertaining to private plant breeding and identifies several crucial issues in proprietary protection of plant breeding inventions.

* CIDSE - International Cooperation for Development and Solidarity (2000) "Biopatenting and the Threat to Food Security - A Christian and Development Perspective". Brussels, CIDSE. [<http://www.cidse.org/pubs/tg1ppcon.htm>]

Half the world relies on a few basic crops for its food and over 830 million people go hungry every day. Taking this reality as its starting point, this report reflects on the impact of bio-patenting on food security for poor countries and communities. It argues that trade policy and food security are matters of justice and human rights, not just economics. Trade rules, especially those relating to IPRs, must be fair and equitable and must promote rather than hinder human development. The report raises concerns about the rise in monopoly power accompanying bio-patents which it is felt is more likely to stifle innovative approaches to the problem of world hunger than it is to provide a solution. The report sets out a series of recommendations for the

European Union and the international community to ensure bio-patenting does not further impoverish the world's poor. At the same time it suggests a number of key changes to the structure of international trade relations and food security policies which would promote food for all in the early years of the 21st century.

Cleveland, D. A. and S. C. Murray (1997) "The world's crop genetic resources and the rights of indigenous farmers." *Current Anthropology* 38(4): 477-514.

Folk crop varieties developed over many generations by indigenous farmers are an important component of global crop genetic resources for use by both industrial and indigenous agriculture. Currently there is a debate between advocates of indigenous farmers' rights in their folk varieties and the dominant world system, which vests IPRs to crop genetic resources only in users of those resources for industrial agriculture. While indigenous peoples at the individual and group levels do have a broad range of IPRs in their folk varieties, they define and use them differently from the industrial world. Therefore industrial world IPRs are generally inappropriate for protecting the IPRs of indigenous farmers, but some could be used effectively. To meet indigenous farmers' need for protection, new approaches are being developed that embed indigenous farmers' rights in folk varieties in cultural, human, and environmental rights. More research on the cultural, social, and agronomic roles of folk varieties, ongoing negotiation of the meaning of key concepts such as 'crop genetic resources', 'rights', and 'indigenous', and an emphasis on a common goal of sustainability will help to resolve the debate.

Correa, C. M. (1994) "Sovereign and Property Rights over Plant Genetic Resources". Commission on Plant Genetic Resources Background Study Paper No. 2. Rome, Food and Agriculture Organization.

Deals with the concept of sovereign rights and its application to plant genetic resources, particularly in the context of the IUPGR and the CBD; analyses the applicability and extent of IPRs over plant genetic resources; and discusses the so-called 'informal' innovations and the implementation of farmers' rights at the national and international level.

Correa, C. M. (1996) "Intellectual property rights and agriculture: strategies and policies for developing countries". *Intellectual Property Rights and Agriculture in Developing Countries*. J. Van Wijk and W. Jaffé. Amsterdam, University of Amsterdam: 100-113.

The paper deals first with the different IPRs that are relevant to agriculture. Second, it considers the relevance of such rights. It is suggested that the 'technological distance' and varying degrees of 'technical protection' explain to a great extent differences in the relative importance of IPRs in agriculture. Thirdly, the system of plant genetic resources is briefly described. The tension between conservation goals and the diffusion of modern varieties is addressed. Finally, the paper considers the requirements and difficulties in developing special IPRs to protect traditional varieties.

* Crucible Group (1994) *People, Plants and Patents: The Impact of Intellectual Property on Trade, Plant Biodiversity, and Rural Society*. Ottawa, International Development Research Centre.

Decisions about IPRs, particularly for plants, have major implications for food security, agriculture, rural development, and the environment for every country in the world. For the developing world in particular, the impact of IPRs on farmers, rural societies, and biodiversity will be profoundly important. In this fast-changing and politicised field, this book identifies and examines the major issues and the range of policy alternatives including consensus positions and the various conflicting viewpoints.

* Crucible Group II (2000) *Seeding Solutions. Volume 1. Policy Options for Genetic Resources: People, Plants and Patents Revisited*. Ottawa, Rome and Uppsala, International Development Research Centre, International Plant Genetic Resources Institute and Dag Hammarskjöld Foundation.

Volume 1 of Seeding Solutions brings readers up to date on what has changed, scientifically, politically and environmentally, since the first publication in 1994 of People, Plants, and Patents, the book that summarised the major issues related to the ownership, conservation and exchange of plant germplasm. Vol. 1 offers policymakers a clear description of the facts, the fights and the forums relevant to genetic resources.

* Crucible Group II (2001) *Seeding Solutions. Volume 2. Options for National Laws Governing Control over Genetic Resources and Biological Innovations*. Ottawa, Rome and Uppsala, International Development Research Centre, International Plant Genetic Resources Institute and Dag Hammarskjöld Foundation.

Volume 2 of Seeding Solutions provides provides annotated model legislation to regulate access to genetic resources and to create various forms of IP protection for plant varieties, biological innovations, and indigenous and local knowledge.

Dawkins, K. and S. Suppan (1996) “Sterile Fields: The Impacts of Intellectual Property Rights and Trade on Biodiversity and Food Security. With Case Studies from the Philippines, Zimbabwe and Mexico”. Minnesota, US, Institute for Agriculture and Trade Policy.

Presents the negative impacts of IPRs and free trade on biodiversity and food security, concluding with a series of recommendations to respond to these conflicts. The paper contains reports on the present situation in three developing countries: the Philippines, Zimbabwe and Mexico.

Drahos, P. and M. Blakeney, Eds. (2001) *Intellectual Property in Biodiversity and Agriculture: Regulating the Biosphere*. London, Sweet and Maxwell.

The essays in this volume draw attention to a broad set of global biodiversity-related regulatory agendas with which IPRs are now irrevocably linked, and address aspects of the failure to address the difficult relationship between IPRs and the regulation of food, agriculture, the environment and health.

Duvick, D. N. (1993) “Possible effects of intellectual property rights on erosion and conservation of plant genetic resources in centers of crop diversity”. *International Crop Science* I. D. R. Buxton, R. Shibles, R. A. Forsberg et al. Eds. Madison, WI, Crop

Science Society of America.

Discusses the relationship between IPRs and erosion of genetic diversity by comparing the two kinds of plant breeding - by trained scientists and by traditional farmers. The latter make use of in field genetic diversity while the former depend on global exchange of genetic resources. Professional breeders supply farmers, not with internally variable varieties, but with variable arrays of uniform cultivars. Recently interest has grown in the fate of the small farmers in developing countries, and also on the fate of the banked germplasm collections.

Ewens, L. E. (2000) "Seed wars: biotechnology, intellectual property, and the quest for high yield seeds". *Boston College International and Comparative Law Review* 23(2): 285-310.

[http://infoeagle.bc.edu/bc_org/avp/law/lwsch/journals/bciclr/23_2/23_2_TOC.htm]

Presently, IPR law is the mechanism that determines international protection and control over biotech innovations and genetic resources. The IPR paradigm employs western definitions of property in order to provide a framework in which to allocate rights. This has resulted in serious distributive problems. Until international IPR law increases awareness of the importance of the public domain in preserving genetic diversity, protecting the global food supply, and safeguarding genetic resources, IPR law will under-value and under-compensate the contributions and agricultural concerns of the developing countries that safeguard the vast majority of the world's plant genetic resources.

* Fowler, C. (1994) *Unnatural Science: Technology, Politics and Plant Evolution*. Yverdon, Gordon and Breach.

Seeds and planting materials are central to the agricultural industry that feeds us all. Yet, until recently, there has been little interest in analysing the legal and political processes through which IPRs are constructed for these biological materials. Concentrating on the US experience, this book offers a comprehensive history and sociological analysis of the struggle to own and control biological materials from the 1800s, to the first patent law covering plant varieties, to current international controversies.

* Fowler, C. and P. Mooney (1990) *The Threatened Gene: Food, Politics and the Loss of Genetic Diversity*. Cambridge, Lutterworth Press.

Genetic erosion has very serious social effects, including mass starvation. Control over the gene pool is shifting from farmers to scientists and heads of industry, while political considerations determine agricultural policy with increasing frequency. The North is struggling with the South for control over plant genetic resources.

Frisvold, G. B. and P. T. Condon (1998) "The Convention on Biological Diversity and agriculture: implications and unresolved debates." *World Development* 26(4): 551-570.

The CBD addresses two controversies that surround plant genetic resources. One debate has been over property rights governing PGRs and the distribution of benefits from their use. The second has been over the adequacy of measures to maintain crop genetic diversity. This paper examines how these debates are linked and reviews multilateral attempts to address them.

Funder, J. (1999) "Rethinking patents for plant innovation." *European Intellectual Property Review* 21(11): 551-577.

In a recent case, the European Patent Office again tackled the exclusion of plant varieties from biotechnology patents. This article presents an alternative approach to understanding the subject matter of patents in general and plant appropriation in particular. Some of the biological and legal factors relevant to the scope of property rights for living organisms are also explored.

Gaia Foundation and Genetic Resources Action International (1998) "Ten Reasons not to join UPOV". *Global Trade and Biodiversity in Conflict*, Issue 2. London & Barcelona, Gaia Foundation & GRAIN. [<http://www.grain.org/publications/issue2-en.cfm>]

Provides ten reasons why joining UPOV is contrary to the interests of developing countries and traditional communities.

Godden, D. (1987) "Plant Variety Rights: framework for evaluating recent research and continuing issues." *Journal of Rural Studies* 3(3): 255-272.

A review of the economic literature concerning Plant Variety Rights which pays particular attention to empirical evidence on the relationship between PVRs and (1) increasing plant yields; (2) the corporate structure of the plant breeding and seeds industries; and (3) the interaction between private breeders and the State. The author concludes that it is currently impossible to form a definitive judgement as to the net economic effects of PVR, or similar methods of establishing IPRs in plant varieties.

Hamilton, N. D. (1994) "Why own the farm if you can own the farmer (and the crop)?: contract production and intellectual property protection of grain crops." *Nebraska Law Review* 73: 48-103.

U.S. grain production is experiencing two key developments: (1) the trend towards use of contract production for grain; and (2) the connection between this and the protection of IPRs for seeds and plants. This article surveys the emerging legal issues associated with these two developments.

* Herdt, R. W. (1999) "Enclosing the global plant genetic commons". Paper prepared for delivery at the China Center for Economic Research, May 24. [<http://208.240.92.21/reports/proprights/paper.html>]

Property rights are assured by the collective standing behind one's claim to the benefit stream generated by property. Changing technology and institutions have interacted throughout history to create property rights from what had previously been public goods. The discovery of knowledge about DNA and the useful products that can be created through the applications of that knowledge has generated conditions that have led to intellectual private property claims on many new processes and products. Large multinational life science companies seeking to capitalise on these developments have purchased many heretofore independent seed companies, leading to a high level of concentration in the seed industry. These issues are treated differently in various countries and many developing countries have limited capacity to deal with them. Policies to address the challenges created by this set of events are

outlined.

* Jaffé, W. and J. Van Wijk (1996) “The Impact of Plant Breeders’ Rights in Developing Countries: Debate and Experience in Argentina, Chile, Colombia, Mexico and Uruguay”. The Hague, Ministry of Foreign Affairs.

So far, empirical evidence of the socio-economic impact of IPRs in agriculture is almost non-existent. This study examines the expected impact of breeders’ rights on developing countries with respect to: private investment in plant breeding, breeding policies of public institutes, transfer of foreign germplasm, and the diffusion of seed among farmers. Case studies were conducted in five Latin American countries and conclusions of the investigation are presented in this paper.

Kameri-Mbote, A. P. and P. Cullet (1999) “Agro-biodiversity and international law - a conceptual framework.” *Journal of Environmental Law* 11(2): 257-279.

This paper lays out the international framework currently governing agro-biodiversity management which emphasises private property rights and thus provides incentives for the private sector to participate in agriculture. The authors argue that the attendant commercialisation of agriculture has failed to protect the rights of local farmers and generally not contributed to meeting the food needs of every human being. Moreover, it has contributed to the erosion of the genetic base necessary for the further development of agro-biodiversity. They contend that the legal framework can only foster the fulfilment of everyone’s food needs if agro-biodiversity is recognised as a common heritage of humankind.

Kerr, W. A., J. E. Hobbs and R. Yampoin (1999) “Intellectual property protection, biotechnology and developing countries: will the TRIPS be effective?” *AgBioForum* 2(3/4): 203-211.

[<http://www.agbioforum.org/vol2no34/Kerr.htm>]

The international protection of IPRs has been a contentious issue between developed and developing countries. Protection of IPRs in agricultural biotechnology is the latest manifestation of the dispute with both developed and developing countries accusing each other of piracy. TRIPS was only grudgingly agreed to by developing countries at the Uruguay Round. The WTO allows trade retaliation to be used for violations of TRIPS commitments. The paper investigates the likely efficacy of trade measures in encouraging countries to live up to their TRIPS commitments. The results suggest that developed countries will not receive the protection they desire and, hence, there may be a mutual interest in re-opening negotiations related to patenting genetic material.

* Kloppenburg, J., Jr. (1988) *First the Seed: The Political Economy of Plant Biotechnology*. Cambridge, Cambridge University Press.

The emergence of the new biotechnologies and of large corporations that produce both seeds and chemicals for the agriculture industry is a significant recent phenomenon. In spite of their dependence on the plant genetic resources of the South, the economic and political power of these corporations and of Northern governments has ensured that they continue to enjoy free access to these resources.

Lehmann, V. (1998) "Patent on seed sterility threatens seed saving". *Biotechnology and Development Monitor* 35: 6-8. [<http://www.pscw.uva.nl/monitor/3503.htm>]

A patent recently granted on a technology which produces sterile seeds has revived the discussion on the consequences of in-built biological protection against seed saving. Seed companies see this as an incentive to develop new varieties. But what will be the consequences for farmers in developing countries if they cannot re-use their harvest as seed material?

* Lele, U., W. Lesser and G. Horstkotte-Wessler (2000) "Intellectual Property Rights in Agriculture: The World Bank's Role in Assisting Borrower and Member Countries". Environmentally and Socially Sustainable Development series. Washington DC, The World Bank.

Papers from a workshop held in June 1998 on IPRs and agriculture, and the possible role that the World Bank might play in assisting developing countries. It includes perspectives from the International Agricultural Research Centres, industry, and national systems and universities.

* Leskien, D. and M. Flitner (1997) "Intellectual Property Rights and Plant Genetic Resources: Options for a *Sui Generis* System". Issues in Genetic Resources No. 6. Rome, International Plant Genetic Resources Institute.

This study aims at the development and evaluation of elements for inclusion in a sui generis system for the protection of plant varieties as permitted by the TRIPS Agreement. The report studies the legal obligations posed by TRIPS in relation to plant genetic resources, and analyses the status of plant genetic resources under the existing international regulatory framework, in particular the CBD. The study gives an overview of and discusses possible elements for recognition of Farmers's Rights, which, if included in a protection system for plant varieties, may reconcile the interests of formal breeders with the rights and interests of informal breeders. There is a broad range of possible TRIPS-compatible sui generis systems. These should be explored and discussed before ready-made protection systems currently being used in many industrialised countries are adopted.

Lesser, W. (1997) "Assessing the implications of intellectual property rights on plant and animal agriculture." *American Journal of Agricultural Economics* 79(5): 1584-1591.

The author starts by noting that little economic research has to date been completed on the implications of expanding IPR protection for living agricultural inputs. What has been explored extensively, though, are expressed concerns about IPRs on farm structure, ethics, university/industry relationships, information exchange, and related matters. In concluding, the author finds surprisingly limited analysis of the effects of IPRs on R&D investment. But what exists supports the expectations that protection encourages private investment in developed economies, especially for easily copied products such as living plants and animals. But the situation appears less well documented for developing economies, where access seems a more significant issue than investment. In any case, attempts to identify an optimal IPR system are apparently of little practical use.

Lesser, W. (1998) *Sustainable Use of Genetic Resources Under the Convention on*

Biological Diversity: Exploring Access and Benefit Sharing Issues. Wallingford, CAB International.

While only limited progress has been made in applying the CBD, countries are acting unilaterally on the placement of genetic resources as their sovereign right to exploit. This book focuses on the presentation of legal and economic issues regarding the sustainable use and transfer of genetic resources and associated technologies, identifying steps that can be taken and their expected consequences.

Mangeni, F. (2001) "Technical Issues on Protecting Plant Varieties by Effective Sui Generis Systems". Occasional Paper no. 2. Geneva, South Centre.
[<http://www.southcentre.org/publications/occasional/paper02/op2.pdf>]

This paper reviews the options for developing countries in the context of plant variety protection. It concludes with a set of proposals for developing countries implementing TRIPS Article 27.3(b) that requires an IPR system to protect plant varieties.

Mooney, P. R. (1996) "The Parts of Life: Agricultural Biodiversity, Indigenous Knowledge, and the Role of the Third System". Development Dialogue. Special Issue (1996:1–2) Uppsala, Dag Hammarskjold Foundation.

Describes the debates at FAO in the early 1980s resulting in the creation of the Commission and the IUPGR, and the discussions of the Keystone Dialogue Series on Plant Genetic Resources. The author comments on the process leading to, and the outcome of, the 1996 Leipzig conference on plant genetic resources, the CBD Conference of the Parties, and the 1996 World Food Summit. He explains the need to reform the CGIAR system, comparing the official view with those who maintain that food security means supporting local farmers in pursuing their practices and technologies within their own development framework. He discusses the commercial prospecting of other genetic resources to develop new products, including human genes. Linked to this is the growing concentration of capital and power among corporations in the area of food security and biodiversity. Finally, he discusses the roles of the different actors and particularly those of civil society organisations (the Third System).

Perrin, R. K. (1999) "Intellectual property rights and developing country agriculture." *Agricultural Economics* 21: 221-229.

Theoretical studies indicate that the welfare of the developing countries might either be improved or damaged by strengthening of their own IPRs. Net gains through their agricultural sectors will be positive if the payoff from new innovations is sufficiently different as compared to the technology-importing countries. Scattered evidence supports the hypothesis that agricultural R&D is responsive to IPRs in developing countries, but there is also evidence that developed-country technology is sufficiently appropriate for developing countries to offer substantial free-rider gains. However, without IPRs it seems unlikely that the agricultural productivity rates in developing countries can begin to catch up with those in developed country agriculture.

Rangnekar, D. (1996) "GATT, Intellectual Property Rights, and the Seed Industry: Some Unsolved Problems". Kingston upon Thames, Surrey, Kingston University - Faculty of Human Sciences. Economics Discussion Paper 96/5.

Reflects on recent changes for the international protection of IPRs achieved through GATT. Specific aspects of the global harmonisation of domestic regimes of protection are identified. These substantive changes contrast with general presumptions of theoretical economics on IPRs. Through a survey of economic literature on this subject, the paper concludes that the achievements at GATT are not supported by theory. Emphasis is given to the subject of plant variety protection.

Santaniello, V., R. E. Evenson, D. Zilberman and G. A. Carlson (2000) *Agriculture and Intellectual Property Rights: Economic, Institutional and Implementation Issues in Biotechnology*. Wallingford, CAB International.

Collection of papers by agricultural economists and policymakers providing a range of perspectives on agro-biotechnology, plant breeding, IPRs and their interrelationships.

Seiler, A. (1998) "Sui generis systems: obligations and options for developing countries." *Biotechnology and Development Monitor* 34: 2-5.

[<http://www.pscw.uva.nl/monitor>]

In 1999, the sui generis option for the protection of plant varieties was evaluated by the TRIPS Council. The likelihood is that further periodic reviews will also take place. The shape of a TRIPS-compatible sui generis system will play a key role in establishing alternatives to patents on plant varieties. Five different sui generis approaches are considered: (i) granting community IPRs; (ii) community and collective intellectual rights; (iii) modified plant variety protection (like UPOV but with modifications); (iv) comprehensive biodiversity legislation; and (v) sectoral community rights regime.

Suppan, S. (1998) "Biotechnology's Takeover of the Seed Industry". Minneapolis, Institute for Agriculture and Trade Policy.

Describes the growing dominance of the global seed industry by a small number of life-science corporations such as Monsanto. In spite of the optimistic claims of such companies, there is little discussion of how the application of agricultural biotechnology to agricultural trade policy's emphasis on monoculture production will reverse the loss of plant diversity essential for reinvigorating plant breeding programmes.

* Tansey, G. (1999) *Trade, Intellectual Property, Food and Biodiversity: Key Issues and Options for the 1999 Review of Article 27.3(b) of the TRIPS Agreement*. (Available in French, German, Spanish and Swedish). London, Quaker Peace and Service.

[<http://www.btinternet.com/~g.tansey/trips/>]

This paper draws on various perspectives presented in the literature on IPRs, food, farming, biodiversity, TRIPS and related agreements. It aims to highlight the policy questions for developing countries by TRIPS Article 27.3(b); examines the key ethical, economic, environment and social issues surrounding its provisions; and considers the possible contributions of overseas development assistance.

Tripp, R. and Byerlee, D. (2000) "Public plant breeding in an era of privatisation".

Natural Resource Perspectives No. 57. London, Overseas Development Institute.
[<http://www.odi.org.uk/nrp/index.html>]

Both agricultural research and national seed systems are undergoing increasing privatisation. Although there are a number of possibilities for making public agricultural research more efficient and better able to interact with the private sector, the major opportunities are in plant breeding. This paper examines the possibilities and limitations associated with revenue generation through public plant breeding; the opportunities for moving the products of public plant breeding through the private sector; and the need for increased contacts with, and contributions from, private research.

van Wijk, J. (1996) "How does stronger protection of intellectual property rights affect seed supply? early evidence of impact". Natural Resource Perspectives No. 13. London, Overseas Development Institute.
[<http://www.odi.org.uk/nrp/index.html>]

A study on the relationships between stronger IPR protection in developing countries and seed supply, which finds that stronger plant-related IPR protection has apparently not increased the diversity of plant material available to farmers or enhanced the rate of innovation in plant breeding. Although evidence suggests a strong likelihood that flows of improved genetic material will increase in line with stronger protection, the author predicts that while commercial farmers might benefit from this, middle and lower income farmers will not because of likely restrictions on seed saving and exchange.

4. Education

One way that copyright law seeks to strike a balance between the rights of the owners and the public interest is to allow – within certain limits – unauthorized copying of protected works for educational or other non-commercial purposes. This is called fair use or fair dealing. However, there are concerns that as part of the tendency towards strengthened copyright protection, fair use will be one of the casualties. Either it will be restricted further or it might even be eliminated altogether. Information technology provides both opportunities and threats for the copyright industries that include the publishing industry, which is a key supplier of educational content. It sometimes appears, though, that these industries would prefer to emphasize the threats when lobbying governments to reform the law to accommodate technological changes. The Crews, Lyman and Okerson articles all highlight various contemporary concerns about trends in copyright law, including public education and libraries.

As for developing countries whose public education systems are dependent upon foreign publications, price is obviously a very important determinant of access. And academic journals such as the many titles published by the large transnational publishing houses tend to be very expensive. While private schools and colleges may be able to afford imported copyright-protected texts and distribute them to all the students, the public education system may not. There educators may be tempted to encourage or turn a blind eye to the copying of such texts by students, schools and colleges. This creates a difficult dilemma for developing countries: should they clamp down on copyright infringers but allow textbook prices to be prohibitively high for most students and educational institutions? Or should they allow copying with impunity but risk being threatened with trade sanctions by the governments of the copyright-owing publishing companies?

The Berne Convention for the Protection of Literary and Artistic Works offers some support for developing countries in this regard. The 1971 Paris Act of the Convention contains an Appendix which provides – subject to just compensation to the right owner – ‘for the possibility of granting non-exclusive and non-transferable compulsory licensing in respect of (i) translation for the purpose of teaching, scholarship or research, and (ii) reproduction for use in connection with systematic instructional activities, of works protected under the Convention’.¹¹ However, this option has only rarely been used.

The writings

* Crews, K. D. (1998) “Harmonization and the goals of copyright: property rights or cultural progress?” *Indiana Journal of Global Legal Studies* 6(1): 117-. [<http://www.law.indiana.edu/glsj/vol6/no1/crews.html>]

The author raises four main concerns about the effects of international harmonisation of copyright on the United States law. First is the contraction of the public domain. Loss of the public domain, even a partial loss, is a loss of one of the few clear opportunities for a member of the public to build upon existing works and to expand upon the base of creative resources available in the marketplace. Second, the trend toward tightened copyright protection harms the public good by narrowing the exercise of fair use. Fair use is essential not only to the public seeking to build on

existing works, but also for the creation of the next generation of many new copyright-protected works. Third is undue restriction on the deployment of new technologies. The success of many new technologies, from the photocopier to the Internet, depends on the ability to utilise copyright protected materials in ways that raise questions about the possibility of infringement. Just as the motion picture and publishing industries might argue that stronger copyright protection can reinforce their businesses and have strong positive consequences for the economy, so could the computer and technology industries argue that greater opportunities for reproduction and transmission of copyrighted works can make new technologies more useful, more valuable, and consequently of greater importance to the economy. Fourth is the diminished ability to share or disseminate protected works. If teachers are barred from using materials in the classroom, leaders are constrained from sharing materials at public functions, and cultural programmes are prohibited from performing or otherwise making works available to an audience, then the public is simply denied exposure to creative works. That lack of exposure translates into a loss of learning opportunities and a curtailment of cultural progress.

Lyman, P. (1996) "What is a digital library? technology, intellectual property, and the public interest." *Daedalus: Proceedings of the American Academy of Arts and Sciences* 125(4): 1-33.

Critical analysis of the implications for the public interest, education and human rights of the application of IPR protection over digital libraries and the Internet.

* Okerson, A. (1996) "Who owns digital works?" *Scientific American* (July): 64-68.

This article, written by a university librarian discusses the challenges to copyright law presented by the new information technologies. Recent proposals in the United States to reform copyright law to accommodate such challenges would appear to be detrimental to the public interest. Library and education groups, on-line services and private citizens have all criticised these proposals, which would severely restrict fair use (fair dealing) exceptions, treat all information appearing in a computer's memory for any length of time as constituting 'fixation' and therefore a possible copyright infringement, and would not apply the first sale doctrine to electronic copies of works.

Pedley, P. (1998) *Copyright for Library and Information Service Professionals*. Colchester, Portland Press.

This book explains the changes in UK copyright law as well as international developments in the IPR field as they affect libraries. Sections deal with topics such as user permissions, licensing, electronic copying and digital use of copyright works, case law, and case studies.

Shulman, S. (1999) *Owning the Future*. Boston and New York, Houghton Mifflin Co.

Author argues that the free exchange of essential information is being hoarded, fought over, and controlled as never before. He explains that in the rush to stake claims in the knowledge economy, we risk auctioning off our technological and cultural heritage and eroding the public education and public access that are the bedrock of our democratic society.

5. Business and Industrial Development

Under this category are two kinds of writing. The first examines the ways that businesses actually use intellectual property rights. The second type of work seeks to discover whether IPRs actually stimulate industrial development.

How does economic theory explain why businesses use IPRs? And is this explanation realistic? With respect to patents, the conventional interpretation of the modern patent system since the nineteenth century in economics is as a regulatory response to the failure of the free market to achieve optimal resource allocation for invention. According to Geroski¹²: ‘patents are designed to create a market for knowledge by assigning propriety rights to innovators which enable them to overcome the problem of non-excludability while, at the same time, encouraging the maximum diffusion of knowledge by making it public.’

The assumption behind such a view is that valuable knowledge is essentially a public good; that is to say it is characterised by non-rivalry and non-excludability. Moreover, the holder of such knowledge can demonstrate its value only by revealing it, yet in doing so he or she can no longer control access to it and thereby capture all of its value. So by providing temporary *legal* monopolies – which may or may not translate into *market* monopolies – for inventions, patents may stimulate greater investment in inventive activity and very probably do in some industrial sectors at least (especially pharmaceuticals).

But patent monopolies are not the only possible means of achieving excludability, and patent specifications may not be efficient mediums for diffusing knowledge anyway.¹³ Moreover, patents may be used to block equally legitimate attempts by rivals to achieve excludability for *their* inventions. Such arguably anticompetitive practices are described (approvingly) by Rivette and Kline. ‘Clustering’ means “building a patent wall around a product”, preferably consisting of a large quantity of interlocking patents. ‘Bracketing’ means surrounding a competitor’s key patent with so many of one’s own that that it cannot be commercialised. A fairly obvious inference is that patent law is open to abuse. A less obvious one, though, is that the award of a patent is a state-sanctioned grant of a property right, and as with all such grants affects the interests and opportunity sets of others. The Grandstrand volume, though, is a more detailed and sophisticated exposition of the many different ways that companies use IPRs in their business strategies.

Paul Doremus of the U.S. Department of Commerce gives support to the view that IPRs are regulatory institutions that clearly affect the opportunity sets and freedoms of right and non-right holders, and are thus bound to be the focus of interest group competition when reforms are being considered: ‘IPR ... are a form of *adversarial regulation*. IPR rules distribute costs and capabilities among competing groups that are in a zero-sum relationship (as opposed to policies that regulate individuals or groups for their own individual or collective benefit)’ [emphasis added].

It is important to make clear that intangible property is different from tangible property in at least one important respect. As Peter Drahos¹⁴ has observed ‘abstract objects have no natural boundaries’. In the case of patents one consequence is that transaction costs of

defining and enforcing the rights are potentially very high. Another is that claims within a patent are very likely to overlap with those in others held by competitors. The scope of a patent is determined through an examination by trained specialists and, in some cases, also by litigation. The high costs involved mean that the system is more accessible to larger companies. This situation may also encourage free-riding by such firms since they may find that they can infringe the property rights of smaller firms, independent inventors and, for example, indigenous peoples safe in the knowledge that these other parties lack the economic muscle to mount an effective challenge. Moreover, one can surmise that other opportunistic behaviours will be encouraged. Possible examples include: speculative accusations of patent infringement made by large companies to intimidate smaller firms; excessively broad patent claims in the hope that at least some of these will slip through the examination system and be allowed; and the 'bracketing' and 'blocking' strategies described above. With respect to plant breeders' rights, considering the less rigorous novelty criterion compared to patents, and the fact that there is no prior art search, it is highly probable that on occasions certificates are awarded for what are really landraces or varieties which result merely from 'cleaning' a landrace. And trademarks may be awarded for what are commonly used words and expressions that could not possibly have been coined or first applied by the owner.

Turning to the second type of work, Siebeck *et al* is a good review of the economic literature which concludes cautiously concerning the effects of strengthened IPRs on developing countries, highlighting the dearth of evidence so far. Ten years later its caution still seems to be realistic. The more recent World Bank, UNDP (see below) and UNCTAD (see Section 9 of this bibliography) reports contain sophisticated analyses of the international IPR regime in terms of how far it supports or hinders development of industry and advanced technology in developing countries. The fact that the World Bank and UNDP are now examining the real costs and benefits for developing countries of implementing TRIPS in their most widely disseminated publications is indicative not only of genuine concern within these particular agencies but also a growing acceptance among many of the member governments of legitimate reasons to question whether what is good for large corporations in the IPR sphere is necessarily good for the world.

The writings

Doremus, P. N. (1996) "The externalization of domestic regulation: intellectual property rights reform in a global era". *Indiana Journal of Global Legal Studies* 3(2). [<http://www.law.indiana.edu/glsj/vol3/no2/doremus.html>]

IPR issues in the software, biotechnology, and semiconductor industries exemplify the pressure that new technologies and international competition are placing on domestic and international regulatory systems. Traditional IPR rules cannot easily accommodate any of these technologies. At the same time, the high costs of R&D, relative ease of replication, and global markets characteristic of these technologies heighten the importance of both domestic and foreign IPR protection. In the context of rapidly changing technological conditions, borderless markets, and inflexible international regimes, national policymakers face a political dilemma: how to accommodate new technologies at home, encourage similar accommodation abroad, and do both without undermining either long-standing domestic IPR arrangements or the international patent and copyright regimes.

This article reviews the different strategies of externalization associated with IPR reform in the software, biotechnology, and semiconductor industries.

Gerster, R. (1998) "Patents and development: a non-governmental organization view prior to revision of the TRIPS Agreement." *Journal of World Intellectual Property* 1(4): 605-619.

The author uses a historical approach to argue against any moves to strengthen the global IPR regime through a revision of TRIPS. He notes for example, that Switzerland industrialised in the absence of a patent system, and that the victory of interest groups favouring patents in nineteenth century Europe was actually a victory for protectionists, not free traders.

Grandstrand, O. (1999) *The Economics and Management of Intellectual Property: Towards Intellectual Capitalism*. Cheltenham, Edward Elgar.

This book presents a study of intellectual property and its economics and management in large, technology-based corporations. The book's main purpose is to present thoughts and ideas about a general global transition into what can be called 'intellectual capitalism'. While its coverage is global it focuses mainly on the United States, Japan and Sweden.

Griliches, Z., Ed. (1984) *R&D, Patents, and Productivity*. Chicago and London, University of Chicago Press.

A ground-breaking collection of papers on the links between R&D, patents, technology development and economic performance. Major findings include the documentation of a significant relationship between R&D expenditures and productivity growth, the usefulness of patents as an indicator of inventive activity, and the relative unimportance of R&D in accounting for the late '70s-early '80s world wide slow-down in productivity growth.

* Primo Braga, C. A., C. Fink and C. P. Sepulveda (2000) "Intellectual Property Rights and Economic Development". World Bank Discussion Paper No. 412. Washington DC, The World Bank.

Over the past decade, the protection of IPR has undergone tremendous changes - fostered on the one hand by a widening of the range of products and technologies covered by proprietary rights, and on the other hand by policy shifts that have initiated a move towards globally harmonised standards of protection. This discussion paper reviews these changes and their implications for developing countries. It briefly outlines the main IPR instruments, the institutions that govern IPRs at the national and international levels, and the importance of IPRs in various economic activities. Based on this review, the paper explores approaches to IPR reforms in developing countries. The authors conclude that recent changes in the IPR field pose significant challenges to the developing world. At the same time, developing countries can enhance the benefits of recent policy changes by establishing an effective institutional framework for IPRs. Assistance from industrialised countries and multilateral organisations can make important contributions in this regard.

* Rai, A. K. (1999) "Regulating scientific research: intellectual property rights and the

norms of science.” *Northwestern University Law Review* 94(1): 77-152.

The issue of IPRs in basic scientific research forces scholars to consider not only various competing theories of intellectual property but also the social norms that have traditionally governed claims of ownership in basic science. The author argues that legal change has been insufficiently sensitive to the contexts in which the central instrumental goals of IPRs - success in stimulating creation, disclosure, and development of inventive or creative works - would be maximised not through stronger IPRs, but through norms that militate against the securing of such rights. Fortunately, those scientific research norms that have been most resistant to change are more likely to achieve creation, disclosure, and development than full-blown IPRs.

Rivette, K. G. and D. Kline (2000) *Rembrandts in the Attic: Unlocking the Hidden Value of Patents*. Boston, Harvard Business School Press.

Provides a business strategy for how companies can unlock the enormous financial and competitive power hidden in their patent portfolios.

Shavell, S. and T. van Ypersele (1999) “Rewards Versus Intellectual Property Rights”. Cambridge, MA, National Bureau of Economic Research. NBER Working Paper No. 6956.

This paper compares reward systems to IPRs. Under a reward system, innovators are paid for innovations directly by government (possibly on the basis of sales), and innovations pass immediately into the public domain. Thus, reward systems engender incentives to innovate without creating the monopoly power of IPRs, but a principal difficulty with rewards is the information required for their determination. The authors conclude in their model that IPRs do not possess a fundamental social advantage over reward systems, and that an optimal reward system - under which innovators choose between rewards and IPRs - is superior to IPRs.

* Siebeck, W. E., with R. E. Evenson, W. Lesser and C. A. Primo Braga (1990) “Strengthening Protection of Intellectual Property in Developing Countries: A Survey of the Literature”. World Bank Discussion Paper No. 112. Washington DC, The World Bank.

Will developing countries benefit economically from strengthening their protection of intellectual property? In search of the answer to this question the authors review a substantial body of economic literature, theoretical and empirical, covering the economics of patents and other IPRs. The vast majority of studies to date have focused on industrial economies. This body of research suggests that increases in IPR protection generate R&D activity sufficient to offset the social cost of the limited monopoly granted to patentees, copyright holders, and other IPR owners. For developing countries, unfortunately, similar research is lacking. The paper proposes a research agenda that includes an assessment of IPR protection in developing countries, the incentive effects on local R&D, foreign direct investment and technology licensing, and the potential benefit to developing countries of “petty patents” and plant breeders’ rights.

* Stoneman, P., Ed. (1995) *Handbook of the Economics of Innovation and Technological*

Change. Oxford and Cambridge, Blackwell.

This book claims to be the first comprehensive, detailed and up-to-date overview of current knowledge in the economics of technological change. It both reviews what is known and accepted as the best thinking in the field and sets the agenda for research in the future by taking the reader to the boundaries of the subject. Key topics covered are: theory empirics and policy; technology and trade; the theory and practice of technology policy; finance and technological change; R&D and diffusion measuring both technological change and its impact; and game theoretic modelling of technological change.

* United Nations Development Programme (1999) *Human Development Report 1999*. New York and Oxford, Oxford University Press.

The 1999 HDR argues that globalisation is not new, but that the present era of globalisation, driven by competitive global markets, is outpacing the governance of markets and has repercussions for everyone. Chapter 2 ("New technologies and the global race for knowledge") argues that global governance of technology must respect and encompass diverse needs and cultures. With respect to new knowledge and technologies the global gap between the haves and the have-nots is widening because: in private research agendas money talks louder than need; tightened IPRs keep developing countries out of the knowledge sector; patent laws do not recognise traditional knowledge and systems of ownership; and the rush and push of commercial interests protects profits, not people, despite the risk in the new technologies.

Watal, J. (1999) "Intellectual property and biotechnology: trade interests of developing countries". *International Journal of Biotechnology* 2(1/2/3): 44-55.

Biotechnology has the potential to provide the answers to some of the developing world's most intractable problems. There is scope for developing countries to interpret the provisions of TRIPS on biotechnology at different levels, as evidenced by differing interpretations in the developed world. Equally, however, demands of developing countries on biodiversity-related issues can be countered through the ambiguities in the CBD. Instead of attempting to amend TRIPS, developing countries should aim to obtain access to the new technologies, at reasonable terms, by collaboration and not confrontation with their owners, with the help of multilateral developmental institutions.

6. Biotechnology

Biotechnology sounds like a neologism, but was actually coined early in the twentieth century by a Hungarian agricultural engineer called Karl Ereky, who included within its meaning ‘all such work by which products are produced from raw materials with the aid of living organisms’.¹⁵ Over time it has acquired a confusing variety of definitions. It may be defined quite broadly or much more narrowly. Typical of a broad definition is that of the (now defunct) United States Office of Technology Assessment: ‘biotechnology, broadly defined, includes any technique that uses living organisms (or parts of organisms) to make or modify products, to improve plants or animals, or to develop micro-organisms for specific uses.’¹⁶

Alternatively, biotechnologies may be divided by generation. Thus, the first generation includes traditional technologies like beer brewing and bread making which go back at least to the Sumerians of ancient Mesopotamia. The second begins with the microbiological applications developed by Pasteur and continues with the mass production by fermentation of the antibiotics. Tissue culture and modern plant and animal breeding also fall within this generation. The third generation includes techniques like recombinant DNA, monoclonal antibodies, polymerase chain reaction (PCR), and genomics, whose emergence was triggered by post Second World War advances in molecular biology. Most innovation in these new fields takes place in the United States, western Europe and Japan. Nowadays, biotechnology is often treated as being synonymous with the third generation of biotechnologies.

The uniqueness of modern biotechnology lies, in the words of anthropologist Paul Rabinow, ‘in its potential to get away from nature, to construct artificial conditions in which specific variables can be known in such a way that they can be manipulated. This knowledge then forms the basis for remaking nature according to our norms’.¹⁷

Genomics refers to the mapping and sequencing of the full set of genes (i.e. the genome) of different organisms or species. As one might expect, the *human* genome has always been the most interesting for companies seeking to identify commercial applications from genomics. The genomics revolution has so far spawned four types of business. These are: (a) the technology providers who manufacture the DNA sequencing machines; (b) the information providers, who do the actual sequencing; (c) the research firms, which consist mainly of the so-called dedicated biotechnology firms (DBFs) that generally do the upstream research but not the downstream product development; and (d) the biopharmaceutical firms, which consist of both the larger DBFs and the pharmaceutical and life-science corporations. For business types (a) and (b) genomics has perhaps more to do with information technology than biotechnology. For types (c) and (d), genomics including functional genomics, proteomics and pharmacogenomics are among the most essential informational and analytical platforms for modern biotechnology of the present and near future.

As with other science-based sectors, the road leading from basic research to product development is long, winding, and has many branches, some of which may be short cuts but are mostly dead ends. It is also very expensive to use especially as journey’s end approaches. And the companies best equipped to carry a product to the end of the

road are not necessarily the most competent to start the journey.

This situation provides both obstacles and opportunities for business. For new start-up firms it is hugely difficult for them to transform themselves into biopharmaceutical corporations. The opportunities lie in the fact that as the big firms concentrate on their core competences they outsource more and more tasks that may be essential elements of the R&D process. Therefore niches are created that new small and medium-sized science-based firms can occupy profitably. As the cost of gene sequencing falls, it is likely that barriers to entry will fall as well. Therefore, we can expect some highly specialized small genomics firms to spring up in the coming years, many from universities, and not just in developed countries.

Arguably, DNA patents encourage such a diversification of business activity by stimulating the foundation of small but highly-innovative firms and then by helping them to survive and remain independent. It has always been crucial to have access to large amounts of investment capital just to stay in business. Patent portfolios are the main magnet for outside investors – which also include larger science-based firms – and the larger the portfolio, the greater the interest from investors. In common with other industries, patents also become a form of currency in inter-firm transactions. As Cary Fowler explains: ‘few products can be developed, tested, approved by regulatory agencies, and on the markets in time to generate enough cash to save most biotechnology companies. For many companies, the patent becomes the product – the product that can be dangled before the investment community for more funds, or the product that can literally be sold to other companies’. Research decisions in many companies can depend as much, if not more, on the advice of patent lawyers as the opinions of the scientists. Naturally, companies have a strong interest in securing patents that encompass the broadest possible scope and whose claims are drawn in ways that seek to anticipate future scientific developments.

But from the view of the public interest, there is a danger in the increasing dis-integration of the genomics innovation chain. For new DBFs that provide genetic information to the drug development firms, what they sell are to them final products but to their customers further down the chain are mere research tools. In order to protect these ‘products’ – and to secure funding to produce further ones – the DBFs have a strong incentive to privatize their information through IPRs. But since the development of future commercial products such as therapeutic proteins or genetic diagnostic tests often requires the use of multiple gene fragments, an increasing number of which are being patented, companies intending to develop such products will need to acquire licences from other patent holders. In doing so, they will incur large (and possibly prohibitive) transaction costs. To return to the road metaphor, the danger is that more and more tollgates will be installed making the journey ever more expensive and excluding more and more potential travellers. So not only is the product development race becoming a relay race with more and more runners, but each runner is being forced to pay for the privilege of receiving the baton from the previous runner. The question is, will this slow down innovation and lead to fewer products on the market than would otherwise be available? And if so, how should the regulation of innovation through intellectual property protection be recountoured in response?

To date most of the basic research in biotechnology and genomics have been financed and conducted by governments, universities and private foundations. But private sector

investment has increased in recent years. The United States pioneered commercial biotechnology. There are various reasons for this but two important ones are the considerable amount of related basic research that had already been conducted by the universities and government agencies, and the large quantities of venture capital funds made available partly by the late 1970s deregulation of pension funds.

U.S. government funding for biomedical research especially from the 1970s was on a huge scale. In addition, start-up firms in the 1970s and early 1980s were frequently successful at attracting venture capital and then securing further investment through public offerings. After this period many DBFs found it harder to attract further investment, and few of them succeeded in generating enough new products to join the ranks of the pharmaceutical giants. However, while a number of DBFs were taken over by their larger rivals, most have been able to avoid this fate. They have done this by entering into strategic alliances with other DBFs and the bigger longer-established firms, and forming extensive networks of DBFs, large firms, and government and university research institutions. Patenting has undoubtedly helped DBFs to maintain their independence.

Such networks exist also in Europe and Japan, though the role of DBFs tends to be less important. It is worth noting that such networks are not necessarily confined within national boundaries. Japanese and European firms often look to collaborate with U.S. firms.

While the U.S. system has been relatively effective at turning new discoveries made by public sector and university researchers into commercial products, Europe and Japan have been less successful in putting together the downstream linkages from fundraising for basic research all the way to commercialization. However, since the 1980s the European Community countries and Japan have been preoccupied with catching up with the US. Both the European Commission and the member governments have sought to stimulate biotechnology R&D through industrial policy and more business-friendly product and IPR regulation.

Developing countries vary considerably according to the capacity of their research institutions and businesses to generate biotechnological inventions. M.R. Bhagavan of the Swedish International Development Cooperation Agency¹⁸ divides developing countries according to their science and technology (S&T) capacities. Thus, these countries are members either of the 'strong', 'medium' or 'weak' South. The Strong South includes such countries as Brazil, China, India and Mexico, which are moving into high-technology fields such as the third-generation biotechnologies. The Medium South includes Indonesia, Malaysia and Argentina, while the Weak South consists of most other countries which are as technologically dependent on the developed countries as they were before decolonization.

Several developing countries, including India, China, Brazil and Cuba, have adopted third generation biotechnologies. India is perhaps the most advanced developing country in terms of scientific capabilities, including the life sciences. However, the overwhelming bulk of biotechnology applications even in these countries are of the earlier generations such as fermentation and tissue culture. While health biotechnology is more important than agro-biotechnology in the United States and Europe, agro-biotechnology has been

prioritized by many developing country governments. This is largely due to the dependence of most emerging national economies on the viability of agricultural sectors for food security and employment, and in many cases, foreign exchange and political stability.

Given the likelihood that sequencing and analysing human, animal, plant and microbial genomes are starting to take less and less time and money, one can anticipate a lowering of barriers to entry. In fact, such barriers could become less financial than regulatory. This increases the possibility that a small number of 'elite' developing countries like India, China and Brazil will become sources of innovations in this field in the coming years. It is perfectly feasible, then, to envisage a time in the near future when a developing country like India will not just be a recipient of gene technologies and products but will be a provider to global markets as well.

It is frequently argued that biotechnology has nothing to offer developing countries. This view tends to be founded upon three convictions: first, that transnational corporations are aggressively promoting inappropriate and potentially dangerous genetic modification technologies in countries where biosafety regulations either do not exist or cannot easily be enforced; second, that traditional natural products like cocoa and vanilla, upon which some countries are heavily dependent, may be displaced by laboratory-produced substitutes; and third that because genetically-modified (GM) crops are bad for developing countries, then so is biotechnology.

Supporters of biotechnology are likely to counter that whether or not transnational life-science corporations are guilty and to what extent, and whatever the merits or demerits of GM crops, these are not reasons for developing countries to reject *all* biotechnology. Moreover, most second and third generation biotechnologies are not capital intensive compared to most other advanced technological fields.¹⁹ Therefore, entry barriers need not be prohibitively high, although success would probably still depend on there being adequate capacities in all the related disciplinary fields including fermentation science and chemical engineering, and a conducive institutional environment.²⁰

It is only after a country has a critical mass of trained life-science technicians that inventorship in the life sciences can take place on any scale, and only once this stage has been reached can a patent system be of benefit to a country by rewarding and encouraging further invention. While a few developing countries may perhaps be reaching this critical mass, domestic research institutions and businesses in developing countries are unlikely to be heavy users of patent systems at least in the short term.

But the truth of this proposition provides no definitive answer to the question of whether these countries should offer broad and strong patent protection in the field of biotechnology or to take a TRIPS *de minimis* approach that excludes plants and animals, defines 'micro-organism' narrowly, and opts for a sui generis alternative to patents for plant varieties. Most likely, the latter approach would be preferable for most if not all developing countries. But if biotechnological inventions are well protected, developing countries could benefit even if there are few if any domestic patents applicants. This would depend on whether foreign firms are encouraged to transfer technologies to those countries or to establish R&D facilities there. At this stage we simply cannot be sure that strong IPR protection will make this happen. One complicating factor is that such

business decisions depend on a range of factors of which intellectual property is one among several.

Developing countries need first to determine to what extent and how they wish to harness biotechnology for their economic development and then to design an IPR regime that supports the objectives they decide to pursue. The TRIPS Agreement gives them quite a lot of choice in terms of how they prefer to define a patentable invention in the context of biotechnology. Since discussing the first task is beyond the scope of this paper, this section discusses how TRIPS deals with the IPR protection of biotechnological inventions and how the relevant provisions may be interpreted.

TRIPS makes no reference at all to biotechnology, but the section of the Agreement dealing with IPR protection of life-forms is Article 27.3(b), which allows members to exclude from patentability ‘plants and animals other than micro-organisms, and essentially 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.’

This means that with respect to *products*, plants and animals may be excluded from patentability. As regards *processes*, essentially biological processes for the production of plants or animals may also be excluded. But patents *must* be available for micro-organisms as *products* and for non-biological and microbiological *processes* for producing plants or animals. Patent protection need not be available for plant varieties but an effective IPR system is still obligatory. This may be an UPOV-type plant variety right system, an alternative system yet to be devised, or some combination of systems. Drawing distinctions between micro- and macro- biological processes is by no means easy, especially in the biotechnology age. Therefore, different jurisdictions are likely to draw the line in different places according to how these terms are understood in specific cases.

Much of the language is difficult and open to conflicting interpretations. For example, it remains an open question whether an application relating to a genetically-engineered plant would necessarily include plant varieties within its scope or not. This is important because in some jurisdictions, plants can be patented but plant varieties cannot. In others neither can but there may be a separate IPR system exclusively for plant varieties.

Since the language follows quite closely that of the European Patent Convention, it may be useful to see how the European Patent Office (EPO), which allows plants to be patented but not plant varieties, has addressed this complex issue. In 1995, the Technical Board of Appeal of the EPO²¹ determined that a claim for plant cells *contained in a plant* is unpatentable since it does not exclude plant varieties from its scope. This implied that transgenic plants *per se* were unpatentable because of the plant variety exclusion. But in December 1999, the Enlarged Board of Appeal of the EPO declared that ‘a claim wherein specific plant varieties are not individually claimed is not excluded from patentability under Article 53(b), even though it may embrace plant varieties’, but that ‘plant varieties containing genes introduced into an ancestral plant by recombinant gene technology are excluded from patentability’.²² Of course, other WTO Members do not have to follow this interpretation.

Even words like ‘micro-organisms’ can be interpreted differently from one legal jurisdiction to another. According to the EPO, for example, ‘micro-organism’ ‘includes not only bacteria and yeasts, but also fungi, algae, protozoa and human, animal and plant cells, i.e. all generally unicellular organisms with dimensions beneath the limits of vision which can be propagated and manipulated in a laboratory. Plasmids and viruses are also considered to fall under this definition.’ This seems rather over-expansive since it is not at all obvious that a single cell from a multi-cellular organism is itself an organism even if it has been cultured in a laboratory. There is no reason why developing countries should not define the term in a narrower sense if they should consider it advantageous to do so.

TRIPS makes no reference to genes or DNA sequences. Therefore, WTO Members are presumably not required to allow these to be patented. However, *if* we accept that DNA is not ‘life’ but merely a chemical, then one could make the following interpretation in favour of complementary DNA (cDNA) patenting. This is that cDNA sequences are produced in the laboratory and differ from their naturally-occurring counterparts in that certain sections of the molecule are ‘edited out’; therefore, as with any other synthetic chemical, they should be patentable provided that they fulfil the criteria of novelty, inventive step and industrial applicability.

Alternatively, one can reasonably be sceptical that the deletion of ‘junk DNA’ is inventive enough to deserve the reward of a patent, in that a claimed cDNA molecule is likely to be obvious to somebody ‘skilled in the art’ who knew the sequence of its naturally-occurring equivalent. This is because techniques for isolating and purifying DNA sequences are well-known and no longer require a great deal of skill to use. But what if nobody knew about the naturally-occurring equivalent? Such a claim should still arguably fail for the lack of an inventive step on the basis of the techniques employed being routine. Nonetheless, several countries do allow ‘purified’ and ‘isolated’ DNA sequences to be patented as long as a credible use is disclosed.

It has also been argued that allowing patents on genes and gene fragments is inadvisable because, for the reasons given earlier, it is likely to raise the cost of doing research. Objections to such patents have also been raised on moral or religious grounds, as have patents on plants, animals and other life-forms.²³

Such objections notwithstanding, the extent of patenting relating to DNA has increased tremendously in the last two decades. According to Giles Stokes of Derwent Information, ‘[DNA] sequences first began appearing in patents in 1980, just 16 sequences all year. By 1990 that figure had risen to over 6,000 sequences. Throughout the 1990s the growth in the patenting of sequences expanded exponentially, and this looks set to continue. In 2000 over 355,000 sequences were published in patents, a 5000 percent increase over 1990’²⁴

The writings below comprise a broad spectrum of views on the highly controversial (and fast-moving) topic of intellectual property rights and biotechnology. Ironically, it is some of the older publications that are the most interesting and helpful (e.g. the Barton 1991 and Winter 1992 articles). Ducor and Grubb are both highly technical and should probably be read after looking at these earlier and more general works.

The Sterckx collection of papers is useful in that it comprehensively covers all the issues and contains an extremely broad range of perspectives.

The writings

Adcock, M. and M. Llewelyn (2000) “Micro-organisms, Definitions and Options under TRIPS” and: “Micro-organisms, Definitions and Options under TRIPS: Supplementary Thoughts”. Quaker United Nations Office. Occasional Paper 2.
[<http://hostings.diplomacy.edu/quaker/new/doc/OP2.pdf>]

The paper discusses the various meanings of ‘micro-organism’, which finds that from an historical viewpoint the characterisation of micro-organisms has developed as our ability to study them has improved. The result is that the term has become widely used while our understanding of what micro-organisms are is ill-defined. Taking this point into account, the paper provides a list of possible options for developing countries implementing Article 27.3(b) of TRIPS.

Barton, J. H. (1993) “Adapting the intellectual property system to new technologies”. *Global Dimensions of Intellectual Property Rights in Science and Technology*. M. B. Wallerstein, R. A. Schoen and M. E. Moge. Washington, DC, National Academy Press: 256-283.

This chapter examines whether the intellectual property system is able to adapt to the current rate of change of technology. It uses as examples biotechnology, computer software, and computer-maintained and searched databases. The author describes the new issues posed by these technologies, reviews the approaches taken to adapt the IPR system in each case, and evaluates the performance of this adaptation process by looking at three levels: (1) the mechanisms for developing doctrine; (2) the systems that grant IPRs; and (3) the formal systems (primarily courts) and informal systems (e.g. cross-licenses) that enforce IPRs and shape their practical economic implementation.

*Barton, J. H. (1991) “Patenting life”. *Scientific American*. 264: 40-46.

Entrepreneurs can now legally protect any novel plant, animal or micro-organism they ‘invent’. However, the courts have not yet settled many questions about the reach of biotechnology patents.

BioIndustry Association (1996) “Innovation from Nature: The Protection of Inventions in Biology”. London, BioIndustry Association.

This report contains contributions that set out the important issues in the patenting of biotechnological inventions. The publication is intended to contribute to an informed discussion of the ethics and regulation of biotechnology, with particular reference to the forthcoming debate in Europe on the new Directive for the Legal Protection of Biotechnological Inventions. The report was prepared by the BioIndustry Association’s Intellectual Property Advisory Committee.

Busch, L. (1995) "Eight reasons why patents should not be extended to plants and animals." *Biotechnology and Development Monitor* 24: 24.
[<http://www.pscw.uva.nl/monitor/2409.htm>]

Biotechnology industry interests normally call for an extension of patents to plants and animals as a requirement to stimulate investments in biotechnological research, and to insure the wide distribution of the benefits from such research. The author, on the other hand questions whether such an extension will serve this purpose. If IPRs must be extended to living organisms, he argues, another legal form would be needed.

Crespi, S. (1995) "Biotechnology patenting: the wicked animal must defend itself." *European Intellectual Property Review* 9: 431-441.

Vigorous defence of biotechnology patents. The author dismisses the objections to such patents, such as ethics and morality, and argues that 'patenting life' is a meaningless slogan.

Dronamraju, K. R. (1999) *Biological and Social Issues in Biotechnology Sharing*. Aldershot, Ashgate.

A comprehensive summary of both the global and institutional issues involved in biotechnology sharing. The book covers IPRs and the patenting of new discoveries in genetic knowledge in both agriculture and the human genome. Specific issues covered in the book include the creation of public and private DNA sequencing databases; the North-South dimension of biotechnology sharing; and the exploitation and erosion of biodiversity.

Ducor, P. G. (1998) *Patenting the Recombinant Products of Biotechnology and Other Molecules*. London, The Hague, Boston, Kluwer Law International.

Examines the requirements for patentability in the biotech context, with a special focus on non-obviousness. The book closes by considering broader issues such as the growing secrecy in basic science.

Gaia Foundation (1997) *Raiding the Future: Patent Truth or Patent Lies*. London, Gaia Foundation.

Comprehensive collection of documents critical of the patenting of life-forms.

Gannon, P., T. Guthrie and G. Laurie (1995) "Patents, morality and DNA: should there be intellectual property protection of the Human Genome Project?" *Medical Law International* 1: 321-345.

Examines the appropriateness of using existing patent laws in an effort to secure protection of the work being carried out on the Human Genome Project. Certain ethical and practical problems are explored. It is submitted that it might be appropriate to consider alternative means of rewarding those involved in unravelling human DNA. An attempt is made to outline some appropriate matters to consider in developing such an alternative.

Gollin, M. A. (1993) "An intellectual property rights framework for biodiversity prospecting". *Biodiversity Prospecting*. W. V. Reid, S. A. Laird, C. A. Meyer et al. Washington DC, WRI, INBio, Rainforest Alliance, ACTS: 159-197.

Outlines how IPRs can be applied to the new technologies, commercial practices and ethical standards of bioprospecting and discusses the merits of creating new bioprospecting rights. IPR laws are no panacea without the harmonisation of intellectual property, environmental protection, and commercial laws. The various IPR types are explained and analysed.

Grubb, P. W. (1999) *Patents for Chemicals, Pharmaceuticals and Biotechnology*. Oxford, Clarendon Press.

Provides a comprehensive description of the techniques and industry know-how that underlie successful patent practice and portfolio management in the fields of chemicals, pharmaceuticals and biotechnology.

*Llewelyn, M. (2000) "The patentability of biological material: continuing contradiction and confusion." *European Intellectual Property Review* 22(5): 191-197.

The public distancing of bioscience companies from the image of corporate concerns taking precedence over public and environmental safety has meant a renewed focus on more traditional methods of producing new plant varieties. There is a clear need, if the bioscience industry is to survive, for it to regain public confidence as well as that of the marketplace. One of the key factors in this lack of confidence is the insistence on patent protection for all aspects of genetic research. The need to reclaim confidence cannot and should not be simply seen in terms of human genetic research, but also in respect of all bioscience. The failure within Europe to reach agreement on the issue of the provision of patent protection for genetic material should serve as evidence that it is time for those who have sought to gain acceptance of the patent system as an appropriate means of protecting biological material to admit defeat. While the exclusions remain they leave the system open to abuse through encouraging legal sleight of hand. It is time for the situation to be clarified. In respect of plants this could be achieved either by removing the exclusion or by banning patent protection for all plant material leaving the plant variety right as the sole means of protection.

McNally, R. and P. Wheale (1996) "Biopatenting and biodiversity: comparative advantages in the new global order." *The Ecologist* 26(5): 222-228.

Over the last two decades, the biotechnology industry has been stretching the interpretation of patent law in order to obtain IPRs over genetically engineered living organisms. Such patent rights, coupled with moves to gain exclusive access to the biodiversity of the South, are leading to a new global order. Opposition to such 'biotechnological imperialism' is gaining in momentum.

Moufang, R. (1998) "The concept of 'ordre public' and morality in patent law". *Octrooirecht, Ethiek en Biotechnologie/Patent Law, Ethics and Biotechnology/Droit des Brevets, Ethique et Biotechnologie*. G. van Overwalle. Brussels, Bruylant: 65-77.

Argues that patent law is not ethically neutral. The moral foundations of patent law largely depend on the values of technical progress and free market economy since the

primary task of patent law is to protect technical innovation by exclusive property rights. Considerations based on ethical arguments pervade the entire normative structure of the patent system and play an important role in its further development.

Overwalle, G. van, Ed. (1998) *Octrooirecht, Ethiek en Biotechnologie/Patent Law, Ethics and Biotechnology/Droit des Brevets, Ethique et Biotechnologie*. Brussels, Byuylant.

Collection of papers by lawyers, academics and ethicists considering the ethical dimensions of patent law with respect to biotechnological inventions.

Price, S. C. (1992) "The economic impact of novel genes in plant biotechnology: not without strong intellectual property rights". *Conservation of plant genes: DNA banking and in vitro biotechnology*. R. P. Adams and J. E. Adams. San Diego & London, Academic Press.

The historical basis of patents is reviewed along with the development of IPRs as they pertain to plants and biotechnology. The thesis is advanced that patents and licensing will not inhibit research and development, but actually promote R&D amid the free exchange of information and materials. This is a world wide concept that applies equally to developed and developing countries.

Purdue, D. (1995) "Hegemonic trips: world trade, intellectual property and biodiversity." *Environmental Politics* 4(1): 88-107.

This article argues that the attempt to establish uniform global IPRs over living material is a hegemonic project driven by the biotechnology industry with its complex articulations of molecular biology, agrochemical transnational corporations and state intervention.

Rai, A.K. (1999) "Intellectual property rights in biotechnology: addressing new technology". *Wake Forest Law Review* 34: 827-847.

The author raises various issues about the application of existing IPRs to new technological fields with particular reference to biotechnology.

Scalise, D. G. and D. Nugent (1995) "International intellectual property protection for living matter: biotechnology, multinational conventions and the exception for agriculture." *Case Western Reserve Journal of International Law* 27: 83-118.

The authors argue that TRIPS, the CBD and UPOV are all failed opportunities as far as the US biotech industry is concerned. If the international community desires an equitable sharing of wealth and technology with developing nations, it should not use the mechanism of IPR conventions to achieve that goal. Forcing the financial burden on the biotech industry - in the sense of requiring these firms to seek patent protection in every country and being unable to do so in countries where biotech inventions are not allowed - creates a disincentive to future investment and consequently sacrifices the progress of technology. Instead, the authors propose a UN-supervised fund to support technology-sharing and the promotion of agreements like the one between INBio and Merck.

*Sterckx, S., Ed. (1997) *Biotechnology, Morality and Patents*. Aldershot, Ashgate.

Documents an international workshop held in January 1996 on the ethical aspects of the patenting of biotechnological inventions. The book includes contributions from Greenpeace and animal welfare societies, geneticists, moral philosophers, patent lawyers and politicians from European countries and the USA. The general public perception of biotechnology is discussed and how these perceptions relate to ethical, social and cultural factors. The legal framework is laid out by several experts in the field of patent law and the situation in the U.S. is also described. Attention is focused on the European Commission's Directive on the legal protection of biotechnological inventions.

Sung, L. M. and D. J. Peltó (1998) "The biotechnology patent landscape in the United States as we enter the new millennium." *Journal of World Intellectual Property* 1(6): 889-901.

While still in its infancy, relative to most other technical disciplines, biotechnology has progressed at a pace that has already outstripped the ability of the U.S. legal system to cope. Even so, the authors argue that patent coverage per se, even to basic research tools, does not impede technological advance on a practical level. The patenting of newer applications, such as bioinformatics, is likely to proceed undaunted as biotechnology industry members continue to hedge their infringement liability risks by shoring up defensive patent portfolios.

Thomas, S. and Bobrow, M. (2000) "Patents in a genetic age. *Nature* 409: 763-764 [http://www.nature.com/Dynasearch/App/DynaSearch.taf?target=journals]

This article criticises the trend towards expanded patent protection of DNA sequences, and argues that the present patent system risks becoming a barrier to medical progress. Therefore policy reforms are needed.

*United States Congress – Office of Technology Assessment (1989) *New Developments in Biotechnology: Patenting Life – Special Report*. Washington DC, U.S. Government Printing Office. [http://www.wws.princeton.edu/~ota/ns20/pubs_f.html]

This report reviews US patent law as it relates to the patentability of micro-organisms, cells, plants, and animals; as well as specific areas of concern, including deposit requirements and international considerations. The report includes a range of options for congressional action related to the patenting of animals, intellectual property protection for plants, and enablement of patents involving biological material.

Wells, A. J. (1994) "Patenting life forms: an ecological perspective." *European Intellectual Property Review* 3: 111-118.

Far from being an inappropriate place for the consideration of ethical and moral issues, patent regimes have continually been used explicitly to make moral value judgements. The ideology of development and technocentricity embodied in the patent system has allowed patent systems to grant patents for new life forms, despite many calls by the broader community for limits to this extension. The ecological

implications of allowing these patents are numerous. The author argues that the patent application mechanism should be opened up to a broad range of community views.

* Winter, G. (1992) "Patent law policy in biotechnology." *Journal of Environmental Law* 4(2): 167-187.

Examines the logic of patenting life-forms which is found to be faulty in certain respects. The author explains why interests favouring the expansion of patent law into biotechnological products were successful.

7. Information and Communication Technologies, and Media

Electronic information-processing and communication is the other technological field in which tremendous advances have been achieved in a very short time. Like biotechnology, information technology has multiple industrial applications. The main sources of innovation in ICT are the software, hardware, semiconductor and telecommunications industries.

But other types of business are involved in the ICT sector that have an interest in intellectual property regulation including those that do not innovate in this particular field. For example, the copyright industries have benefited tremendously from ICT, by cutting the cost of doing business and increasing the availability of their products to the public.

On the Internet such businesses can be divided into:

- The World Wide Web browsers. This sector is essentially a duopoly, since virtually all computers use either Microsoft's Internet Explorer or Netscape's Navigator or Communicator.
- The Internet service providers (ISPs), which enable users to access the Internet. These include companies like America On Line (AOL), Compuserve, and telecommunications companies.
- The content providers which make information and creative works available on the Internet. These include publishing and media companies, non-profit organizations, universities and individuals.
- The content creators. These include authors and entertainment companies. Sometimes these are also providers.
- E-commerce businesses. These include dedicated e-commerce firms (e.g. Amazon.com) and those using e-commerce in addition to more conventional means of selling goods and services to the public. These businesses have increased their presence in recent years.

Content providers tend to take a hard line on intellectual property rights, favouring protection as strong as, if not stronger than, the levels of copyright protection available to businesses operating in the more conventional environments such as print. Creators often take a similar position, but not all of them. For example, academics are likely to be more interested in circulating their work as widely as possible than in IPRs.

On the other hand, ISPs generally have little reason to favour strong copyright protection of Internet content, especially given the possibility of finding themselves held liable for the copyright infringements of their users. But this situation may change if other ISPs follow the example of one of the biggest, America On Line, which owns Netscape and has recently merged with Time Warner to form AOL Time Warner. This new corporation is therefore not just an ISP but also a large-scale provider and creator of content.

Stated baldly, very little innovation in the field of ICT takes place in most developing countries. Therefore, many such countries may be more concerned with access than with the promotion of innovation. In this context it is important to be aware that in several

ICT-related businesses such as software, hardware, semiconductors and telecommunications, and Internet service providers, the markets tend to be highly concentrated. This has not been the case so far with Internet content, but this situation may begin to change. Therefore innovative start-up firms based in developing countries may find it difficult to grow. And while software and hardware products are often manufactured in developing as well as developed countries, the companies that design and sell the products capture most of the value by far. Few such companies exist in the developing world.

While there is nothing new in patenting telecommunications technologies or copyrighting books and motion pictures, the ICT revolution has pushed the boundaries of the IPR system in a number of different ways. Thus, software programs are copyrightable. Though it can be argued that computer programs are in essence a long sequence of binary-coded instructions to a computer, copyright law nowadays treats them as if they are literary works.

In the United States, programs are now patentable. There are two types of software-related intellectual product that may be regarded as an invention in some jurisdictions: 'a) computer programs that produce a technical effect within the computer or on other hardware components; and b) computer programs that produce technical effects different from those described in (a), entailing changes in the state of physical matter such as effects on equipment applied to a specific industrial task.'²⁵ In the U.S. it is possible to obtain patents for both types. In Europe, programs are not patentable officially, although patents on type (b) inventions have been granted.

The semiconductor manufacturers came up with a different approach to the software industry. They deemed existing IPRs to be unsuitable for the protection of their chip designs and successfully lobbied for a *sui generis* system, first in the United States and now globally through the TRIPS Agreement. The U.S. legislation, passed in 1984, is known as the Semiconductor Chip Protection Act (SCPA). To a large extent, the SCPA provided the model for the 1989 WIPO Treaty on Intellectual Property in Respect of Integrated Circuits (Washington Treaty). The agreed text of the Treaty was a disappointment for the main semiconductor-producing countries. So while it was incorporated by reference into TRIPS, modifications were made that strengthened the rights provided.

As for digital information, views on the applicability of IPRs vary from the opinion of those who believe that IPRs are completely inappropriate, to others who hold that IPRs have evolved over time and that it is nothing new for them to accommodate new technologies even while there may be problems at first. Among the former are radicals (e.g. former rock musician John Perry Barlow) who believe that 'information wants to be free', and that attempting to use them only holds up technological development while intruding on freedom of expression. Many, if not most, others hold to a view somewhere in between (e.g. McManis and Samuelson).

Developing countries are required under TRIPS to protect software under copyright law and semiconductor designs under the *sui generis* system in accordance with Articles 35-37. However, they do not have to allow the patenting of programs, although they may be required to do so under the terms of bilateral free trade agreements, such as the one

between the United States and Jordan.

Although the writings below are rather small in number, these issues come up in numerous publications included in other sections, such as the Boyle, Weil and Snapper, and Wallerstein *et al* volumes (Section 1).

The writings

Barlow, J. P. (1994) "The economy of ideas: everything you know about intellectual property is wrong". *Wired* March [also in Moore, A. D. (1997): 349-371].

The author explains why copyright is inapplicable to protection of digital information. Among the reasons given are that copyright makes no accommodation for expressions that do not become fixed, that develop cumulatively and that may lack a specific author, and that it is not completely enforceable anyway.

Bettig, R. V. (1996) *Copyrighting Culture: The Political Economy of Intellectual Property*. Boulder and Oxford, Westview Press.

Radical study of copyright law and the media. Beginning with a critical interpretation of copyright history in the USA, the author goes on to explore such issues as the videocassette recorder and the control of copyrights, the invention of cable television and the first challenge to the filmed entertainment copyright system, the politics and economics of intellectual property as seen from both the neoclassical economists' and radical political economists' points of view, and methods of resisting existing laws.

Boyle, J. (1997) "A politics of intellectual property: environmentalism for the Net?" *Duke Law Journal* 47: 87-116. [<http://www.james-boyle.com>]

This article argues that we need a politics, or perhaps a political economy, of intellectual property. Using the controversy over copyright on the Internet as a case-study and the history of the environmental movement as a comparison, it offers a couple of proposals about what such a politics might look like – what theoretical ideas it might draw upon and what constituencies it might unite. The author fears that the present IPR regime inter alia could: (a) lead to extraordinary monopoly and concentration in the software industry, as copyright and patent trump antitrust/ competition policy; (b) "privatise" words, or aspects of images or texts that are currently in the public domain, to the detriment of public debate, education, equal access to information and the like; and (c) impose a pay-as-you-read architecture on the Internet without considering some of the costs resulting from that decision.

Lessig, L. (1999) *Code and Other Laws of Cyberspace*. New York, Basic Books.

There is a common belief that cyberspace cannot be regulated – that it is, in its very essence, immune from the government's or anyone else's control. This book argues that this belief is wrong. It is not in the nature of cyberspace to be unregulable; cyberspace has no 'nature'. It only has code – the software and hardware that make cyberspace what it is. That code can create a place of freedom or a place of oppressive control. With respect to IPRs, code will increasingly replace the law as the primary means of protecting copyright

on the net. However, as the author explains, cyberspace is becoming a highly regulable space, where our behaviour is much more tightly controlled than in real space. In response, he argues that the public can and must choose the kind of cyberspace it want and what freedoms should be guaranteed.

Litman, J. (2001) *Digital Copyright*. Amherst, Prometheus Books.

While the networked digital technology underlying the Internet has greatly enhanced social and economic forms of wealth, it has also made it much easier for producers and distributors of informational works to monitor, record, and restrict what people look at, listen to, read and hear. The author examines the current legal atmosphere in the United States and explores the effects of copyright law on the exchange of information in a free society.

* McManis, C. R. (1996) "Taking TRIPS on the information superhighway: international intellectual property protection and emerging computer technology." *Villanova Law Review* 41(1): 207-288.

The author concludes that the one genuinely new international IPR issue posed by digital technology and the emerging global information superhighway is how to enforce territorially-limited IPRs in what is rapidly becoming an integrated global economy. The emergence of digital technology and global computer networks is rapidly undermining the whole concept of territorially-limited IPRs, and, to a certain extent, the concept of intellectual property itself.

* Samuelson, P. (1993) "A case study on computer programs". *Global Dimensions of Intellectual Property Rights in Science and Technology*. M. B. Wallerstein, R. A. Schoen and M. E. Mogue. Washington, DC, National Academy Press: 284-318.

Balanced historical and contemporary analysis of the pros and cons of IPR protection of software programs in the United States, Europe and Japan.

Thurow, L. (1997) "Needed: a new system of intellectual property rights." *Harvard Business Review* (September-October): 93-103.

Argues that fundamental shifts in technology and in the economic landscape are rapidly making the current system of IPRs unworkable and ineffective. Designed more than 100 years ago to meet the simpler needs of an industrial era, it is an undifferentiated one-size-fits-all system. Moreover the global IPR regime does not reflect the interests of Third World countries since every country that has caught up with more technologically advances countries has done so by copying.

United States Congress – Office of Technology Assessment (1986) *Intellectual Property Rights in an Age of Electronics and Information*. Washington DC, U.S. Government Printing Office.

[http://www.princeton.edu/~ota/ns20/year_f.html]

This report examines the impact of recent and anticipated advances in communication and information technologies on the IPR system. It focuses primarily on the U.S. copyright system, and on the continuing effectiveness of copyright law as a

policy tool in the light of technologies such as audio and videorecorders, computer programs, electronic databases, and telecommunications networks. To obtain a comprehensive view, the study examines the IPR system from a number of perspectives: the constitutional basis of intellectual property policy; the system's goals, laws, and economics; the creative environment; problems of enforcement; the international context; and the U.S. government's role in administering IPRs.

Vivas Eugui, D. (2001) "Issues on the Relationship between E-commerce and Intellectual Property Rights in the WTO: Implications for Developing Countries". Occasional Paper no. 5. Geneva, South Centre.

[<http://www.southcentre.org/publications/occasional/paper05/toc.htm>]

The relationship between IPRs and e-commerce can be identified in four areas: (1) the appropriate and predictable legal environment that a balanced IP regime could bring to the progress and expansion of e-commerce activities; (2) the IP content that can be transmitted or delivered through the Internet and become the object of e-commerce; (3) a new group of issues, including the need for IPR protection for audiovisuals, sui generis databases, new business procedures and the use of Internet domain names and their relation to trademarks; and (4) the identification of most suitable forum to analyze and possibly negotiate the above-mentioned issues. This paper explains the discussions being held in the WTO on the relationship between IPR and e-commerce. It also analyses some of the issues in the relationship between e-commerce and IPR and the implications involved for developing countries. Finally, it proposes recommendations for incorporating the development dimension in the international negotiations.

8. Technology Transfer and Direct Foreign Investment

An oft-repeated claim is that if strong patent rights are not available in a developing country, developed world corporations will not transfer their technologies and will prefer to make their direct investments elsewhere. Is this true? First it is important to understand what ‘technologies’ are and how transfers are conventionally made.

According to Crespi and Straus, technologies are “industrial and agricultural processes and products, and the relevant enabling technology for practical realisation”. To Mugabe and Clark technologies may also be conceived as a range of elements such as ‘knowledge about plant design, process know-how, plant construction, feasibility studies, production management, marketing, distribution, and so on’.

Mugabe and Clark warn against simplistic understandings of North to South technology transfer which envision it as ‘a costless flow of hardware’. They define technology transfer as: ‘a non-linear flow from one production locus to another, of systematic knowledge, skills and equipment for the manufacture of a product and/or the application of a process to generate a product or service.’

According to Pedro Roffe of UNCTAD²⁶ *formal private-sector*²⁷ technology transfer ‘is a commercial operation that takes place through firm-to-firm arrangements and involves flows of knowledge, be they embodied in goods (as in the sale of machinery and equipment) or in the form of ideas, technical information and skills (through licensing, franchising or distribution agreements). Technology transfer can take place at arm’s length, as in the case of the export of capital equipment or of licensing agreements between unaffiliated firms, or it can be internationalized through the transfer of new production techniques within a transnational corporation, between affiliate firms.’

There are several formalized means of transferring technologies, which include foreign direct investment (FDI), joint ventures, wholly owned subsidiaries, licensing, technical-service arrangements, joint R&D arrangements, training, information exchanges, sales contracts, and management contracts. Of these, Mugabe and Clark, estimate that FDI in some form or another accounts for *over 60 percent* of technology transfer flows to developing countries.

The relationship between levels of IPR protection and the volume and direction of inward technology flows is highly complex and is likely to involve a great many factors whose relative importance will vary widely from one country to another. Theoretically, it seems logical to assume that IPR availability would be a prerequisite for the international transfer of new technologies, *at least those that can easily be copied*. One would expect companies to be reluctant to lose control over technologies that may have cost them millions of dollars to develop *in countries where domestic firms can adopt the technologies and produce goods that will compete with those of the technology owners*. Accordingly, the only way that companies would feel encouraged to transfer proprietary technologies is where IPR protection is strong enough for them to charge licence fees high enough to reflect the costs of innovation, or alternatively by means of FDI or joint ventures where they maintain more control over these technologies.²⁸ According to Keith

Maskus of the World Bank (in his book in the 'General Texts' section), in countries with strong IPR protection and enforcement, transnational corporations are likely to favour technology licensing agreements and joint ventures. In countries with weak IPRs, FDI would be the favoured business strategy in overseas markets. Similarly, Vishwarao suggests the possibility that gains for developing countries from lack of IPR protection would be 'offset by strategic behavior by Northern firms who opt for technology transfer via subsidiary or monopoly production'.

However, a counter-argument can be made that the *overall* effect of IPRs will inhibit technology transfers. The views of the critics who argue that IPRs inhibit technology transfer and reinforce North-South inequalities can be summarized as follows:

As an intervention in the free market, patents restrict the number of people who could otherwise freely make, use, sell or import the protected products and processes, and enable owners to avoid a situation where the price of their products or processes is driven down towards the marginal cost of reproduction. If IPRs are available in a developing country, licence fees for protected technologies may be too high for most domestic firms. Therefore, the best way for developing country governments to help domestic firms and public institutions to acquire technologies, and ensure that the products derived from these technologies are affordable to smaller companies and poor people, would be either by keeping them outside the patent system or by allowing compulsory licensing on licensee-friendly terms.

As for the geography of patent ownership, this is heavily skewed in favour of the North. Patent Cooperation Treaty statistics show that despite the increased developing country membership of recent years, the vast majority of PCT applications continue to be filed by companies based in North America, Western Europe or Japan. Since such companies are the main users of the patent system, in the short term at least, they will be the major beneficiaries of new patent laws in developing countries. And given the economic power of these companies it may be more difficult than ever for developing countries to negotiate favourable terms for technology.

What is the empirical evidence concerning the links between stronger IPRs, investment flows, R&D and technology transfers? In fact, as Correa notes, the data produced so far are hardly conclusive. The study by Maskus (see below) claimed some evidence of a positive correlation, while conceding that IPRs are one of several factors that may facilitate technology transfers, and also that strengthening IPRs will involve unavoidable costs (in terms of legislation, administration and enforcement), as well as benefits for developing countries. The Primo Braga and Fink study for the World Bank was even more cautious and recommended further research before firm conclusions could be made. Evidence from Turkey published in 1985 found that the banning of pharmaceutical patents appeared to have no significant effects on levels of direct foreign investment, technology transfers or domestic innovation. Similarly, Kondo's study on Brazil, taking manufacturing industry as a whole, found no evidence that FDI levels were greatly affected by patent protection. On the other hand, Edwin Mansfield's well-known study indicated that a large proportion of respondents from the chemical and pharmaceuticals industries claimed that their FDI decisions *were* affected by the levels of IPR protection available.

In short, much uncertainty remains as to whether IPRs support or hinder technology transfers to developing countries, or make little difference either way. But the existence of TRIPS and of the highly concentrated market structures of some industries suggests that the bargaining power of developing countries and their companies is likely to be weak and getting weaker still, especially the smaller countries that are unlikely to be an important market for the technology-owning firms. But again there is a plausible counter-argument: transnational corporations may be *more willing* to share technologies on concessional terms in countries with no companies that could use them to produce competing products for sale there or in other markets.

The writings

Almeida, P. R. de (1995) "The political economy of intellectual property protection: technological protectionism and transfer of revenue among nations." *International Journal of Technology Management* 10(2/3): 214-229.

This paper discusses the differing attitudes of developing and developed countries to protection of IPRs and the effects on international trade negotiations. It highlights the trend in industrialised countries towards technological protectionism and the economic and social costs for developing countries. Finally, suggestions are made as to how these difficulties may be resolved.

Correa, C. M. (1995) "Intellectual property rights and foreign direct investment." *International Journal of Technology Management* 10(2/3): 173-199.

This paper discusses the relationship between foreign direct investment and IPRs. It aims to provide an analytical framework with which to understand this relationship, the industries involved and the degree of development of countries concerned. The main developments in legislation, WIPO, UPOV and GATT that have recently taken place are outlined with regard to strategies and decisions for FDI. An analytical framework is then presented and the significant differences it exposes when applied to different types of IPR are exemplified by case studies.

Crespi, R. S. and J. Straus (1996) "Intellectual Property, Technology Transfer and Genetic Resources: An OECD Survey of Current Practices and Policies". Paris, OECD. [http://www.oecd.org/dsti/sti/s_t/biotech/prod/ipr.pdf]

This report reviews current practices and policies on intellectual property, technology transfer, and access to genetic resources, in an attempt to better understand the links between these topics that have recently been highlighted by the adoption of the Convention on Biological Diversity (CBD). The analysis is based primarily on responses to an OECD Questionnaire which complemented work done in other parts of the Organisation in relation to the CBD.

Eisenberg, R. S. (1994) "Technology transfer and the genome project: problems with patenting research tools." *Risk: Health, Safety and Environment* 5(2): 163-175.

The author raises various concerns about the patenting of basic human genomic

research tools. She concludes that patents have a critical role in promoting technology transfer, but the incentives created by patent rights in government-sponsored inventions would do little to compensate for the damage we could do to our research enterprise if we allocate too much of our knowledge to private owners and too little to the public domain.

Juma, C. and J. Mugabe (1997) "Public policy and new generic technologies: the case of biotechnology in Sub-Saharan Africa". *New Generic Technologies in Developing Countries*. M. R. Bhagavan, Ed. Basingstoke, Macmillan Press: 115-139.

Discussion on the challenges faced by African countries in terms of developing capacity in biotechnology. The authors propose a range of policy-related approaches to address the problems. With respect to technology acquisition, they take the view that while strong IPRs increase transaction costs of accessing technologies, relaxing IPRs will not necessarily lead to technology transfer. Developing countries are still failing to use technologies already in the public domain, and most of the biotechnologies needed by developing countries are in the public domain.

Kondo, E.K. (1995) "The effect of patent protection on foreign direct investment". *Journal of World Trade* 29(6): 97-122.

Study on manufacturing in Brazil which casts doubt on claims that strong patent rights are necessary for direct foreign investment.

Kumar, N. (1996) "Intellectual property protection, market orientation and location of overseas R&D activities by multinational enterprises." *World Development* 24(4): 673-688.

This paper develops an analytical framework to explain the determinants of location of overseas R&D by multinationals in terms of the nature and extent of FDI and host country resources and policy regimes. Empirical findings for U.S. MNCs suggest that MNCs prefer to locate their R&D activities in countries that are able to offer them, among other things, large markets, technological resources and infrastructure. Host market-oriented affiliates are more likely to have R&D units than the export-oriented ones, especially in developing countries. The relative strength of the patent regime appears to affect the direction rather than the magnitude of R&D investments made in a country.

Mansfield, E. (1994) "Intellectual Property Protection, Foreign Direct Investment and Technology Transfer". International Finance Corporation Discussion Paper Number 19. Washington DC, IFC.

Policy makers and analysts require a better understanding of the effect, if any, that a developing country's IPR system has on technology transfer through foreign direct investment. It is frequently argued that relatively weak IPRs may lower the probability that multinational firms will invest there, and that, even if they do invest there, they may be willing to invest only in wholly owned subsidiaries or to transfer only older technologies. But this and other hypotheses have been challenged, and there is very little evidence one way or the other. This paper is an attempt to help fill this gap. Based on a combination of survey data, interview studies, and statistical analysis, it is found that the strength or weakness of a country's IPR system seems to have a substantial effect,

particularly in high-technology industries, on the kinds of technology transferred by many U.S. firms to that country. Also, this factor seems to influence the composition and extent of U.S. direct investment there, although the size of the effects seems to differ from industry to industry.

* Maskus, K. (1998) "The role of intellectual property rights in encouraging foreign direct investment and technology transfer." *Duke Journal of Comparative and International Law* 9(1): 109-161.

A review of globalisation which suggests that emerging countries have strong and growing interests in attracting trade, foreign direct investment, and technological expertise. In this context, IPRs are an important element in a broader policy package that governments in developing economies should design with a view toward maximising the benefits of expanded market access and promoting dynamic competition in which local firms take part meaningfully. This broad package would include promoting political stability and economic growth, encouraging flexible labour markets and building labour skills, continuing to liberalise markets, and developing forward-looking regulatory regimes in services, investment, IPRs, and competition policy.

* Mugabe, J. and N. Clark (1996) "Technology transfer and the Biodiversity Convention: issues of conservation and sustainable use." *Science, Technology and Development* 14(3): 1-31.

This paper is concerned with how to facilitate the development and transfer of technology relevant to conservation of biodiversity and sustainable use of its components. It examines the range and nature of technologies relevant to the objectives of the CBD and suggests ways or means to facilitate the development and transfer of such technologies. Developing countries treat IPRs as a barrier to transfer of technology while developed countries argue that to stimulate and promote private investments in technological development, countries should strengthen IPRs. However, neither position is informed by empirical evidence of how IPRs affect the transfer of specific technologies to developing countries.

* Primo Braga, C. A. and C. Fink (2000) "International transactions in intellectual property and developing countries." *International Journal of Technology Management* 19(1): 35-.

This paper discusses the international dimension of intellectual property protection with an emphasis on the implications for developing countries. It explores the effects of IPR protection on trade, foreign direct investment, and technology licensing, and reviews empirical evidence in this context. Finally, it discusses how international transactions in intellectual property affect the international transfer of knowledge.

Vishwasrao, S. (1994) "Intellectual property rights and the mode of technology transfer." *Journal of Development Economics* 44: 381-402.

Transferring technology in an environment where patent protection is uncertain can pose significant risks to an innovating firm's ability to appropriate rents. This paper incorporates asymmetric information in a screening game where the innovating firm has

the choices of licensing a new product at arm's length to a foreign firm, exporting it, or licensing it to a subsidiary. Subsidiary production avoids the risk of imitation but involves higher costs for the innovating firm. The gains to the Southern country from the lack of IPR protection may be offset by strategic behaviour by Northern firms who opt for technology transfer via subsidiary or monopoly production.

9. Administration and Enforcement

TRIPS places much emphasis on enforcement. With respect to the general enforcement obligations, procedures that are fair, equitable and not unnecessarily complicated, costly or time-consuming must be established that permit effective action against any act of infringement of IPRs.

The judicial authorities must be granted the power to require infringers to pay damages adequate to compensate the right holder for the injury suffered due to the infringement. Members are required to provide for criminal procedures and penalties at least in cases of wilful trademark counterfeiting or copyright piracy on a commercial scale. Remedies may include imprisonment and/or monetary fines. Such remedies may also be applied in other cases of IPR infringement if done wilfully and on a commercial scale.

Members are not required to put in place a judicial system for enforcing IPRs separate from that for the enforcement of law in general. Moreover, TRIPS creates no obligation to shift resources away from the enforcement of law in general towards the enforcement of IPRs. Nonetheless, resource-poor countries may face a difficult dilemma when determining how to allocate the scarce resources they have.

The dynamic efficiencies of stronger and more effective IPR systems may more than make up for the administrative and enforcement costs. Whether or not this turns out to be true, the costs must be borne before the benefits accrue and, for least-developed countries especially, these are likely to be particularly onerous. In addition, since regulators and courts are likely to lack experience in dealing with IPR-related matters, financial and technical assistance will be desperately needed in many poor countries.

Another serious challenge for many developing countries is to employ sufficient qualified examiners to handle a high volume of patent applications. The danger is that national patent offices will accumulate large backlogs of unexamined applications, especially in the most advanced technological fields.

This issue has attracted surprisingly little attention, which is why the writings are so few in number. The most important one is the booklet produced by UNCTAD.

The writings

* United Nations Conference on Trade and Development (1996) *The TRIPS Agreement and Developing Countries*. New York and Geneva, United Nations.

This is a study on the financial and other implications of TRIPS on developing countries. Part one of the report assesses the economic implications of TRIPS, focusing on market-related costs and benefits, as well as the direct costs stemming from implementation. It also summarises the results of selected country case studies carried out for the purpose of this study. Part two deals with the main disciplines covered by TRIPS. It highlights the principal provisions of each of these, its main economic and legal implications, general issues arising from its implementation and the costs involved in implementing the specific discipline. A section containing

summaries of the main findings and conclusions of the study and the key issues that might require further consideration is presented. The section also explores the role that international organisation can play in assisting developing countries in their efforts to implement TRIPS.

10. Trade and Competition

The WTO is intended to promote and enforce the *deregulation* of international trade. At the same time, the TRIPS Agreement establishes a global regime of economic *regulation* intended to protect producers from competitive practices deemed by certain criteria contained within the Agreement to be 'unfair'. Do IPRs help to establish the level playing field needed to allow fair competition to exist in the products and services provided by high technology industries? Or do IPRs create monopolies that actually hinder competition?

In fact whether IPRs support fair trade or protectionism is largely a matter of one's own perspective. It is worth bearing in mind that in late nineteenth century Europe free trade economists were generally opposed to patents on ideological grounds, while those favouring protectionism supported the patent system. These economists tended to view IPRs not as – in the Lockean tradition – natural rights, but as monopoly privileges. Nowadays, opponents of strong IPRs are often depicted as being against free trade.

Somebody promoting the interests of a developed country may regard an international IPR convention defining high global minimum standards (e.g. TRIPS) as a desirable pro-free trade measure that helps tear down discriminatory barriers to trade and benefits everybody in the long run. A representative from a developing country who considers his or her nation has benefited from being able to copy or export foreign inventions may regard being prevented or restricted from doing so as a protectionist restraint on trade, or alternatively as an undesirable free trade measure that conflicts with the need to allow infant industries to flourish before being exposed to competition from long-established foreign firms.

Clearly, then, whether TRIPS supports free trade or protectionism and increases or impedes the convergence of national economic wealth indices throughout the world, are matters for continued debate. And one should hardly be surprised that criticism of TRIPS from those favouring developing country interests has come both from people supporting free trade and those who are much more sceptical about liberalisation. From the first perspective, the economist Jagdish Baghwati has criticised TRIPS on the grounds that: (a) it will increase financial transfers from poor to rich countries in the form of royalties and licence fees thereby further impoverishing the former and enriching the latter nations; and (b) that it is protectionist in the sense that it allows developed countries to impose sanctions on countries that fail 'adequately' to respect their companies' intellectual property rights. And from the second, Paulo de Almeida of the Brazilian Foreign Ministry, believes that the establishment of a global IPR regime via the Uruguay Round was an act of technological protectionism by the developed countries which will impose huge economic and social costs for many developing countries. This view is shared by many pro-developing country advocates who tend to be sceptical about free trade and globalisation, at least as these are understood in North America and Europe.

So far we are treating this as a North-South issue but neglecting the micro level and the effects of IPRs on global markets in specific industrial sectors. In fact, concerns are being raised that IPRs catalyse tendencies for global markets to be dominated by small numbers of mega-corporations. Take for example the emergence of that new type of business known as the 'life-science corporation'. The growth of these firms is

having the consequence that the concentration of technology ownership is becoming ever more skewed as large corporations in the life science/biotechnology sectors increasingly access rival companies' IPR-protected technologies through cross-licensing, or by purchasing or merging with these companies. Such life science giants as Monsanto, Novartis, AstraZeneca²⁹ and Aventis³⁰, which hold dominant positions in two or more industrial sectors, are rarely if ever the result of organic (internal) growth but of mergers, acquisitions, joint ventures and strategic partnerships involving companies in such sectors as chemicals, seeds, processed foods and dietary supplements, and pharmaceuticals. In the case of pharmaceuticals, McManis notes that a major factor driving the consolidation trend is the significant number of patent expiries of recent years, coupled with the lack of new drugs coming on the market to replace them. One of the major inducements for companies to acquire other firms is the opportunity to enlarge their patent portfolios, helping them to secure increased market shares while eliminating rivals.

According to the United Nations Development Programme the ten largest corporations in the main life science sectors now dominate global markets to a very high level, as follows:

- Commercial seed: 32% of a \$23 billion industry
- Pharmaceuticals: 35% of \$297 billion
- Veterinary medicine: 60% of \$17 billion
- Pesticides: 85% of \$31 billion

This situation can be attributed to a combination of possible factors, some of which may operate synergistically, including:

- privatisation of industry;
- privatisation of research;
- stricter environmental and/or safety regulation;
- trade liberalisation;
- mergers and acquisitions; and
- intellectual property rights.

With respect to the agrochemical and seed industry, the Nuffield Council on Bioethics notes that consolidation “continues to shorten the list of owners of the important ‘enabling’ intellectual property for plant genetic modification and plant molecular genetics.” Furthermore: ‘there are now six major industrial groups who between them control most of the technology which gives freedom to undertake commercial R&D in the area of GM crops’.³¹

IPRs have much to do with these trends, which appear to have begun in the 1970s, but really gathered speed in the 1990s. Two U.S. rural sociologists, Frederick Buttel and Jill Belsky, argued that the 1970 United States *Plant Variety Protection Act* increased expectations of seed industry profits and thereby helped to stimulate an upsurge in acquisitions and mergers involving seed companies such that many seed producers became subsidiaries of large agrochemical firms. These ‘multinational parents of seed companies have larger fertiliser, herbicide, insecticide, and fungicide product lines that generally are far more important in terms of total revenue and profit than are

seeds...[a]ccordingly, many agrochemical-based seed company subsidiaries might be hesitant to emphasise plant breeding goals that would threaten fertiliser and pesticide product lines.'

Consequently, 'a substantial amount of plant research in private firms has been aimed at developing various types of seed-chemical packages that reinforce rather than threaten sales of agricultural chemicals.'

Since then, biotechnology emerged to form the 'glue' providing the potential for R&D synergies that made so commercially attractive the construction of conglomerates with interests extending well beyond agribusiness to include human and animal diagnostic and therapeutic products.

The extent and the implications for developing countries of such concentrated market power across the life sciences is difficult to predict but is undoubtedly cause for serious concern.

This is not to paint an entirely negative picture nor to argue that IPRs are anti-competitive *per se*, as well as in their consequences. Neither is it true to say that developing country firms cannot benefit from intellectual property rights. In fact, it can be argued that absence of IPR protection in developing countries is unfair and even disadvantageous to local firms seeking a strong position in the domestic market and looking to IPR protection as a way to secure and maintain such a position. Yet history and recent experience suggest that where IPRs are available to domestic and foreign firms alike, the largest firms will tend to dominate and in developing countries these will probably be foreign transnational corporations.

Can stronger IPRs increase the international competitiveness of firms in developing countries? The history of IPRs suggests that with exceptions this is unlikely to happen at least in the short term. Developing country firms interested in the possibility of exporting innovative products will probably be better off with domestic IPR systems that preclude the dominance of foreign firms even if they themselves are prevented from securing IPR protection as well. History seems to tell us that IPRs will not make them innovative; rather IPRs can strengthen their positions in domestic and international markets *once they have become innovative*. And a vital stage in the process of becoming innovative is to be good at imitating - a possibility that TRIPS makes very difficult.

Even so, blanket generalisations should be avoided. There will always be exceptions to the rule since developing country firms can be innovative where there are strong IPRs as well as where the rights are weak or non-existent. Moreover, freedom to copy does not necessarily create incentives to be innovative or prepare firms for the time when imitation becomes illegal.

The writings

Anderman, S. D. (1998) *EC Competition Law and Intellectual Property Rights: The Regulation of Innovation*. Oxford, Clarendon Press.

IPR specialists argue that EC competition law should defer to IPR legislation in the interests of innovation. The author argues against such an approach and demonstrates how, both according to the interpretation given to the EC Treaty and as a matter of economic policy, EC competition law must provide a set of outer limits to, and a framework of rules which regulate, the exploitation and licensing of IPRs.

Anderson, R. and N. T. Gallini, Eds. (1998) *Competition Policy and Intellectual Property Rights in the Knowledge-based Economy*. Calgary, University of Calgary Press.

This book seeks to demonstrate - in the Canadian context - that ensuring a high rate of innovation and productivity improvement is at the core of the challenges facing the Canadian economy. The sound application of well-designed government policies to maximise incentives for innovative activity while maintaining vigorous interfirm rivalry is vital to meeting the challenge. The book also considers competition and IPR policy in other major economies such as the United States, the European Community and Japan.

Capling, A. (1999) "Intellectual property". *Trade Politics: International, Domestic and Regional Perspectives*. B. Hocking and S. McGuire. London and New York, Routledge: 79-95.

The author argues that the debate over IPRs is characterised by competing normative positions, few of which are grounded in either economic theory or empirically demonstrable outcomes. As a result, it is possible that TRIPS will simply enhance the economic benefits accruing to the holders of IPRs while imposing new and greater economic and social costs for many others.

Coleman, P. (1997) "U.S. Trade in Intangible Intellectual Property: Royalties and Licensing Fees." *Industry, Trade, and Technology Review (U.S. International Trade Commission)* (April): 23-37.

In addition to the growing emphasis on worldwide protection of IPRs, trade in intellectual property generates intense interest in the United States and abroad, in part because leading experts contend that net exports of intellectual property reflect national competitiveness, especially in advanced-technology industries. This article examines the principle components of trade in intangible intellectual property, identifies underlying patterns, and discusses trade barriers in principle export markets. One of the findings revealed by this article is that in 1995, the US exported intangible intellectual property valued at nearly \$27 billion, and imported intellectual property valued at \$6.3 billion, resulting in a trade surplus of \$20.6 billion.

Cornish, W. R. (1993) "The international relations of intellectual property." *Cambridge Law Journal* 52(1): 46-63.

Reviews the international relations of IPRs from the 19th century to the Uruguay Round GATT negotiations, and argues that IPRs should be no more than a corrective for those cases where the introduction of novel goods and services would be unduly impeded without the special incentive of an exclusive IPR right.

Hayenga, M. L. (1998) "Structural change in the biotech seed and chemical industrial

complex.” *AgBioForum* 1(2): 43-55.
[<http://www.agbioforum.org/vol1no2/hayenga.html>]

In this paper, the restructuring of the seed and chemical industries is discussed. Impacts on the herbicide and insecticide markets are detailed, along with the contractual relationships between biotechnology seed suppliers and farmers. Antitrust issues raised by the recent wave of merger and acquisition activity and IPR issues are briefly discussed.

* Lesser, W. (1998) “Intellectual property rights and concentration in agricultural biotechnology.” *AgBioForum* 1(2): 56-61.
[<http://www.agbioforum.org/vol1no2/lesser.htm>]

The relationships between IPRs and structural change are examined in this paper. IPRs are a complex, multifaceted area and one in which corporate strategies are poorly understood. Nevertheless, it is argued here that IPRs can affect firm entry, make vertical integration in downstream industries more or less necessary, and create financial incentives for downstream mergers and acquisitions. Hence, IPRs can have significant structural impacts.

Lippert, O., Ed. (1999) *Competitive Strategies for the Protection of Intellectual Property*. Vancouver, The Fraser Institute.

This book contains discussions on the global changes in IPRs, including patents and trademarks. It discusses the critical trade and economic issues for the developing and developed countries involved in creating this new international standard of intellectual property protection.

* Maskus, K. E. (1998) “The international regulation of intellectual property.” *Weltwirtschaftliches Archiv* 134(2): 186-.

The TRIPS Agreement will usher in a markedly stronger global system of defining and protecting IPRs. This paper analyses TRIPS as a global regulatory device. It first discusses the concept of intellectual property and the need for its protection and regulation. It presents evidence on the wide variations in IPRs across countries and discusses how TRIPS will affect these differences. Theoretical predictions about how this stronger system will influence global trade, investment, and technology innovation and diffusion are ambiguous, but limited empirical evidence suggests a modest positive effect overall. However, the distribution of costs and benefits will vary across countries. Countries that are net importers of intellectual property should implement the agreement in ways that promote dynamic competition and should pay attention to linkages to competition policies.

Maskus, K. E. and M. Lahouel (2000) “Competition policy and intellectual property rights in developing countries.” *The World Economy* 23(4): 595-611.

The authors argue that developing countries would gain if a WTO agreement were reached that recognised the principle that competition law should promote open competition, emphasised international cooperation in competition enforcement, and disciplined the most anti-competitive forms of public and private restraints against market contestability. They propose that any new round of trade negotiations should incorporate competition regulation, with a view towards enhancing global market

accessibility.

Maskus, K. E. (2000) "Regulatory Standards in the WTO: Comparing Intellectual Property Rights with Competition Policy, Environmental Protection, and Core Labor Standards". Working Paper 00-1. Washington DC, Institute for International Economics. [<http://www.iie.com/catalog/WP/2000/wp00.htm>]

TRIPS greatly expands the purview of the WTO into domestic regulatory standards. The minimum standards required in TRIPS are essentially about production processes, thereby erasing the traditional "product versus process" distinction in the trading rules. This evolution immediately raises the question of whether other regulatory and process standards, including competition policy, environmental standards, and worker rights, should be placed onto the WTO agenda. Because they evidently no longer may be excluded on the grounds of the inability of the trading system to discipline process standards, the argument must proceed on other grounds. In this paper the author reviews the logic and evidence for such inclusion based on economic arguments for multilateral management of market externalities, policy coordination problems, and systemic trade issues. The review concludes that, conditional upon the protection of IPRs in the WTO, a strong case may be made for including competition rules. The case is weaker for environmental regulation and quite weak for labour rights.

McManis, C. R. (1998) "Intellectual property and international mergers and acquisitions." *University of Cincinnati Law Review* 66: 1283-1314.

Study on the links between IPRs and the consolidation trend in some industries such as pharmaceuticals that are experiencing mergers and acquisitions involving some of the biggest corporations. Inter alia, the author proposes that entrepreneurs in developing countries and the developing countries themselves develop ties with small- and medium-sized firms in the developed world. This is because the developing world and its allies among such small- and medium-sized firms could play a constructive role in the global economy, by combating the market distorting effects of oligopoly and incipient cartelisation of R&D in industrialised countries.

Moran, W. (1993) "Rural space as intellectual property." *Political Geography* 12(3): 263-277.

Under free trade agreements nations are questioning the commercial legislation governing production of their partners. Also, for specific commodities, groups of producers and countries are bring litigation against other trading partners over the use of place-names by successfully claiming that they are intellectual property (i.e. geographical indications). Both processes are part of the globalisation of production under capitalism but their effects may be contradictory. Increased similarity in the commercial legislation of countries will enhance the advantage of the most competitive regions and nations leading to greater regional specialisation in rural production.

Nuffield Council on Bioethics (1999) *Genetically Modified Crops: The Ethical and Social Issues*. London, Nuffield Council on Bioethics. [<http://www.nuffieldfoundation.org>]

Study on the ethical and social issues relating to GM crops. Chapter 3 (“Issues related to commercial implementation”) deals with the following issues and questions: commercial investment in GM technologies; the growth of the commercial sector; where are the decisions taken regarding the goals for GM technology?; consolidation of the plant biotechnology industry; the concept of property rights; the development of intellectual property in the life sciences; patenting living organisms; patenting DNA; patents on basic technologies; patenting and the impact of genomics; patents and commercialisation issues; commercialisation and developing countries issues; licensing; compulsory licensing; broad claims; patented technologies which override the UPOV convention; consequences of raw material substitution; globalisation and commodification; and accountability in the international dimension.

* Reichman, J. J. (1996-97) “From free riders to fair followers: global competition under the TRIPS Agreement.” *New York Journal of International Law and Politics* 29: 11-93.

The author argues that developing countries have much to gain by accepting the challenge implicit in TRIPS to become fair followers in the worldwide quest for technical information. To sustain this thesis, the author begins by contrasting the growing tendency of the developed countries to adopt anti-competitive, high-protectionist industrial policies with the developing countries’ new prospects for rapid economic growth under free-market conditions. He then outlines a pro-competitive strategy that could strengthen the developing countries’ capacities to acquire up-to-date technological knowledge and skills while implementing minimum international IPR standards. In conclusion, the author argues that until a global equilibrium between innovators and competitors is achieved, any developing country willing to adopt and defend a pro-competitive reading of the TRIPS standards actually represents the interests of consumers and second-comers everywhere, including those in the developed countries themselves.

Ryan, M. P. (1998) *Knowledge Diplomacy: Global Competition and the Politics of Intellectual Property*. Washington DC, Brookings Institution Press.

Explains the issues, politics, and diplomacy of balancing IPRs with the public’s right of access, and discusses the major negotiations to forge international policy in the 1980s and 1990s, including the bilateral US intellectual property negotiations with China and other developing countries, the multilateral negotiations conducted at GATT, and the 1996 copyright treaties negotiated at WIPO. Also – from a strongly pro-U.S. position – analyses the shaping context of global competition in intellectual property-intensive industries – pharmaceuticals and fine chemicals, film and music, publishing, information technology, and software – and the industries’ policy advocacy tactics and strategies to protect their markets.

* Sehgal, S. (1996) “IPR driven restructuring of the seed industry”. *Biotechnology and Development Monitor* 29: 18-21. [<http://www.pscw.uva.nl/monitor/2907.htm>]

Until recently, success in the seed business could be traced to the strength of a company’s classical breeding programme. But with the advent of the first transgenic plants, such breeding, as well as access to germplasm, genes, and biotechnologies have become of considerable strategic importance. Genetic material, biotechnologies and their associated IPRs are leading to a new restructuring of the relations between agrochemical, agro-biotechnological, food processing, and seed industries.

Sell, S. K. (1998) *Power and Ideas: North-South Politics of Intellectual Property and Antitrust*. Albany, State University of New York Press.

Provides historical perspective, a broad introduction to the issues, and an in-depth, substantive analysis of the North-South politics and diplomacy of intellectual property protection and antitrust from the early 1970s to the present.

11. The TRIPS Agreement

The Agreement on Trade-Related Aspects of Intellectual Property Rights was one of the main outcomes of the Uruguay Round of trade negotiations concluded in 1994, which also led to the establishment of the World Trade Organization. TRIPS is now the key international agreement promoting the harmonisation of national IPR regimes.³² The purpose of the TRIPS Agreement, as stated in the preamble, is to introduce new rules and disciplines for global trade concerning the provision of:

- adequate standards and principles concerning the availability, scope and use of trade-related intellectual property rights
- effective and appropriate means for the enforcement of trade-related intellectual property rights
- effective and expeditious procedures for the multilateral prevention and settlement of disputes between governments

Protection and enforcement of IPRs should, according to Article 7 (*Objectives*), “contribute to the promotion of technological innovation and to the transfer and dissemination of technology, to the mutual advantage of producers and users of technological knowledge and in a manner conducive to social and economic welfare, and to a balance of rights and obligations.” Just as social and economic welfare are considered as priority matters, Article 8 Paragraph 1 gives priority not only to the public interest in sectors of vital importance to social, economic and technological development, but also to public health and nutrition.

This section consists of legal analyses of the TRIPS Agreement (Blakeney, Correa and Yusuf, and Gervais) plus writings dealing with certain aspects of the Agreement which are of particular relevance to the interests of developing countries (e.g. Correa, Halewood and Juma), in addition to which there is an interesting paper (by Drahos) which describes the political background to the inclusion of trade-related IPRs in the GATT Uruguay Round negotiation and the achievement of the Agreement itself.

Surprisingly little attention has been given to one of the biggest challenges facing developing countries, which is that of making the domestic IPR regulatory systems function effectively. For example, bearing the heavy administrative and financial burden of establishing a patent office with the capacity to process efficiently an ever-increasing volume of applications in the latest technological fields is going to be a huge difficulty for a great many countries. A rare exception is the UNCTAD publication referred to in Section 9, which covers this issue well.

The writings

Beier, F.-K. and G. Schricker, eds. (1997) *From GATT to TRIPS*. Weinheim, VCH.

This book constitutes a comprehensive survey over, and insight into the TRIPS Agreement, from the general rules and special provisions to the obligations of the Member States with regard to the enforcement of the various rights and settlement of

disputes. The book also deals with the adoption of the Agreement's provisions into national law, particularly within the framework of the European Community.

Blakeney, M. (1996) *Trade Related Aspects of Intellectual Property Rights: A Concise Guide to the TRIPS Agreement*. London, Sweet and Maxwell.

Comprehensive textual analysis of the TRIPS Agreement. The first part details the background of TRIPS including its evolution, and introduces the key concepts and institutions of the global IPR system. The second part of the book comprises an in-depth analysis of the whole agreement.

* Correa, C. M. and A. A. Yusuf, Eds. (1998) *Intellectual Property and International Trade: The TRIPS Agreement*. London, The Hague and Boston, Kluwer Law International.

TRIPS is the most far-reaching and comprehensive legal regime ever concluded at the multilateral level in the area of IPRs. In ten chapters, this work offers a framework for understanding the background, principles and complex provisions of the Agreement, it highlights the context in which it was elaborated and adopted, and the manner in which it is to be interpreted and applied. The book further analyses the new standards established under TRIPS. Finally, the work aims to stimulate further discussions and analysis in this area of growing importance to international law and international economic relations, particularly in respect of the possibilities offered by TRIPS, the legislative latitudes it leaves its Member States and the loose ends that may need to be addressed at national or international level in the future.

* Correa, C. M. (2000) *Intellectual Property Rights, the WTO and Developing Countries: The TRIPS Agreement and Policy Options*. London, New York, Penang, Zed Books and Third World Network.

The author explores the TRIPS Agreement's implications for developing countries. These relate to the future of R&D, their access to advanced technology, commercial exploitation of their natural resources and the welfare effects. He focuses on information technologies, integrated circuits and digital information, and also the conservation and sustainable use of genetic resources for food and agriculture. Correa also indicates some TRIPS-compatible policy options.

Dhar, B. and C. N. Rao (1995) "Trade relatedness of intellectual property rights". *Science Communication* 17(3): 304-325.

This article argues that the patent provisions in the TRIPS Agreement will strengthen existing trade monopolies and adversely influence technology diffusion between the North and the South. Such an outcome, which would possibly diminish market opportunities for the less affluent nations, would further widen the economic gap between the North and South. The article uses a neo-technology theory of trade to shed light on this emerging problem.

Drahos, P. (1995) "Global property rights in information: the story of TRIPS at the GATT." *Prometheus* 13(1): 6-19.

The paper tells the story of how the U.S. managed to secure an agreement, which heavily favoured it, on IPRs at the GATT. This agreement has important implications

for global information flows. Understanding this event, the paper argues, will help us to understand some of the mechanisms which operate to bring about global regulatory institutions. Coercion of some kind is bound to be fundamental to the constitution of global regulatory orders.

Drahos, P. (2000) "Trade-offs and Trade Linkages: TRIPS in a Negotiating Context". Quaker United Nations Office. Occasional Paper 1.
[<http://hostings.diplomacy.edu/quaker/new/doc/OP1.pdf>]

This paper seeks to assist developing countries to negotiate more successfully on IPRs, particularly TRIPS. It is argued that developing country negotiators need to take into account the following: (1) the likely costs and benefits of IPRs for domestic economy and social institutions; (2) the linkages that other trade negotiators see between IPRs and others sectors such as investment, agriculture and high technology; (3) the trade-offs that might or might not be possible given the linkages; (4) their own negotiating capacity and power-base and those of others; and (5) the webs of dialogue and webs of coercion that surround IP in a multi-actor world of regulatory standard setting.

Escudero, S. (2001) "International Protection of Developing Countries and Geographical Indications". South Centre.
[<http://www.southcentre.org/publications/geoindication/toc.htm>]

The main aims of the paper are: (1) to give policy makers the basic elements of geographical indications (GIs); (2) to review the way GIs were protected internationally prior to the TRIPS Agreement; (3) to give some historical background on Section 3 of the TRIPS Agreement; (4) to analyse the main figures of the only international register in force to date on appellations of origin (the Lisbon Agreement); and (5) to highlight the main current issues on GIs, especially within the WTO. This paper also tries to establish some criteria to be kept in mind when considering the advantages and disadvantages of protecting GIs or whether to extend the current protection.

Evans, G. E. (1996) "The principle of national treatment and the international protection of intellectual property." *European Intellectual Property Review* 3: 149-160.

Traces the history of the national treatment principle in international IPR law and evaluates the treatment of the principle under the TRIPS Agreement.

* Gervais, D. (1998) *The TRIPS Agreement: Drafting History and Analysis*. London, Sweet and Maxwell.

This guide to the TRIPS Agreement consists of two parts. The first part is a summary of the negotiations themselves including the informal sessions. The second provides information on how to interpret the text of the Agreement, and includes texts of earlier versions and a commentary with each Article of the final version. The purposes of the commentary is to explain the underlying issues, any link with other provisions of the Agreement or of other relevant agreements, the possible impact of other GATT rules or principles of international IPR law, and where this is useful, to point out possible divergencies of views or arguments that may surface in the application of the Agreement.

Halewood, M. (1997) "Regulating patent holders: local working requirements and

compulsory licences at international law.” *Osgoode Hall Law Journal* 35(2): 243-287.

For decades, industry lobbyists and governments have been mounting pressure on other countries to offer strong protection for foreign owned intellectual property. However, this article argues that there are a wide range of policy options open to patent granting countries which both circumscribe patent holder’s rights and comply with TRIPS and NAFTA.

Heald, P. J. (1996) “Trademarks and geographical indications: exploring the contours of the TRIPS Agreement”. *Vanderbilt Journal of Transnational Law* 29:635-660.

This article examines TRIPS’ substantive trademark provisions, including the definition of trademark, eligibility for registration, rights of registrants, and assignments/licensing. The author then considers geographical indications, particularly the unique issues raised by the wine and spirits industry. He also discusses enforcement issues, absence of use requirements, dispute resolution, and the U.S. domestic implementing legislation before closing with a general assessment of the pluses and minuses TRIPS offers in the area of trademark protection.

Juma, C. (1999) “Intellectual property rights and globalization: implications for developing countries”. Science, Technology and Development Discussion Paper No. 4. Cambridge, Center for International Development and Belfer Center for Science and International Affairs, Harvard University.

[<http://www2.cid.harvard.edu/cidbiotech/dp/discuss4.pdf>]

This paper reviews the implications of TRIPS. It focuses on the national implementation, technological development, plant variety protection, geographical indications, and biodiversity and associated traditional knowledge. The paper argues that efforts to promote compliance with TRIPS should be accompanied by measures that address public interest challenges such as health, nutrition and environmental conservation in developing countries. It suggests that addressing these issues will require policy and institutional innovations in the developed and developing countries. While some of the measures can be addressed through multilateral forums, many of them should be addressed through domestic laws and policies designed to foster innovation and expand international trade.

McGrath, M. (1996) “The patent provisions in TRIPS: protecting reasonable remuneration for services rendered - or the latest development in western colonialism?” *European Intellectual Property Review* (7): 398-403.

Criticises the stance of the United States in international negotiations on IPRs and in its unilateral actions against individual countries. It is argued that for developing countries whose patent provisions seek to tread the narrow path between protecting fair remuneration and promoting national development, TRIPS seems most likely to reinstate and perpetuate dependence.

Otten, A. and Wager, H. (1996) “Compliance with TRIPS: The Emerging World View”. *Vanderbilt Journal of Transnational Law* 29: 391:413.

This article provides an overview of the substantive provisions of TRIPS. The authors – both of whom work at the WTO – begin by explaining how TRIPS signals a new emphasis on protecting IP in the international trading system and the WTO. They then

discuss the Agreement's obligations on substantive protection, as well as its enforcement and dispute resolution mechanisms. Finally, the authors address the international plans for the Agreement's implementation and enforcement.

Reichman, J. H. (2000) "The TRIPS Agreement comes of age: conflict or cooperation with the developing countries?" *Case Western Reserve Journal of International Law* 32(3): 441-470.

[<http://lawwww.cwru.edu/academic/jil/32-3/reichmanArticle.pdf>]

This article focuses on the critical juncture in the TRIPS Agreement that occurred in January 2000, when the developing countries (but not the LDCs) became liable for compliance with the relevant international minimum standards. After summarising some of the positive achievement of the past five years, the author reviews some of the negative trends that could become worrisome in the post-transitional period, especially of the developed countries adopt a hardline, confrontational approach to the coming implementation period. He then explores the virtues of a non-confrontational (or less confrontational) approach and closes with some long-term forecasts.

Sell, S. K. (1995) "The origins of a trade-based approach to intellectual property protection". *Science Communication* 17(2): 163-185.

How did the previously arcane, technical issue of IPRs become elevated to the top tier of the US trade agenda? A powerful coalition of private sector industry associations, whose intellectual property constitutes increasingly valuable exports of goods and services, successfully lobbied for new domestic laws, and bilateral and multilateral negotiations linking IP protection to international trade. They framed the problem in a way that captured the imagination of US policymakers and marketed a trade-based approach as a solution to government concerns over the trade deficit and international competitiveness.

South Centre (1997) "The TRIPS Agreement: A Guide for the South". Geneva, South Centre.

[<http://www.southcentre.org/publications/trips/tripsmain.pdf>]

This document is intended as an introductory overview for developing countries of the TRIPS Agreement. In addition to highlighting some of the central issues, the document draws attention to the aspects to which policy makers and technical personnel should pay special attention when formulating policy and legislation. In particular, the document suggests that maximum advantage must be taken of those areas where the Agreement leaves some scope for choice in determining national legislation. In view of the potentially negative impact of the Agreement on industrial and agricultural development in the South, its implementation requires careful monitoring by developing countries and an exchange of experience. In addition, it is suggested that there are a number of areas in which developing countries could co-operate to great mutual advantage, both in relation to the formulation of national implementing legislation and to the planned reviews of the TRIPs Agreement.

Stillwell, M. and Monagle, C. (2000) "Review of TRIPS Agreement under Article 71.1". Occasional Papers no. 3. Geneva, South Centre.

[<http://www.southcentre.org/publications/occasional/paper03/toc.htm>]

This paper provides some reflections on the review of TRIPS required under Article 71.1.

It notes the need for a full review of the Agreement from a development standpoint, in line with the decision of WTO Members at the General Council Meeting of February 2000, which provides that ‘the General Council also agreed that mandated reviews should address the impact of the agreements concerned on the trade and development prospects of developing countries.’ It suggests that the review should carefully examine the impact of implementing TRIPS on developing countries, and should acknowledge that IP protection is not an objective in itself and should thus be viewed in the context of the trade and development conditions in these countries.

Watal, J. (2001) *Intellectual Property Rights in the WTO and Developing Countries*. London, The Hague and Boston, Kluwer Law International.

The implementation of TRIPS with its enormous effect on national and global strategies for healthcare, agriculture, and the environment, among other crucial sectors of the world economy is clearly among the most critical projects currently under way in the field of international relations. This book, written by a former TRIPS negotiator for India, assesses the benefits and pitfalls of TRIPS compliance for developing countries. She explains how TRIPS was negotiated at the Uruguay Round, how various countries have implemented it so far, how the WTO monitors compliance, how the WTO dispute settlement process has worked to date in matters involving TRIPS, and how it is likely to deal with new issues that arise. Most importantly, she explains how developing countries can interpret TRIPS to their best advantage, and how to ensure that the “constructive ambiguity” that characterizes the agreement remains flexible.

Williams, D. (2001) “Developing TRIPS jurisprudence: the first six years and beyond”. *Journal of World Intellectual Property* 4:177-209.

Against the backdrop of the commencement of developing countries’ TRIPS obligations on 1 January 2000, this article examines the state of play in dispute settlement under TRIPS and analyses the potential legal and political implications of the jurisprudence to date.

12. Traditional Knowledge

The proliferation of literature on traditional knowledge and intellectual property rights was stimulated by the 1992 Earth Summit, and in particular the Convention on Biological Diversity. But the idea that traditional or local knowledge might have a useful role to play in development predates the Earth Summit. According to William Adams in his book “Green Development”, enlightened attitudes towards the knowledge, skills and subsistence practices of rural communities in developing countries emerged in the 1970s “as part of a liberal and populist reaction against the unsuccessful technological triumphalism of rural development practice”. These attitudes have become increasingly mainstream in academia and among international development and conservation agencies. And in the mid-late 1980s as the public became increasingly concerned about tropical deforestation, the depletion of the ozone layer and global warming, the idea that indigenous peoples – through their environmentally-friendly resource management practices – held the key to humankind’s survival became fashionable. At the same time there was a growth in awareness that traditional knowledge relating to health and agriculture not only had tremendous commercial potential, but that seed and drug companies had effectively been free-riding on traditional knowledge for decades while the holders of this knowledge were not only left uncompensated but were finding themselves and their communities mired in ever increasing deprivation. Among the first people to speak out about this situation were the Canadian activist Pat Mooney, the United States anthropologist Darrell Posey, and the Indian Vandana Shiva.

During the 1990s claims that indigenous/local communities were being subjected to massive and increasing ‘biopiracy’ by companies from the pharmaceutical, seed and agrochemical industries seemed to increase exponentially each year. Biopiracy is rarely defined in the literature though it tends to imply the unauthorised extraction of traditional knowledge or biological resources and/or the patenting of ‘inventions’ that derive from such knowledge or resources without provision for benefit sharing with the providers.

There is no doubt that in the past commercial use of traditional knowledge has generated vast profits for industry without the providers receiving any benefits at all except perhaps for a small collection fee. Anecdotal – but often well-substantiated – evidence suggests that such unfair practices continue although it is very difficult to estimate how prevalent they are. Most pharmaceutical companies claim to have no interest in the ethnobotanical approach to drug discovery and it is true that the most famous company to use this strategy, Shaman Pharmaceuticals, has only just marketed its first product (a botanical rather than a pharmaceutical), and underwent a period of serious financial difficulties. Similarly, the seed industry is not as great a user of folk varieties as is often supposed, although this is mainly because it is able to draw upon the huge stocks of such varieties that were collected and used as breeding material in the past. It is likely, though, that industrial use of traditional knowledge goes on, and on a large scale, but is underreported.

It is sometimes asserted that intellectual property rights – in terms of their characteristics or their effects – are inequitable or even exploitative of indigenous peoples and local communities. Is this true? Two questions must be considered when discussing the relationship between IPRs, especially patents, and the rights of the holders of traditional

knowledge, innovations and practices. First, do IPRs have characteristics that are inherently unjust or which lead to injustices *vis-à-vis* traditional knowledge holders? Second, to what extent can IPRs be used to protect their rights? The quality of published work on these questions varies tremendously. Some of the literature makes ill-informed and naïve assumptions about intellectual property rights, incorrectly assuming for example that IPRs and patents are synonymous and that a patent relating to a folk variety or medicinal plant allows the owner of the patent to prevent the provider farming community or shaman from continuing to use that plant. Many of the same writings also seem to presume that traditional communities share everything and have no conception of communal, group or individual property rights. Whether or not western notions of ownership and property necessarily apply exactly to non-western or traditional societies³³, the anthropological literature demonstrates conclusively that such presumptions are far too sweeping. However, the writings below are without exception of a high standard, and the highlighted ones especially will help to resolve these controversial questions in the reader's mind.

The writings

Axt, J. R., M. L. Corn, M. Lee and D. M. Ackerman (1993) "Biotechnology, Indigenous Peoples and Intellectual Property Rights". Congressional Research Service. Washington DC: The Library of Congress.

[http://www.ipmall.fplc.edu/hosted_resources/crs/93-478.pdf]

The world may be experiencing mass extinctions of species. There is now an increase in biodiversity prospecting, but with concerns being expressed that indigenous peoples should be involved. Some arrangements have been forthcoming, such as INBio, the NCI Letter of Intent and Shaman Pharmaceuticals, but an emerging issue is the debate about indigenous peoples' rights and their possible entitlement to protection of their knowledge under IPR laws. The authors suggest that the most promising avenues for compensating indigenous peoples while promoting biodiversity conservation are not through IPR, but through contracts between such peoples and companies and research organisations.

Biothai/GRAIN (1998) "Road Maps to a Peoples' Sui Generis Rights Plan of Action". Bangkok, Biothai & GRAIN.

Proceedings of an international NGO seminar that sought to elaborate a coherent response to the TRIPS provision allowing for a sui generis alternative to patents for protection of plant varieties. The main outcomes of the seminar were the Thammasat Resolution and a Plan of Action.

* Blakeney, M., Ed. (1999) *Intellectual Property Aspects of Ethnobiology*. Perspectives on Intellectual Property. London, Sweet and Maxwell.

This volume contains a detailed examination of the legal, economic and political contexts within which proposals for the protection of ethnobiological knowledge under intellectual property law are discussed. The broadening of the subject of IPR protection is currently being debated by the World Intellectual Property Organization

and this book aims to contribute to the debate.

- * Brush, S. B. (1993) "Indigenous knowledge of biological resources and intellectual property rights: the role of anthropology." *American Anthropologist* 95(3): 653-686.

IPRs for ethnobiological knowledge have been proposed as a way to compensate indigenous peoples. Four obstacles are critical: whether general and collective knowledge can be protected; whether certain indigenous groups can claim exclusive control over knowledge and resources; the uncertain status of indigenous peoples; and the lack of a well-developed market for biological resources or traditional knowledge. Anthropologists can play a critical role in the debate by providing analysis and ethnobiological information.

- * Brush, S. B. and D. Stabinsky, Eds. (1996) *Valuing Local Knowledge: Indigenous Peoples and Intellectual Property Rights*. Covelo, CA, USA, Island Press.

Papers from the 1993 conference on IPR and Indigenous Knowledge, which took place in Lake Tahoe, California. Includes sections on equity and indigenous rights, conservation, knowledge, and policy options and alternatives.

- Brush, S. B. (1996) "Is common heritage outmoded?" *Valuing Local Knowledge: Indigenous Peoples and Intellectual Property Rights*. S. B. Brush and D. Stabinsky. Covelo, CA, Island Press: 143-164.

Writer argues that biological resources are and should remain common heritage of mankind. IPRs can be justified on utilitarian grounds but are inappropriate and impracticable for conservation and indigenous knowledge. Instead he advocates public subsidy approach.

- * Chadwick, D. J. and J. Marsh, Eds. (1994) *Ethnobotany and the Search for New Drugs*. Ciba Foundation Symposium (185). Chichester, John Wiley & Sons.

Contains papers and discussions from a symposium which presented studies of traditional medicine around the world and debated ways to encourage conservation of natural habitats and cultivation of medicinal plants. IPR are considered, including the application of patent laws and methods of compensation for the local communities.

- Costa e Silva, E. da (1995) "The protection of intellectual property for local and indigenous communities." *European Intellectual Property Review* 17(11): 546-549.

Presents and analyses recent legislative processes in Latin America relevant to the intellectual property rights of indigenous peoples. These processes are concerned with national and regional implementation of TRIPS in conformity with the requirements of the CBD vis-à-vis indigenous peoples.

- * Downes, D. (1997) "Using Intellectual Property as a Tool to Protect Traditional Knowledge: Recommendations for Next Steps". Washington DC, Center for International Environmental Law.

[www.ciel.org/Publications/UsingIPtoProtectTraditionalKnowledge.pdf]

Although IPRs currently provide limited incentives to communities, it is argued that some form of IPRs could be a valuable tool for communities to use to control their traditional knowledge and gain greater shares of the benefits. CBD Parties are urged to explore possible modifications to existing IPRs, or the creation of sui generis rights, that could accomplish these goals. Various recommendations are proposed, including: exploring the use of geographical indications, trademarks and authors' moral rights; supporting the establishment of national and international registries of traditional knowledge; and considering a requirement for patent applicants to disclose traditional knowledge and its origin as well as the origin of genetic resources used in the invention.

* Downes, D. R., Laird, S.A., (with contributions by G. Dutfield and R. Wynberg) (1999) "Innovative Mechanisms for Sharing Benefits of Biodiversity and Related Knowledge Case Studies on Geographical Indications and Trademarks". Prepared for UNCTAD Biotrade Initiative.

[<http://www.ciel.org/Publications/InnovativeMechanisms.pdf>]

This paper explores the innovative use of selected legal tools to support the efforts of the people of local and indigenous communities to conserve and use sustainably their biological diversity, biological resources, and associated traditional knowledge. The paper reviews concepts of intellectual property – in particular trademarks and geographical indications – as possible incentives for the marketing of products from biological resources produced through traditional and environmentally friendly methods. It includes preliminary case studies drawn from Asia, Africa and Latin America.

* Downes, D. R., Laird, S.A., (with contributions by G. Dutfield, T.D. Mays and J. Casey) (1999) "Community Registries of Biodiversity-related Knowledge: The Role of Intellectual Property in Managing Access and Benefit Sharing". Prepared for UNCTAD Biotrade Initiative.

[<http://www.ciel.org/Publications/CommunityRegistries.pdf>]

This paper explores the promise and peril of using registries of knowledge as tools for the people of local and indigenous communities to employ for the conservation, sustainable use and sharing of benefits from their biological diversity, biological resources, and associated traditional knowledge. In particular, the paper explores the impact of applying intellectual property rights and other tools for controlling ownership and access to registries. It includes brief preliminary case studies reviewing current efforts.

* Downes, D. R. (2000) "How intellectual property could be a tool to protect traditional knowledge." *Columbia Journal of Environmental Law* 25: 253-281.

The article starts by critiquing the polarised international debate over IPRs and traditional knowledge in an effort to clarify the terms of discussion. The author then proposes five ways to explore the potential of using IPRs to help traditional knowledge holders benefit from their knowledge and thereby increase incentives for them to preserve it and the biodiversity to which it is related.

Drahos, P. (1997) "Indigenous knowledge and the duties of intellectual property

owners.” *Intellectual Property Journal* 11(2): 179-201.

This paper argues that in a world of global production indigenous peoples should embrace the western commodity form, otherwise their knowledge will simply function as a free input of production. In order to ensure that the western commodity form is consistent with their version of community, indigenous peoples should draw on those theories of property that link property to freedom of personality. This line of argument the author contends will make it easier to establish the idea that intellectual property owners owe other duties.

* Drahos, P. (2000) “Indigenous knowledge, intellectual property and biopiracy: is a global bio-collecting society the answer?” *European Intellectual Property Review* (6): 245-250.

Finding ways to encourage mutually satisfactory contractual arrangements between life science companies and indigenous groups over the use of traditional knowledge has become a major regulatory challenge. Part of the solution, it is argued in this article, lies in the creation of a global bio-collecting society (GBS). A GBS will overcome some of the problems of uncertainty and enforcement that confront contracting parties in this area. The first section of the article sketches the problems that need to be addressed. The second part outlines the role that the GBS could play.

Dutfield, G. (1999) “Protecting and revitalising traditional ecological knowledge: intellectual property rights and community knowledge databases in India”. *Intellectual Property Aspects of Ethnobiology*. M. Blakeney (ed.). London, Sweet and Maxwell: 101-122.

While scientific and commercial interest in traditional knowledge and resource management practices have never been greater, human cultural diversity is eroding at an accelerating rate. Concerned scientists are calling for the documentation of such knowledge before it disappears. But some indigenous peoples’ organisations worry that documentation initiatives are likely to be top-down and exploitative. This article consists of five sections: (a) the growing interest in and respect for traditional knowledge; (b) the protection of traditional knowledge as an IPR issue; (c) case studies of patents and traditional knowledge; (d) the protection of IPRs and traditional rights in India; and (e) an evaluation of Indian initiatives to document traditional knowledge.

* Dutfield, G. (2000) “The public and private domains: intellectual property rights in traditional knowledge.” *Science Communication* 21(3): 274-295.

IPR law contains an in-built bias that protects the intangible assets of companies while failing to recognise traditional knowledge as protectable subject matter. The rapid globalisation of high-level IPR minimum standards is certain to exacerbate the situation. The main reason why IPRs are unfair is not that they are explicitly discriminatory, but that they treat all knowledge in the world as the intellectual commons except that which is protected under patent or other mainstream IPRs. This situation is unjust to indigenous people and contrary to the interests of everybody except those who profit from exploiting traditional knowledge unfairly.

* Greaves, T., Ed. (1994) *Intellectual Property Rights for Indigenous Peoples: A*

Sourcebook. Oklahoma City, Society for Applied Anthropology.

The rights of indigenous societies to control the use of their cultural knowledge by outsiders has become an issue of global importance. This book includes both cases where indigenous groups have asserted these rights, and analyses of the legal and political contexts for such rights.

Grenier, L. (1998) *Working with Indigenous Knowledge: A Guide for Researchers*. Ottawa, International Development Research Centre.

In the 1990s, indigenous knowledge has been fertile ground for research, and a wealth of information now exists on the topic. The information, however, is disparate and no truly comprehensive guide exists until now. This guidebook demonstrates what indigenous knowledge can contribute to a sustainable development strategy that accounts for the potential of the local environment and the experience and wisdom of the indigenous population. Through an extensive review of field examples as well as current theory and practice, it provides a succinct yet comprehensive review of indigenous knowledge research and assessment.

* Gupta, A. K. (1996) "Rewarding creativity for conserving biodiversity in the Third World". Presented at AIPPI Forum on Ethical and Ecological Aspects of Intellectual Property Rights, 10-14 September, Interlaken.

Evaluates the arguments of those who condemn the TRIPS Agreement for the inability of IPRs to protect traditional knowledge or on the grounds of morality and international equity. The author dispels many of these arguments, while proposing an alternative based on the development of local innovations databases linked to a low-cost and more accessible patent system.

* Halewood, M. (1999) "Indigenous and local knowledge in international law: a preface to *sui generis* intellectual property protection." *McGill Law Journal* 44: 953-996.

The author analyses the development in international law of means by which local communities and developing countries could increase their own control over others' use of their resource-related innovations. Exactly how these norms should be implemented in domestic law, however, is far from clear. The author argues that one plausible means of implementation would be through policies to increase the participation of indigenous communities in resource management decision-making. Another possible means would be through the creation of national *sui generis* IPR laws to protect indigenous and local knowledge. At least in theory, vesting IPRs in indigenous and local communities over their innovations would assist them to stop undesired use of their knowledge and/or compel compensation when it is used.

Huft, M. (1995) "Indigenous peoples and drug discovery research: a question of intellectual property rights." *Northwestern University Law Review* 89(4): 1678-1730.

Focuses on questions relating to how the nature of indigenous knowledge relates to IPRs. In particular, the article examines the nature of indigenous knowledge of medicinal plants and its role in the search for new drugs in order to address three issues: (i) whether the contribution of indigenous knowledge to a final drug is the sort of contribution that would allow one or more indigenous persons to be considered a joint inventor; (ii) whether publication of information concerning indigenous plant

use would bar the availability of a patent; and (iii) whether IPRs are the most appropriate vehicle for addressing problems of compensation in the exploitation of genetic resources.

Kadidal, S. (1997) "Subject-matter imperialism? biodiversity, foreign prior art and the neem patent controversy." *IDEA - The Journal of Law and Technology* 37(2): 371-403.

Under Section 102 of the United States Patent Act prior knowledge, use or invention in that country can be used as evidence to invalidate a U.S. patent for lack of novelty. However, almost all similar foreign activity cannot be used against a U.S. patent. This article recommends that the foreign-activity prior art distinctions in Section 102 (which also exist in Japanese patent law but not in Europe) should be eliminated. First, this article discusses the neem patent controversy. Then, the application of knowledge, use and invention in the USA is explained. Next, the exclusion from prior art of foreign knowledge, use or invention is analysed. Then the inadequacy of foreign patents and printed publications as prior art in biodiversity inventions is discussed. Finally, the article presents several criticisms of the foreign-activity distinctions under Section 102.

King, A. B. and P. B. Eyzaguirre (1999) "Intellectual property rights and agricultural biodiversity: literature addressing the suitability of IPR for the protection of indigenous resources." *Agriculture and Human Values* 16(1): 41-49.

Intellectual property has been suggested as a means to protect indigenous resources from misappropriation, and to create increased investment in their conservation. This article reviews four books that discuss the problems that arise from the application of IPRs for the protection of indigenous resources. All of them highlight a salient issue: that current IPR systems may conflict with and undermine the culture, social structure, and knowledge systems of indigenous societies. The books are by Brush, Swanson, Greaves and Posey and Dutfield.

Moran, K., S. R. King and T. J. Carlson (2001) "Biodiversity prospecting: lessons and prospects." *Annual Review of Anthropology* 30:505-526.

Is bioprospecting an innovative mechanism that will help produce new therapeutics and preserve traditional medical systems, conserve biological and cultural diversity by demonstrating their medical, economic, and social values, and bring biotechnology and other benefits to biodiversity-rich but technology poor countries? Or is bioprospecting yet another form of colonialism – 'bioimperialism' – wherein the North rips off the South's resources and IPRs? This article reviews the current literature on bioprospecting that lies somewhere between current polemics and calls for more anthropological research into the bioprospecting process.

Moran, K. and M. Ruley (guest editors) (2001) "Intellectual Property Rights: Culture as Commodity" – Special issue of *Cultural Survival Quarterly*.
[<http://www.sc.org>]

A special issue of Cultural Survival Quarterly dedicated to the subject of IPRs and traditional knowledge and culture. The issue contains fourteen articles covering various aspects of the subject and covering many different areas of the world.

Nijar, G. S. (1996) "In Defence of Indigenous Knowledge and Biodiversity: A Conceptual Framework and Essential Elements of a Rights Regime". Penang, Third World Network.

Explains the link between traditional knowledge and the protection of biodiversity and discusses international developments affecting recognition of rights in biodiversity of nations, farmers and indigenous peoples. Three draft model laws are presented: the Collectors of Biological Resources (Control and Licensing) Act, the Contract between the Collector and the Government; and the Community Intellectual Rights Act.

* Posey, D. A. and G. Dutfield (1996) *Beyond Intellectual Property: Toward Traditional Resource Rights for Indigenous Peoples and Local Communities*. Ottawa, International Development Research Centre.

A handbook for indigenous, traditional and local communities providing useful information and case studies on the issues raised by the use and appropriation of traditional intellectual, cultural and scientific resources. It is presented in an accessible style and format so that it may serve as a practical guide to the key questions, legal tools, and options available for protection of and just compensation for TK and biogenetic resources. In this way it is hoped that traditional communities, individuals, and institutions will be in a better position to set the terms of their relationships with researchers, companies, and others, and to determine whether involvement in research and commercial projects is in their best interest.

Posey, D. A. assisted by G. Dutfield, K. Plenderleith, E. da Costa e Silva & A. Argumedo (1996) *Traditional Resource Rights: International Instruments for Protection and Compensation for Indigenous Peoples and Local Communities*. Gland, IUCN.

A survey of international agreements relating to indigenous peoples and biodiversity conservation. Proposes a new integrated rights approach as an alternative to IPRs for the protection of traditional knowledge and resources. This approach, Traditional Resource Rights, provides new opportunities for constructive dialogue with indigenous and traditional peoples on their own terms.

Sarma, L. (1999) "Biopiracy: twentieth century imperialism in the form of international agreements." *Temple International and Comparative Law Journal* (Spring): 107.

This paper explores the property right claims indigenous groups have regarding their indigenous innovations and the ways in which the contrasting Northern and Southern views affect such claims. It also considers the role of transnational corporations and their ability to exploit this knowledge as well as the North-South conflict, with particular reference to the U.S. and India. The paper also discusses whether developing country governments could protect TK in their jurisdiction by granting these communities a property right to their innovations. Ways in which less developed countries could work with indigenous communities are then proposed. The paper is sceptical that such affinity between governments and indigenous groups exists, since many of these governments value profit over indigenous rights.

Secretariat of the Convention on Biological Diversity (1998) "Implementation of Article 8 (j) and related provisions. Note by Executive Secretary". For the Conference of the

Parties to the Convention on Biological Diversity, Fourth Meeting. Bratislava, Slovakia. 4 to 15 May 1998. Item 10 of the provisional agenda. Montreal, CBD Secretariat. [<http://www.biodiv.org>]

COP-3 invited Governments, international agencies, research institutions, representatives of indigenous and local communities and NGOs to submit to the Executive Secretary, case studies on measures taken to develop and implement the CBD's provisions relating to indigenous peoples and local communities. These studies were to highlight key areas of discussion and help in considering the implementation of Article 8 (j) and related articles, including, inter alia, interactions between traditional and other forms of knowledge relating to the conservation and sustainable use of biodiversity; the influence of current laws and policies on knowledge, innovations and practices of indigenous peoples and local communities; and incentive measures. This Note provides a synthesis of shared experiences gathered from these case studies, reviews and other documentation on the implementation of Article 8 (j) and related articles.

Tobin, B. (1997) "Know-how licences: recognising indigenous rights over collective knowledge". *Bulletin of the Working Group on Traditional Resource Rights* 4: 17-18.

Legally-binding agreements such as contracts and licences can be used to guarantee benefit sharing with local communities. In Peru, the Aguaruna people have negotiated a know-how licence with the American drug company Searle. The Aguaruna pass on medicinal plants and knowledge (i.e. 'know-how') to the company and in exchange receive an annual know-how licence fee.

Tunney, J. (1998) "European Union, intellectual property, indigenous people and the digital age: intersecting circles?" *European Intellectual Property Review* 20(9): 335-346.

The contemporary evolution of intellectual property is largely in response to pressure exerted by commercial interests, causing a conceptual fault line which emphasises existing exclusionary tendencies. If examined from the ostensibly unrelated perspectives of indigenous people and the digital age difficulties, the conceptual challenge becomes clear. However, the EU provides an ideal opportunity to encourage a conceptual re-alignment consistent with the emergence of other international legal standards.

United Nations Conference on Trade and Development (2000) "Systems and national experiences for protecting traditional knowledge, innovations, and practices". Background Note by the UNCTAD Secretariat". Geneva, Switzerland. [<http://www.unctad.org/en/docs/c1em13d2.en.pdf>]

The importance of protecting TK is increasingly recognised. Developing countries seek to ensure that the benefits of cumulative innovation associated with TK accrue to its holders while enhancing their socio-economic development. They also aim at preventing the improper appropriation of TK. This note briefly describes possible instruments for the protection of TK, including traditional/customary law, modern IPR instruments, sui generis systems, and documentation of TK.

World Intellectual Property Organization (2001) *Intellectual Property Needs and Expectations of Traditional Knowledge Holders. WIPO Report on Fact-Finding Missions on Intellectual Property and Traditional Knowledge (1998-1999)*. Geneva: WIPO.

This Report presents information compiled by WIPO from nine fact-finding missions conducted in 1998 and 1999 on the IPR needs and expectations of holders of traditional knowledge. Its purpose is to provide information to WIPO member states, TK holders, the private sector, international organisations, NGOs, academic and research institutions and other interested parties, on the needs and expectations of TK holders as expressed to WIPO.

13. Music, Folklore and Entertainment

The entertainment industry produces such cultural products as musical and dramatic works and performances, and motion pictures. Only a few developing countries have large motion picture industries (e.g. India, Mexico and Egypt). Yet, many countries have rich folkloric traditions which could be used to generate income for performers, artists and for the country as a whole. In fact, since most of the world's cultural diversity exists in the developing world, many developing countries have the potential to become major producers of recordings of folkloric and other cultural works and performances such as art, music, drama and dance.

The world 'folklore' is sometimes used to refer to the cultural expressions of traditional peoples and traditional communities. According to the UNESCO 'Recommendations on the safeguarding of traditional culture and folklore', adopted by the Geneva Conference of Unesco in 1989: 'folklore (or traditional and popular culture) is the totality of tradition-based creations of a cultural community, expressed by a group of individuals and recognised as reflecting its cultural and social identity; its standards and values are transmitted orally, by imitation or by other means. Its forms are, among others, language, literature, music, dance, games, mythology, rituals, customs, handicrafts, architecture and other arts.' Folklore thus understood is tradition based, collectively held, a source of cultural identity, and includes knowledge and its tangible and intangible expressions.

In Western societies folklore is understood differently because such cultural forms no longer constitute an integral part of most people's lives, and may even be considered as archaic. This is why folklore can have derogatory connotations. But in traditional societies, folklore is not a historical phenomenon, but, as UNESCO recognises, is living and evolving, handed down from generation to generation, often orally rather than in fixed form, and is an essential aspect of cultural identity in many countries.

The entertainment industry is a major user of the copyright system, which was originally intended to protect literary and artistic works. But generally, intangible ('unfixed') cultural expressions are ineligible.

At the international level, the idea of applying copyright law to protect intangible cultural expressions including those of traditional peoples and communities dates back to the 1967 Diplomatic Conference of Stockholm for the revision of the Berne Convention. The following provision was included in the Stockholm Act of the Convention and retained in the most recent revision, adopted in Paris in 1971: 'In the case of unpublished works where the identity of the author is unknown, but where there is every ground to presume that he is a national of a country of the Union, it shall be a matter for legislation in that country to designate the competent authority which shall represent the author and shall be entitled to protect and enforce his rights in the countries of the Union'. Subsequently, the term 'expressions of folklore' was applied. In 1982 the Model Provisions for National Laws on the Protection of Expressions of Folklore Against Illicit Exploitation and Other Prejudicial Actions were adopted by a Committee of Governmental Experts jointly convened by UNESCO and WIPO.

In Australia, Aboriginal artists have on a few occasions successfully sued on the basis of

copyright infringement. This suggests that as developing countries fully comply with the levels of enforcement required by TRIPS, more and more peoples and communities will be able to avail themselves of copyright protection. But copyright law has some fundamental limitations in the folklore context:

(i) *Whereas copyright requires an identifiable author, the notion of authorship is a problematic concept in many traditional societies.* Many experts emphasise the collective nature of creative processes in traditional societies, which they contrast with the individualistic view of creativity (and of ownership in the end-product of that creativity) that prevails in western societies. The sources of much TK and folklore are difficult to trace, either because the knowledge is shared by two or more peoples or communities, or because the author is simply unknown. And for some traditional peoples and communities it would be presumptuous to attribute authorship to a human being anyway. As the ethnoecologist and indigenous rights activist Darrell Posey wrote,³⁴ 'indigenous singers ... may attribute songs to the creator spirit'. Australian lawyer Michael Blakeney explains in the article listed below that 'if the beliefs and practices of Australian indigenous peoples are any guide, authorship may reside in pre-human creator ancestors ... authorship is replaced by a concept of interpretation through initiation'. However, generalisations should be made with caution. According to Jacob Simet, Executive Director of Papua New Guinea's National Culture Commission: 'We have had songs, traditional knowledge and so on for hundreds of years. There was no doubt as to who originally owned them – they were originally owned by one person, who later passed them on to his or her clan.'³⁵ It also needs to be borne in mind that intra-community conflicts can arise between the interests of indigenous artists and community elders with respect to the use, dissemination and further development of artistic works.

(ii) *Copyright has a time limit. But for folkloric expressions that are important elements of people's cultural identity, it would be more appropriate for them to have permanent protection.* Copyright only grants protection for a limited time and most people would probably agree that it is a good thing they do. But for many traditional peoples and groups, certain expressions and works are central to their cultural identity and should therefore never be fully released by others into the public domain, at least not to the extent that others would be free to do whatever they like with them. This is not to say that copyright protection should therefore be permanent for culturally significant expressions and works, but that copyright law is simply not the appropriate approach.

(iii) *Copyright normally requires works to be fixed. But among some traditional groups, folkloric expressions are not fixed, but are passed on orally from generation to generation. This normally excludes such expressions from eligibility for copyright protection.* Conventionally copyright protects works in physical form and not unfixed expressions. Since communities often lack the means to record their cultural expressions, they cannot acquire copyright protection. But this bar to protection can be removed with the will to do so. Several countries have incorporated protection of folkloric expressions into their national copyright laws. However, the most powerful actors in international IPR negotiations are still resistant to the idea of modifying international copyright rules to more effectively protect folklore.

Unfixed cultural expressions can to a limited extent also be protected under performers' rights in cases where performances have been fixed without the

authorisation of the original performers. TRIPS partially incorporates the 1961 Rome Convention for the Protection of Performers, Producers of Phonograms and Broadcasting Organizations, allowing performers to prevent the recording and reproduction of their performance on a phonogram, and the broadcast and public communication of a live performance. But neither the Rome Convention or TRIPS makes any reference to folklore. However, the 1996 WIPO Performances and Phonograms Treaty defines ‘performers’ as ‘actors, singers, musicians, dancers, and other persons who act, sing, deliver, declaim, play in, interpret, or otherwise perform literary or artistic works or expressions of folklore’. It is possible that a future revision of TRIPS will incorporate this treaty. Nonetheless, the scope of protection is quite narrow.

The writings

Anderson, B., Z. Kozul-Wright and R. Kozul-Wright (2000) “Copyrights, competition and development: the case of the music industry”. UNCTAD Discussion Paper 145. Geneva, UNCTAD. [http://www.unctad.org/en/docs/dp_145.en.pdf]

The economic importance of copyright industries in developed market economies has been well documented. Although less important in developing countries, this is likely to change with the growing weight of the service sector in these economies and its importance for their closer integration into the global market economy. This paper analyses the relationship between the copyright and income generation in the audio-visual sector, in particular music, and argues that the appropriate copyright administration is essential in creating the conditions for a viable music industry in developing countries. However, an effective copyright regime is not, by itself, sufficient to guarantee a flourishing music industry, and other institutional arrangements will be needed in countries looking to better exploit their musical resources.

Berryman, C. A. (1994) “Toward more universal protection of intangible cultural property.” *Journal of Intellectual Property Law* 1. [<http://www.lawsch.uga.edu/~jipl/vol.1/berryman.html>]

The notion of a state as the guardian of its people’s cultural heritage has evolved from the mere association of objects and monuments with a particular nation’s culture to an international framework that authorises states to protect and preserve cultural objects from theft, mutilation, and destruction. Extant cultural property conventions recognise the status of cultural property as part of the “common heritage of mankind” and place an international duty on states to protect not only their own cultural heritage but also all other nations’ cultural property. The protection of these measures, however, is limited in scope by the definition of cultural property. Protection is not extended to the non-physical or intangible aspects of cultural property. What national and international measures currently protect intangible cultural property and are they adequate to preserve this form of cultural heritage? This article explores these questions in an effort to determine what steps can be taken to establish more uniform and universal intangible cultural property protection and whether conventions should be extended or developed for intangible cultural property.

Blakeney, M. (1998) “Communal intellectual property rights of indigenous peoples in cultural expressions.” *Journal of World Intellectual Property* 1(6): 985-1002.

In recent years there has been an increase in activism in the area of IPR protection for indigenous peoples' knowledge and cultural expressions. Up to now copyright courts have refused to allow indigenous communities to enforce their rights in such expressions. This article considers some recent Australian cases which have sought to delineate the boundaries of the rights of Aboriginal peoples in asserting communal rights in cultural expressions. This Australian jurisprudence will be of assistance in formulating the new IPR regime in this area. The article concludes with an examination of reform proposals.

Brown, M. F. (1998) "Can culture be copyrighted?" *Current Anthropology* 39(2): 193-222.

The digital revolution has dramatically increased the ability of individuals and corporations to appropriate and profit from the cultural knowledge of indigenous peoples, which is largely unprotected by IPR law. In response, legal scholars, anthropologists, and native activists now propose new legal regimes designed to defend indigenous cultures by radically expanding the notion of copyright. Unfortunately, these proposals are often informed by romantic assumptions that ignore the broader crisis of intellectual property and the already imperilled status of the public domain. This essay offers a sceptical assessment of legal schemes to control cultural appropriation -- in particular, proposals that indigenous peoples should be permitted to copyright ideas rather than tangible expressions and that such protection should exist in perpetuity. Also examined is the pronounced tendency of intellectual property debates to pre-empt urgently needed reflection on the political viability of special rights regimes in pluralist democracies and on using copyright law to enforce respect for other cultures.

Dougherty, T. (1998) "Group rights to cultural survival: intellectual property rights in Native American cultural symbols." *Columbia Human Rights Law Review* 29: 355-399.

This article deals with some of the theoretical and jurisprudential issues that arise when Native American cultural symbols are appropriated by non-Native individuals and businesses to sell products. Legal challenges to these acts of appropriation are generally unsuccessful since the acts are not considered thefts. Rather, the cultural symbols are considered part of the public domain and as a result are available for use in business contexts. In fact, through trademark law, it is the appropriator of the symbol that is often given a property rights in the symbol. In contrast, this article contends that the conceptions of property underlying such legal protection are not relevant to the specific context of Native American culture and law and, further, that they are based on an outdated notion of individual property rights. Specifically, the author argues that in the context of certain Native American claims implicated in the survival of Native American culture, U.S. courts ought to consider these claims from a group, rather than an individual, rights perspective.

Frow, J. (1998) "Public domain and collective rights in culture." *Intellectual Property Journal* 13: 39-52.

Author explores a model of the communal control and authorisation for cultural rights in indigenous societies in order to explore its relevance to the concept of public domain in Western IPR law. Concludes that this model cannot directly be applied to Western law, but that its analysis may help to clarify the presuppositions of each system.

Janke, T. (1999) *Our Culture: Our Future – Report on Australian Indigenous Cultural and Intellectual Property Rights*. Surry Hills, Michael Frankel & Co., Australian Institute of Aboriginal and Torres Strait Islander Studies and Aboriginal and Torres Strait Islander Commission. [<http://www.icip.lawnet.com.au>]

This report maps the rights indigenous peoples want to their cultural heritage and analyses the laws and policies that affect the ability of indigenous peoples to realise these rights. The report also lists a range of measures and recommendations -- both legislative and non-legislative -- for protecting Indigenous Cultural and Intellectual Property. Many of these have much wider applicability than Australia alone.

Samuelson, P. (1999) "Implications of the Agreement on Trade Related Aspects of Intellectual Property Rights for cultural dimensions of national copyright laws". *Journal of Cultural Economics* 23: 95.

Many national IPR laws contain provisions that reflect cultural values and have trade significance. Although cultural value defences have generally been rejected by GATT and WTO panels, they may be more likely to succeed in IP disputes because many culturally-laden rules are widely accepted in the international IP arena. Moreover, intellectual products are less completely commodified than other products. Cultural economists can provide valuable insights to aid WTO in distinguishing between those culturally-laden IP rules that should be or should not be permitted when they have an impact on trade.

Simpson, T. (1997) *Indigenous Heritage and Self-determination: The Cultural and Intellectual Property Rights of Indigenous Peoples*. Copenhagen, International Work Group for Indigenous Affairs.

After centuries of disparagement, indigenous peoples suddenly find their millennial wisdom coveted by outsiders and they are demanding that mechanisms be established to effectively protect their rights. The problem is how. This study examines the legal avenues open to indigenous peoples to defend their cultural heritage, and seeks to elucidate the advantages and disadvantages of the various approaches so far advocated. It aims not to determine indigenous policy but to help them define their own local, national and international proposals to secure their futures, in accordance with their right to self-determination and to exercise their customary law.

14. Biodiversity and the Environment

The debate on IPRs and the environment is one that is generally characterised by more heat than light. As identified in the book by Dutfield, there are three sets of questions that ought to be addressed to focus the debate constructively:

1. Do intellectual property rights encourage the spread of monocultural agriculture consisting of genetically-uniform varieties? And if so, does this cause erosion of biodiversity?
2. Is the increasing production and sale of seed-agrochemical 'packages' (such as transgenic crops sold with pesticides and/or herbicides for which they have built-in resistance) harmful to biodiversity? And if so, are IPRs an inducement for companies to produce these kinds of 'package'? In other words, is this an IPR issue at all?
3. Do IPRs conflict with certain provisions and objectives of the Convention on Biological Diversity such as national sovereignty, benefit sharing, technology transfer, and the interests of holders of traditional knowledge?

Taking the first set of questions, one of the most plausible criticisms of IPRs is that they encourage centralised research. According to Walter Reid, the prevailing policy framework for the use of genetic resources for food and agriculture favours 'centralised crop breeding and the creation of uniform environmental conditions, and discourages agro-ecological research or local breeding tailored to local conditions.' IPRs enhance incentives to develop seeds that will have a large potential demand. To ensure maximum demand for their products, the seed companies will tend to focus their research on commonly utilised high-value crops and develop varieties that can be cultivated as widely as possible. To do so means either breeding through selection of genes for maximum adaptability, or introducing the new seeds while also promoting farming practices that reduce environmental heterogeneity. The biodiversity-erosive effects of this IPR-supported bias towards centralised crop breeding programmes are: (i) decreased crop diversity; (ii) decreased spatial genetic diversity; (iii) increased temporal genetic diversity (due to the need to replace cultivars with new ones every few years); and (iv) increased use of external inputs.

Dwijen Rangnekar has sought to push the discussion forward by taking a historical/institutional analysis of the relationship between plant breeders' rights and genetic uniformity. He reaches the interesting conclusion that such IPRs *do* in fact incentivise plant breeding based upon existing material already in scientific use, while providing 'juridical legitimisation to the breeding of genetically uniform varieties'.

But it is important to point out that *if* a monocultural system produces higher yields per harvest and/or more harvests per year compared to a more polycultural agro-ecosystem it replaced, pressure to open up biodiverse ecosystems to cultivation *may* be reduced as a consequence.

With respect to the second set of questions, the hybrids and other modern varieties developed by seed companies often depend upon applications of agrochemicals to achieve high yields. A common accusation is that excessive use of these chemicals is

encouraged and other plants growing nearby are killed as a result. It is also said that increased use of hybrids and other modern varieties *specifically designed* for use with other proprietary agricultural inputs such as fertilisers and pesticides may have serious social impacts, especially in developing countries. These crop-herbicide-pesticide linkages can be considered to represent a shift towards capital intensive agriculture that increases the costs of farming and may therefore be detrimental to small farmers, especially those in developing countries.

It is important to point out though that this trend in crop breeding dates back to when the Green Revolution began, and earlier still in some countries. The varieties most commonly associated with the Green Revolution were developed by public crop breeding institutions, not corporations. On the face of it, this suggests that this may not be an IPR-related problem at all.

However, a negative IPR link may be quite strong in the case of genetically modified crops. In recent years, life-science corporations (often originally chemical companies that have bought seed companies) have increasingly been creating transgenic plants with built-in resistance either to herbicides marketed by the same company or to insect pests. In the former case, *both* the herbicide and the seed for which it is designed are likely to be patent-protected. These corporations argue that without patents they would have no incentive to create or market such products.

According to critics including a number of scientists, genetically-engineered herbicide resistance has some serious negative environmental effects. Among the claims commonly made are that use of herbicide-resistant transgenic plants may: (a) encourage excessive use of herbicides which may kill other plant varieties and species; (b) accelerate the development of resistance among pests; and (c) create the possibility of herbicide resistant genes crossing over to other plants including the weeds being targeted. This could create 'superweeds' which would render the herbicide ineffective in the long term, and cause ecological impacts that cannot easily be predicted. It may also be possible that transgenic plants themselves could become 'weeds' if the added characteristic gives them a competitive advantage over neighbouring wild species, though this seems unlikely in the case of the most highly domesticated crop species.

As regards the Convention on Biological Diversity, the technology transfer issue is part of a much wider controversy about intellectual property rights that the writings in Section 12 should help shed light upon, while literature pertaining to the traditional knowledge issue is provided in Section 8. But what appears to be true is that conflicts between the CBD and IPRs as far as they exist are mostly likely to be revealed as the relevant policies and laws are put into effect than in the specific provisions of such agreements as the CBD and TRIPS etc. Debates on the CBD/TRIPS relationship have taken place at the inter-governmental level under the auspices of both the World Trade Organization and the Conference of the Parties to the CBD ever since TRIPS came into force in 1995 (see SCBD and WTO papers below).

The writings

Atkinson, N. and B. Sherman (1991) "Intellectual property and environmental protection." *European Intellectual Property Review* (5): 165-170.

With the enactment of the UK Environmental Protection Act, the themes of IPRs and environmental protection find themselves in a close association. This paper explores the relationship between these hitherto separate spheres and suggests that one should at least begin to question the appropriateness and relevance of the ideas and assumptions of patent law formed a century or more ago to the modern world. The Act may well provide the impetus for a re-examination and ultimate improvement in the ideas and principles which have, on the whole, served so well.

Biber-Klemm, S. Ed. (1998) *Legal Claims to Biogenetic Resources: Proceedings of the International Workshop*. National Research Program 42: Foreign Policy. Berne, Swiss National Science Foundation.

Proceedings of a workshop that sought to contribute to the evolution of the Swiss position vis-à-vis the CBD. In view of the re-negotiation of Article 27.3b of TRIPS, which offers the opportunity to create a new (*sui generis*) system for the protection of plant varieties, the discussions and presentation focused on the question as to whether IPRs are an adequate instrument to secure traditional resource rights. Speakers represented industry, government, NGOs, and academe.

Bragdon, S. H. and D. R. Downes (1998) "Recent Policy Trends and Developments Related to the Conservation, Use and Development of Genetic Resources". Issues in Genetic Resources No. 7. Rome, International Plant Genetic Resources Institute.

The erosion of genetic resources continues at an alarming pace. Simultaneously, technologies which develop and make use of these resources outpace the ability of laws and societies to understand and cope with them. Spurred by technological advances, appreciation of the monetary and non-monetary value of genetic resources has grown, leading to increasing conflict over rights and responsibilities for these resources. Developments in international and national law and policy over the past 5 years have significantly changed the policy environment relating to the management and control of genetic resources. The task of discerning all the issues of relevance to the conservation and management of genetic resources and then integrating them into consistent policy is extremely complex. This paper analyses developments in the past 5 years, identifying cross-cutting issues and trends that have emerged including farmers' rights and interests of indigenous and local communities, benefit-sharing, access to genetic resources, patenting and industry trends, and *sui generis* protection of plant varieties.

Cameron, J. and Z. Makuch (1995) "The UN Biodiversity Convention and the WTO TRIPS Agreement: Recommendations to Avoid Conflict and Promote Sustainable Development". Gland, World Wide Fund For Nature.

Negotiation of the CBD took place with little discussion of linkages to GATT-TRIPS. The authors analyse the relationship and potential conflicts between these two agreements and make recommendations to defuse any such conflicts and ensure that the objectives of the CBD are not undermined by TRIPS.

Carvalho, N.P. de (2000) "Requiring disclosure of the origin of genetic resources and

prior informed consent in patent applications without infringing the TRIPS Agreement: the problem and the solution”. *Washington University Journal of Law and Policy* 2. [<http://law.wustl.edu/Journal/2/p371carvalho.pdf>]

This article addresses the TRIPS-compatibility of requirements that patent applicants disclose the origin of genetic resources and prior informed consent. The author argues that making such disclosure a condition for acquiring patent protection would be inconsistent with TRIPS. But there need not be a conflict if compliance with such a requirement were necessary for enforcing the patent.

Cosbey, A. (1996) “The Sustainable Development Effects of the WTO TRIPS Agreement: A Focus on Developing Countries”. Winnipeg, International Institute for Sustainable Development.

This paper examines the TRIPS Agreement and analyses those areas in which the Agreement will impact on sustainable development in developing countries such as Pakistan. Sustainable development, throughout the paper, embraces the fundamentally interrelated concerns of environment, development and economy. After brief introductions to the Agreement itself, and to the concept of IPRs, the paper examines the possible effects of the Agreement, focusing on agriculture, manufacturing and copyrighted goods. It ends by proposing a number of policy actions which might contribute to sustainable development in the context of the Agreement, and suggesting ways to interpret provisions to developing countries’ advantage.

Costa e Silva, E. da (1996) “Biodiversity-Related Aspects of Intellectual Property Rights”. UNU/IAS Working Paper. Tokyo, United Nations University.

Reviews legal developments internationally and in Brazil relating to biodiversity conservation and IPRs. One of the greatest challenges the international community faces is to determine a balance between the common interests of biodiversity conservation and the private interest related to the activities of industries which use biodiversity resources as a main source of materials. This balance is hard to achieve. An IPR framework must consider the particular characteristics of access to genetic resources, technology transfer agreements, biotechnology and the protection of traditional knowledge and practices.

Duessing, J. H. (1996) “The role of intellectual property rights in the exploitation of plant genetic resources and for technology transfer under the Convention on Biological Diversity”. *Valuing Local Knowledge: Indigenous Peoples and Intellectual Property Rights*. S. B. Brush and D. Stabinsky. Covelo, CA, Island Press.

Analyses CBD from pro-business perspective. National sovereignty is now a kind of property right, but it does not adequately protect a biological resource once it leaves the legal domain or control of a culture (for example through the CGIAR system). This makes it difficult to implement important parts of the convention. Standardised international IPRs with acceptance of national sovereignty over genetic resources points to a solution.

Dutfield, G. (1999) “Sharing the benefits of biodiversity: access regimes and intellectual property rights”. Science, Technology and Development Discussion Paper No. 6. Cambridge, Center for International Development and Belfer Center for Science and

International Affairs, Harvard University.
[<http://www2.cid.harvard.edu/cidbiotech/dp/discussion6.htm>]

Two types of legal regime have emerged to regulate the allocative aspects of the trade in biogenetic resources and products derived from them: access and benefit sharing laws and IPRs. This paper describes both, but IPRs are emphasised because: (1) the acquisition by firms of patent and plant variety right portfolios appears to influence the unequal allocations of benefits obtained from industrial use of biogenetic resources; (2) the number of countries allowing strong IPR protection for life-science products and technologies is increasing rapidly. The effect may be to reinforce this asymmetry of benefit allocations; (3) patents and plant breeders' rights have been accused of encouraging biodiversity-erosive breeding and cultivation practices; and (4) just as inappropriate IPRs may harm the interests of developing countries, well-designed IPR systems could conceivably be highly beneficial, helping such countries to add value to their biogenetic wealth. Unfortunately, the global IPR system has become increasingly inflexible in recent years, reducing such opportunities for developing countries.

* Dutfield, G. (2000) *Intellectual Property Rights, Trade and Biodiversity: Seeds and Plant Varieties*. London, Earthscan and IUCN.

Plant genetic resources are crucial for world agriculture, food security and the global economy. They are vital for the pharmaceutical industry and important assets of biodiversity-rich developing countries. The patents and intellectual property rights IPRs associated with the development of new products are critical to trade in these resources. This book examines the relevant international agreements: the CBD, TRIPS and the UPOV Convention. It provides an account of how to integrate the requirements of the CBD into an equitable global IPR regime, taking into account ethical concerns, environmental and social impacts, technology transfer and traditional knowledge.

Gaia Foundation and Genetic Resources Action International (1998) "TRIPS versus CBD: conflicts between the WTO regime of intellectual property rights and sustainable biodiversity management". *Global Trade and Biodiversity in Conflict*, Issue 1. London & Barcelona, Gaia Foundation and GRAIN.
[<http://www.grain.org/publications/issue1-en.cfm>]

Because TRIPS and the CBD embody and promote conflicting objectives, systems of rights and obligations, many states are questioning which treaty takes precedence over the other. It is argued that the CBD has primacy over the WTO in the areas of biodiversity and traditional knowledge, that the review of TRIPS allows states to exclude all life forms and related knowledge from IPR systems, and that the a priori collective rights of indigenous peoples and local communities over their biodiversity and related knowledge must be recognised.

Hoagland, K. E. and A. Y. Rossman, Eds. (1997) *Global Genetic Resources: Access, Ownership, and Intellectual Property Rights*. Washington DC, Association of Systematics Collections.

Collection of papers from a conference that aimed to explore issues related to ownership of and access to genetic resources and biological specimens. The volume examines the current status of the various treaties, national laws, and agreements in

effect around the world; presents case studies that demonstrate how research using international resources benefits the global community; explores models of equitable use of genetic resources; and discusses potential solutions to develop a mutually beneficial compromise for the equitable use of genetic resources.

Johnston, S. with F. Yamin (1997) "Intellectual property rights and access to genetic resources". *Access to Genetic Resources: Strategies for Sharing Benefits*. J. Mugabe, C. V. Barber, G. Henne, L. Glowka and A. La Viña. Nairobi, ACTS Press: 245-269.

Discussion of IPRs in the context of the CBD. Problems with conventional IPRs are identified and options for a sui generis IPR system are considered.

McAfee, K. (1999) "Selling nature to save it? biodiversity and green developmentalism." *Environment and Planning D: Society and Space* 17: 133-154.

New institutions like the CBD and the 'green' World Bank reflect attempts to regulate international flows of 'natural capital' by means of an approach the author calls 'green developmentalism' underpinned by a post-neoliberal environmental-economic paradigm, according to which nature is constructed as a world currency and ecosystems are recoded as warehouses of genetic resources for biotechnology industries. The author critiques and condemns this new paradigm.

McManis, C. R. (1998) "The interface between international intellectual property and environmental protection: biodiversity and biotechnology." *Washington University Law Quarterly* 76: 255.

The debate over TRIPS and the CBD has exposed a series of fault lines dividing technology-rich industrialised countries located in the temperate zone of the Northern Hemisphere, and the biodiversity-rich developing countries located primarily in the tropics and Southern Hemisphere. This Article describes two of the most visible North-South conflicts, and examines the treaty provisions that have given rise to these conflicts and the two specific issues that are at their root. It concludes with a more cooperative vision of the interface between international IPR and environmental protection.

Monagle, C. (2001) "Biodiversity and Intellectual Property Rights: Reviewing Intellectual Property Rights in Light of the Objectives of the Convention on Biological Diversity". Gland and Geneva, WWF and CIEL.

The paper offers an overview of progress at the WTO and the CBD and recommends some ways forward. It explores the relationships between these legal frameworks, and outlines key steps that CBD parties and WTO members - who comprise many of the same countries - should take at the international and national levels. In particular, to support these key steps, the paper calls for action by the Conference of the Parties and subsidiary bodies of the CBD, and by the WTO's Council for TRIPS and General Council.

* Rangnekar, D. (2000) "Plant Breeding, Biodiversity Loss and Intellectual Property Rights". Kingston upon Thames, Surrey, Kingston University - Faculty of Human Sciences. Economics Discussion Paper 00/5.
[http://www.king.ac.uk/~en_s007/school/research/0005.pdf]

There is a general perception that modern agroecosystems have a negative biodiversity impact. The adverse implications are a reflection of modern varieties being bred from a narrow circle of parental genetic material and of the high level of genetic uniformity of the varieties. The paper historically examines the breeding of genetically uniform varieties. Institutional factors, like IPRs, that reinforce the bias towards genetic uniformity are also examined. The paper concludes that the system of IPRs was developed in a specific manner to provide juridical legitimisation to the breeding of genetically uniform varieties.

* Reid, W. V. (1992) “Genetic resources and sustainable agriculture: creating incentives for local innovation and adaptation”. Biopolicy International No. 2. Nairobi and Maastricht, African Centre for Technology Studies.

Current policy regimes fail to promote local innovation or provide incentives for the upstream exploration of potential values of genetic resources. Changes will require acceptance by all countries of new ownership regimes for genetic resources. It is argued that the only lasting solutions to maintaining the genetic resources base of agriculture are in situ conservation, recognition of local and national ownership of genetic resources, and research and investment aimed at informal innovation.

* Secretariat of the Convention on Biological Diversity (1996) “The impact of intellectual property rights systems on the conservation and sustainable use of biological diversity and on the equitable sharing of benefits from its use: a preliminary study”. Note by the Executive Secretary for the Conference of the Parties to the Convention on Biological Diversity, Third Meeting. Buenos Aires, Argentina. 4 to 15 November 1996. Item 14.1 of the provisional agenda. Montreal, CBD Secretariat. [<http://www.biodiv.org>]

Provides a preliminary review of the impact of IPR systems on the conservation and sustainable use of biodiversity and on the equitable sharing of benefits from its use. The paper reviews the range of viewpoints that have been expressed on the issue and provides examples of recent policy proposals.

Secretariat of the Convention on Biological Diversity (1996) “The Convention on Biological Diversity and the Agreement on Trade-Related Intellectual Property Rights: relationships and synergies”. For the Conference of the Parties to the Convention on Biological Diversity, Third Meeting. Buenos Aires, Argentina. 4 to 15 November 1996. Item 14 of the provisional agenda. Montreal, CBD Secretariat. [<http://www.biodiv.org>]

Reviews relationships and synergies between the CBD and TRIPS, and concludes with a list of options for future work.

Subramanian, A. (1992) “Genetic resources, biodiversity and environmental protection: an analysis, and proposals towards a solution.” *Journal of World Trade* 26: 105-109.

Genetic resources have the property that access to one unit is sufficient for the purpose of propagating millions of copies of them. This leads to market failure with potentially significant consequences for environmental protection. A solution to correcting this market is proposed which consists of the grant of a new property right (genetic resource right) akin to and inspired by IPRs. The solution has the attractions of addressing the problem of forest degradation, of being a market-based solution and of providing a simple means of securing international cooperation which would not necessarily rely on

public financial transfers.

Swanson, T., Ed. (1995) *Intellectual Property Rights and Biodiversity Conservation: An Interdisciplinary Analysis of the Values of Medicinal Plants*. Cambridge, Cambridge University Press.

Provides a detailed analysis of the economic and scientific rationales for biodiversity conservation. It discusses the justification for, and implementation of, IPR regimes as incentive systems to encourage conservation. An interdisciplinary approach is used, encompassing fields of study that include evolutionary biology, chemistry, economics and legal studies. The arguments are presented using the case study of the use of medicinal plants in the pharmaceutical industry.

Swanson, T. (1995) "The appropriation of evolution's values: an institutional analysis of intellectual property regimes and biodiversity conservation". *Intellectual Property Rights and Biodiversity Conservation: An Interdisciplinary Analysis of the Values of Medicinal Plants*. T. Swanson. Cambridge, Cambridge University Press: 141-175.

Explains how the decline of biodiversity has been generated by the human development process; categorises the opportunity costs of such development, i.e. the values of biodiversity; and demonstrates the nature of the institution required to bring these values into the calculus. It is essential to invest in a diversity of institutions in order to capture the values of biodiversity.

Tarasofsky, R. (1997) "The relationship between the TRIPs Agreement and the Convention on Biological Diversity: towards a pragmatic approach." *Review of European Community and International Environmental Law* 6(2): 148-156.

The connection between the CBD and the TRIPS Agreement is the subject of considerable rhetoric and political controversy. This article explores the issues, proposes strategies to harmonise the objectives of the two agreements, and suggests that the legal regimes governing IPRs may need to be changed.

Tobin, B. (1997) "Certificates of origin: a role for IPR regimes in securing prior informed consent". *Access to Genetic Resources: Strategies for Sharing Benefits*. J. Mugabe, C. V. Barber, G. Henne, L. Glowka and A. La Viña. Nairobi, ACTS Press: 329-340.

Proposes a multilateral certificates of origin system linked to patent rights as a means of securing prior informed consent. Such a system, it is asserted, might be of greater benefit to developing countries and their people than an access/benefit sharing regime, which might diminish interest in bioprospecting.

Walden, I. (1995) "Preserving biodiversity: the role of property rights". *Intellectual Property Rights and Biodiversity Conservation: An Interdisciplinary Analysis of the Values of Medicinal Plants*. T. Swanson. Cambridge, Cambridge University Press: 176-197.

Considers the use of property law to protect the commercial exploitation of genetic material in naturally occurring biota. Attention is then given to the extent to which IPRs are currently being used by the biotechnology industry to protect their research

investments. The final section reviews some of the issues underlying the creation of some form of sui generis property right in such genetic material.

World Trade Organization - Committee on Trade and Environment (1996) “Environment and TRIPS”. (WT/CTE/W/8). Geneva, WTO. [<http://www.wto.org>]

A background document to assist the CTE in its work dealing with TRIPS. It assesses the links between environmental concerns and IPRs by considering the relevant features of the CBD. The paper then provides a negotiating history of the CBD, especially Article 16. It continues by summarising relevant ongoing work in other international organisations which, with the CBD, indicate the IPR issues that have been raised as having a link with environment. Relevant TRIPS provisions are presented, GATT exemptions are considered, and the paper ends with a note on the UPOV Convention.

World Trade Organization - Committee on Trade and Environment (1996) “Report of the WTO Committee on Trade and Environment”. (Press/TE 014). Geneva, WTO. [<http://www.wto.org>]

Report on discussions that took place during the year’s CTE meetings covering all ten agenda items, of which Item 8 is on the relevant provisions of TRIPS. Under this Item, issues discussed included the relationship of TRIPS to: the environment generally; the generation of, access to and transfer of environmentally-sound technology; environmentally-unsound technologies; indigenous and traditional knowledge; and the CBD.

World Trade Organization - Committee on Trade and Environment (1999) “The relationship between the Convention on Biological Diversity (CBD) and the Agreement on the Trade-related Aspects of Intellectual Property Rights (TRIPS); with a focus on Article 27.3 (b) - Background Note by the Secretariat”. (WT/CTE/W/125). Geneva, WTO. [<http://www.wto.org>]

This paper was prepared in response to a request by the Committee on Trade and Environment for a factual paper on the relationship between the CBD and TRIPS, in particular with respect to Article 27.3(b). It is divided into four sections: Section 1 provides an overview of existing international instruments relevant to plant variety protection; Section 2 introduces the information provided by some WTO Members to the TRIPS Council on their sui generis systems; Section 3 presents three country studies on the implementation of sui generis systems based on the International Convention for the Protection of New Varieties of Plants (UPOV Convention); and Section 4 presents examples of legislation enacted to implement the CBD.

Yamin, F. (1995) “The Biodiversity Convention and Intellectual Property Rights”. Gland, Switzerland, World Wide Fund for Nature.

Examines the link between IPRs and the CBD. The author proposes recommendations for the CBD to ensure that such rights are supportive of and do not run counter to the objectives of the Convention.

15. Human Rights

Conventionally, IPRs tend to be seen as primarily an economic or legal issue, embodied in the rights to ‘ownership’ and thus exclusive use of inventions and creative works. But it has been increasingly argued in recent years that there is also a broader ‘human rights’ dimension, illustrated by the fact that the right of authors to the ‘moral and material interests’ resulting from their scientific, literary and artistic productions is recognised in the 1948 Universal Declaration of Human Rights. The declaration implies, therefore, agreement by the international community of nations that a right to intellectual property is a human right, which is vested in individual ‘authors’ (including inventors). The existence of such a moral interest implies that an author’s right to prevent others from appropriating or otherwise interfering with his or her work emerges from the very fact that the author is responsible for the work’s creation. The right to a material interest suggests that where commercial use is made of the work, the author should be compensated.

The principle that an intellectual right is also a basic human right arguably became legally-binding when the International Covenant on Economic, Social and Cultural Rights (ICESCR) came into force in 1976. Article 15.1 of this covenant states that its state parties (of which there are currently 143) must ‘recognize the right of everyone:

- to take part in cultural life;
- to enjoy the benefits of scientific progress and its applications;
- to benefit from the protection of the moral and material interests resulting from any scientific, literary or artistic production of which he is the author.’

Three important points about the implications of this covenant for international debates on IPR law need to be made. First, paragraphs (a) and (b) affirm that the general public has a legitimate interest in intellectual productions and a right to benefit from them. Policy makers are therefore required under this agreement to strike a balance between the interests of ‘authors’ and those of the wider society (see Chapman).

Second, governments drawing up patent and copyright regulations are in practice usually motivated more by the expectation of positive economic consequences than by considerations of morality. In other words, while they may agree with the moral principle that authors should receive an appropriate reward from society for their efforts, and also that moral rights (the so called rights of paternity and integrity) should be incorporated in copyright law, their prime concern is a more practical one, albeit also consistent with the ICESCR: that IPRs should contribute to the scientific, cultural and economic enrichment of society.

Third, in the modern world ‘authors’ – including, for example, researchers who work for private corporations – often assign copyrights and patents to their employers (or publishers). According to the ICESCR, they must receive benefits to compensate for this.

Rosemary Coombe has gone so far as to argue that international customary law has moved towards the position that indigenous peoples’ rights over their knowledge is a human right. This is not an argument that corporations can so easily take advantage of.

Although inventors are always named in patent applications, it is generally the case that employees' patents are assigned to the companies they work for. It makes no sense to say a corporation is entitled to IPRs on human rights grounds since it is a juridical person legally separate from the people who work for it or own it.

Is there a conflict between the concept of intellectual property and basic human rights? If such property *is* a human right by either definition or international agreement – as indicated by the 1976 covenant – the question arguably does not arise. Others disagree, claiming, for example, that if access to affordable healthcare is a human right, then to the extent that patents make essential drugs more expensive than they would otherwise be, IPRs conflict with this right.

In August 2000, the Sub-Commission on the Promotion and Protection of Human Rights of the United Nations Commission on Human Rights adopted a resolution on 'Intellectual Property Rights and Human Rights', which was partly spurred by the initiative of the World Intellectual Property Organization to hold a panel discussion on Intellectual Property and Human Rights in 1998.³⁶ While the resolution has no legal status it has attracted a great deal of attention to this issue. The 'actual or potential conflicts' referred to in the resolution are:

- impediments resulting from the application of IPRs to the transfer of technology to developing countries;
- the consequences of plant breeder's rights and the patenting of genetically modified organisms for the enjoyment of the basic right to food;
- the reduction of control by communities (especially indigenous communities) over their own genetic and natural resources and cultural values, leading to accusations of 'biopiracy'; and
- restrictions on access to patented pharmaceuticals and the implications for the enjoyment of a basic right to health.

The resolution requested that the WTO take fully into account the obligations of member states under the international human rights conventions to which they are parties during its ongoing review of TRIPS.

In August 2001, the Sub-Commission considered two reports on the relationship between intellectual property rights and human rights in general, and on the impact of TRIPS on human rights.³⁷ In response, another resolution was adopted which essentially reiterated the Sub-Commission's view that actual or potential conflict exists between the implementation of the TRIPS Agreement and the realization of economic, social and cultural rights. It requested that the U.N. High Commissioner for Human Rights seek observer status with the WTO for the ongoing review of TRIPS. The resolution also stressed the need for adequate protection of the traditional knowledge and cultural values of indigenous peoples, and emphasised the Sub-Commission's concern for the protection of the heritage of indigenous peoples.³⁸

Whether these concerns are justified – and if so to what extent – the resolution passed by the commission does not state that IPRs *per se* conflict with human rights. Rather it is suggested that problems lie in the *implementation* of a particular international agreement, namely TRIPS.

The TRIPS Agreement does not itself explicitly refer to human rights. But, as was explained earlier, it does acknowledge that a balance needs to be struck between the interests of producers and users, both to ensure that each side benefits, and to enhance social and economic welfare more widely.

No-one disputes that while TRIPS implies that economic criteria should guide the search for such a balance, governments are free to apply additional factors – such as international human rights norms – in drawing up domestic legislation. What is debated by some, however, is whether governments claiming evidence of conflicts with human right norms would still have to observe the minimum standards of protection and enforcement of IPRs as defined by and required under TRIPS.

According to the Sub-Commission, human rights obligations should take priority over economic agreements. But whether TRIPS should be revised in consequence of this is likely to be opposed by many governments in future trade rounds or meetings of the Council for TRIPS, at least until there is greater clarity concerning the alleged points of conflict between intellectual and human rights than there is at present.

The writings

* Aoki, K. (1998) “Neocolonialism, anticommons property, and biopiracy in the (not-so-brave) new world order of international intellectual property protection.” *Indiana Journal of Global Legal Studies* 6(1): 59-115.

[<http://www.law.indiana.edu/glsj/vol6/no1/aoki.html>]

The author raises issues about the emerging globalised vision of IPR protection embedded in multilateral agreements such as TRIPS. In particular, there are serious distributive questions about the international political economy of intellectual property protection that should be addressed. Additionally, the question of constructing and maintaining an intellectual public domain or commons remains extremely important, if only because the unprecedented grab by IPR owners of the developed nations seems to be imminent. This grabbing obscures traditional understanding that IPR law is about striking a balance between the rights of authors and inventors and the public of consumers and users as well as the fact that all IPR owners are also users. The final issue is the massive and generally uncompensated flow of cultural and biological resources out of the developing nations into the laboratories, universities, and factories of the developed countries.

Chapman, A. (2000) “Approaching Intellectual Property as a Human Right: Obligations Related to Article 15(1)(c)”. Geneva, United Nations Committee on Economic, Social and Cultural Rights.

[[http://www.unhcr.ch/tbs/doc.nsf/898586b1dc7b4043c1256a450044f331/951444022ab674cbc1256999005aadb0/\\$FILE/G0044783.pdf](http://www.unhcr.ch/tbs/doc.nsf/898586b1dc7b4043c1256a450044f331/951444022ab674cbc1256999005aadb0/$FILE/G0044783.pdf)]

This paper explores the human rights aspects of intellectual property rights, identifying the following types of human rights violation: (1) failure to develop intellectual property regimes that reflect ethical and human rights considerations; (2) uncompensated expropriation of traditional knowledge; and (3) interference in the intellectual property

policies of other countries.

* Coombe, R. J. (1998) "Intellectual property, human rights and sovereignty: new dilemmas in international law posed by the recognition of indigenous knowledge and the conservation of biodiversity." *Indiana Journal of Global Legal Studies* 6(1): 59-115. [<http://www.law.indiana.edu/glsj/vol6/no1/coom.html>]

The author situates intellectual property in the human rights framework and considers some of the challenges that full recognition of intellectual property as a human right would pose. Conflicts over the meaning and location of culture create fundamental ambiguities with respect to the scope of IPR protections. The author examines recent controversies over the use of IPRs to protect traditional knowledge and as a means to implement provisions of the CBD to illustrate the point and demonstrate the limitations of traditional understandings of sovereignty. The recognition of IPRs as human rights entails a renewed concern for social justice issues in an era of so-called global harmonisation of intellectual property protections that further challenges our considerations of sovereignty.

Gana, R. L. (1996) "The myth of development, the progress of rights: human rights to intellectual property and development." *Law and Policy* 18(3 & 4): 315-354.

The recognition of IPRs in the Universal Declaration of Human Rights legitimised the efforts of developed countries and international institutions to encourage developing countries to recognise IPRs and to join the international IPR system. But after three decades of experimenting with Western-style IPR laws and an inordinate emphasis on technology from developed countries as an agent of development, Africa remains mired in underdevelopment. The author argues that the human right to intellectual property must be understood in context with the right to development and self-determination. Such an approach would delegitimise the myth of a universally valid IPR system and protect the right of developing countries to establish IPR regimes that reflect their unique socio-economic and cultural norms and that are consistent with development objectives.

* World Intellectual Property Organization, Ed. (1999) *Intellectual Property and Human Rights*. Geneva, WIPO.

Proceedings of a panel discussion organised by WIPO in collaboration with UNCHR to commemorate the 50th anniversary of the Universal Declaration of Human Rights. Contributors include Peter Drahos, Christine Steiner, Silvia Salazar, John Mugabe, Audrey Chapman and Silke von Lewinski.

Appendix 1:

Key journals on intellectual property rights and IPR-related themes

Biotechnology and Development Monitor
European Intellectual Property Review
IDEA - The Journal of Law and Technology
Indiana Journal of Global Legal Studies
Intellectual Property Journal
International Journal of Technology Management
Journal of World Intellectual Property
Prometheus
The World Economy

Appendix 2:

Glossary

CBD	Convention on Biological Diversity
CGIAR	Consultative Group on International Agricultural Research
CTE	Committee on Trade and Environment (of the World Trade Organization)
FDI	Foreign Direct Investment
GATT	General Agreement on Tariffs and Trade
INBio	Instituto Nacional de Biodiversidad (The National Biodiversity Institute of Costa Rica)
IP	Intellectual property
IPRs	Intellectual property rights – which comprise patents; copyright; trade secrets (undisclosed information); trademarks; industrial designs and design rights; geographical indications such as appellations of origin; semiconductor protection; utility models (petty patents); database rights; performers rights; unfair competition)
MNCs	Multinational corporations
NAFTA	North American Free Trade Area
PTO	United States Patent and Trademark Office
R&D	Research and development
SCBD	Secretariat of the Convention on Biological Diversity
TRIPS	Trade-related Aspects of Intellectual Property Rights
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
UPOV	International Union for the Protection of New Varieties of Plants
WIPO	World Intellectual Property Organization
WTO	World Trade Organization

Endnotes

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- ¹ The United States is the only country still to have a first-to-invent system (as opposed to first-to-file).
 - ² E. Kaufer (1980) *The Economics of the Patent System*. Chur: Harwood Academic Publishers:5-6.
 - ³ Officially, 'An act concerning monopolies and dispersions with penal laws and the forfeitures thereof'.
 - ⁴ Officially titled 'An act to promote the progress of useful arts, and to repeal all acts and parts of acts heretofore made for that purpose'.
 - ⁵ As opposed to a registration system.
 - ⁶ Officially 'An act for the encouragement of learning, by vesting the copies of printed books in the author's or purchaser of such copies, during the times therein mentioned'.
 - ⁷ By virtue of the Copyright, Designs and Patents Act 1988.
 - ⁸ World Health Organization (1996) 'Investing in health research and development: report of the ad hoc committee on health research relating to future intervention options'. Geneva: WHO.
 - ⁹ The UPOV abbreviation is based on the French name of the organization.
 - ¹⁰ K. Riley (1996) 'Decentralized breeding and selection: tool to link diversity and development'. In: L. Sperling and M. Loevinsohn (eds.) *Using Diversity: Enhancing and Maintaining Genetic Resources On-farm*. Ottawa: IDRC.
 - ¹¹ WIPO (1998) *Intellectual Property Reading Material*. Geneva: WIPO:260-261.
 - ¹² P. Geroski (1995) 'Markets for technology: knowledge, innovation and appropriability'. In: P. Stoneman (ed.) *Handbook of the Economics of Innovation and Technological Change*. Oxford and Malden: Blackwell.
 - ¹³ Several recent studies undermine public goods-based analyses of intellectual property on the grounds that they are based on an over-simplistic notion of innovation which assumes that innovations are discrete and independent. In reality they tend to be cumulative and dependent. Moreover, reproducing them may depend on tacit knowledge which cannot easily be documented in written form, such as in a patent specification, and is therefore available only to the innovator. One might add that apart from patents and secrecy, other possible means of appropriation for innovators include marketing, customer support services, reputation, and the advantage that comes with being first to bring innovations to market.
 - ¹⁴ P. Drahos (1996) *A Philosophy of Intellectual Property*. Aldershot and Brookfield: Dartmouth.
 - ¹⁵ In R. Bud (1992) 'The zymotechnic roots of biotechnology'. *British Journal for the History of Science*: 27-44.
 - ¹⁶ United States Congress - Office of Technology Assessment (1989) *New Developments in Biotechnology: Patenting Life -- Special Report*. Washington DC: U.S. Government Printing Office.
 - ¹⁷ P. Rabinow (1998) *Making PCR: A Story of Biotechnology*. Chicago: Chicago University Press:20.
 - ¹⁸ M.R. Bhagavan (1997) 'Introduction'. In: M. R. Bhagavan (ed.) *New Generic Technologies in Developing Countries*. Basingstoke: Macmillan Press:3-4.
 - ¹⁹ The United Nations Development Programme's World Development Report 2001 ('Making New Technologies Work for Human Development') provides a discussion on the risks and potential of GM technologies in developing countries.
 - ²⁰ C. Juma and J. B. Ojwang (1992) *Technology Transfer and Sustainable Development: International Policy Issues*. Nairobi and Eldoret: African Centre for Tecnology Studies.:28-29.
 - ²¹ In *Greenpeace v Plant Genetic Systems NV*.
 - ²² EPO Decision G 01/98 - <http://www.european-patent-office.org/dg3/biblio/g980001ex1.htm>.
 - ²³ See D. Bruce and A. Bruce (1998). *Engineering Genesis - The Ethics of Genetic Engineering in Non-human Species*. London: Earthscan.:223-244.
 - ²⁴ http://www.derwent.com/ipmatters/2001_01/genetics.html.
 - ²⁵ C.M. Correa (2000) *Intellectual Property Rights, the WTO and Developing Countries*. London: Zed Press:134.
 - ²⁶ P. Roffe (1999) 'Transfer of technology and competition policy in the context of a possible multilateral investment agreement'. In: S. Picciotto and R. Mayne (eds.) *Regulating International Business: Beyond Liberalization*. Basingstoke, Macmillan Press.
 - ²⁷ Governments are also involved in technology transfer. Informal and free-of-charge technology transfers are also possible.
 - ²⁸ But having made this point, licensing agreements can also be quite restrictive with respect to the licensees' freedom to use and profit from the technologies.
 - ²⁹ Created in 1999 through the merger of Astra with Zeneca, formerly the pharmaceutical and agrochemical

divisions of ICI.

³⁰ Created in 2000 through the merger of Hoechst and Rhône-Poulenc.

³¹ Agrevo/Plant Genetic Systems (PGS); Du Pont/ Pioneer; ELM/ DNAP /Asgrow /Seminis; Monsanto/ Calgene/ Delkalb/ Agracetus/ PBI /Hybritech /Delta and Pine Lane Co.; Novartis; Zeneca/ Mogen/ Avanta.

³² Its intent is to guarantee minimum standards rather than harmonisation *per se*, but the effect will also be to make national IPR systems more similar to each other.

³³ And indigenous peoples themselves often express preference for words like 'stewardship' and 'custodianship', which imply existence of duties as well as rights.

³⁴ D.A. Posey (1995) *Indigenous Peoples and Traditional Resource Rights: A Basis for Equitable Relationships?* (1995).

³⁵ Jacob Simet, cited in: WIPO (2001) *Intellectual Property Needs and Expectations of Traditional Knowledge Holders. WIPO Report on Fact-Finding Missions on Intellectual Property and Traditional Knowledge* (1998-1999). Geneva: WIPO: 76.

³⁶ Intellectual property and human rights. Sub-Commission on Human Rights resolution 2001/21. E/CN.4/SUB.2/RES/2000/7.

³⁷ U.N. Commission on Human Rights, Sub-Commission on the Promotion and Protection of Human Rights (2001) Intellectual property rights and human rights. Report of the Secretary-General E/CN.4/Sub.2/2001/12. U.N. Commission on Human Rights, Sub-Commission on the Promotion and Protection of Human Rights (2001) The impact of the Agreement on Trade-Related Aspects of Intellectual Property Rights on human rights. Report of the High Commissioner. E/CN.4/Sub.2/2001/13.

³⁸ Intellectual property and human rights. Sub-Commission on Human Rights resolution 2001/21. E/CN.4/SUB.2/RES/2001/21.