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ABSTRACT

There is an emerging international regime complex concerning traditional knowledge (TK). Debate continues on what form strong legal protection should take including how benefits from commercial use ought to be shared and what form positive protection might take. This article considers how far progress is feasible. It makes three related claims. First, there is a persistent tendency, impliedly at least, to position 'tradition' in direct opposition to 'modern'. We show how this is ahistorical and causes misconceptions regarding the nature of TK, and its relationship to other knowledge systems. It also tends to discourage possibilities for mutually advantageous collaborations based on respect for local norms regulating access, control and ownership. The second claim is that many TK advocates, by misconceiving it, are too expansive in what they demand the proposed international regimes accommodate. This appears to preclude possibilities for policy coherence. The third is that the access and benefit sharing measures envisaged by the Convention on Biological Diversity tend to disregard the value of TK for holders and their communities themselves, which is often non-economic. This matters because of its significance to local people's lives, which is likely to outweigh the value arising from its translation into biotechnological knowledge inputs.

INTRODUCTION

International negotiations concerning the design of legal instruments protecting holders of traditional knowledge (TK) from 'the scourge of biopiracy' (Mgbeoji, 2001) have focused in

recent years on three forums and two attached legal instruments. These are the United Nations World Intellectual Property Organization (WIPO), the World Trade Organization (WTO), the Conference of the Parties to the Convention on Biological Diversity (CBD), the latter Convention itself and its Nagoya Protocol to the CBD. Further instruments may follow.[1] The movement, which is formally led by the relevant international organizations and their membership but influenced by various non-governmental organizations and business associations, has encountered various differences of opinion including, for example, how intellectual property-like should a positive protection regime for traditional knowledge be.[2] There is also a serious conceptual challenge which negotiators have failed to resolve despite so many years of debate.[3] Insofar as some degree of international consensus is considered essential to deal with misappropriation or misuse, the continued absence of workable parameters or clear definitions around 'traditional knowledge' is obstacle to any real international-level progress. Traditional knowledge unlimited for many advocates embraces all 'traditional knowledge' including those vast amounts that have become completely unmoored from any specific place, country (or even continent) they may have originally come from and which may in essence have become mixed and hybridised. Can we achieve international protection of traditional knowledge as long as it is construed so broadly that anything that *could* be traditional *is* traditional and equally worthy of legal protection and benefit sharing rights? This is very important. There is a world of difference between turmeric drinks with added milk that have no specifically local source (Biswas, n.d.), and something as apparently specific in origin as the use of an extract of the bark of the tiki uba tree as an arrow poison by the Urueu-Wau-Wau, comprising just a few hundred people in the Amazon (Posey, Dutfield and Plenderleith, 1995). Traditional knowledge means different things to different people, but even if it meant the same thing to different people, is it realistic to suppose it can form a bounded and coherent broad category of knowledge for the purpose

of assigning legal rights and duties on the basis of its use by third parties? Little attention has been paid in the literature to this question yet it is crucially important.

Admittedly, these definitional and conceptual challenges have not gone completely unrecognized. Nor are we strangers any more to the notion that tradition (and TK itself) can be 'invented' (Hobsbawm and Ranger, 1983; Sunder, 2006). It was precisely because 'traditional knowledge had different meanings for different people in different fora' that in 2010 the WIPO Intergovernmental Committee on Intellectual Property and Genetic Resources, Traditional Knowledge and Folklore was requested to prepare a technical report on 'the various forms in which traditional knowledge may be found' (WIPO, 2010).[4] The document focuses largely on the practical forms of traditional knowledge: know-how, skills, innovations, etc. Lumping together the documented 'grassroots innovations' (Gupta, 2016) often from individuals or small groups with the largely anonymous collective ones of indigenous peoples *and* without excluding also the practical general knowledge of vast numbers of rural inhabitants in one or more country is useful with some essential and correct distinctions made. It fully accepts that traditional knowledge changes and evolves generation by generation rather than stays the same. It distinguishes between traditional knowledge *as such* and traditional knowledge-based innovations and creations acknowledging that drawing lines between them can be very difficult. The report has nothing to say about the legal implications arising from those essential and correct distinctions. It does not really explore the implications of the mixing and remixing of knowledge so that knowledge may only be partially 'traditional' or 'modern' and that this could potentially be true for most so-called traditional knowledge in the world as it could be also for non-traditional knowledge. Nor does it fully consider the difficulties in assigning origin and attribution which again might be applicable to most of the world's traditional knowledge.

In 2010, the Nagoya Protocol to the Convention on Biological Diversity (CBD) was adopted. It has now entered into force. The Protocol, whose full name is the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of the Benefits Arising from their Utilization, seeks to further the third objective of the CBD: the fair and equitable benefit sharing arising from the use of genetic resources including associated traditional knowledge (Greiber et al., 2012; UNCTAD, 2014). To date government regulations on access to genetic resources and benefit sharing (typically abbreviated to 'ABS') and the use of legal agreements such as contracts are deemed the appropriate and effective means by which biodiversity and the undefined 'associated traditional knowledge' may be transferred internationally to commercial actors under principles of fairness and equity (Carrizosa et al., 2004). The latter use intellectual property law to acquire legal monopolies enabling an income stream that can then be shared, at least in theory. The Philippines and the Andean Community of South American nations pioneered genetic resource access and benefit sharing regulatory structures in the mid-late 1990s. Peru has two statutory instruments on traditional knowledge protection.[5] Many more countries have since followed their example.

The purpose of this article is to investigate the TK concept. We will critically assess conventional usage of the term, including the prevalent assumptions as to how 'tradition' relates to 'modern'. We will also consider its value. Who uses TK? And who *needs* TK? The original contribution of this article is to apply history to the analysis rather than relying on law alone. We will relate this analysis to present-day debates on international TK protection. The discussion aims to show whether we may be misunderstanding TK. Can TK be better operationalized legally through a better targeted application of the term than the currently

somewhat vague and contradictory understandings of the term allow? This is a question we seek answers to.

The article makes three related claims. First, there has been a strong and persistent tendency, impliedly at least, to position 'tradition' in direct opposition to 'modern'. We argue that this is ahistorical and causes misconceptions regarding the nature of TK, its relationship to other knowledge systems, and how far it may be subject to local norms regulating access, control and ownership. The second claim is that many advocates, including diplomats, negotiators and activists, whether by design or default, are too expansive in what they demand the proposed international regimes should accommodate to the detriment of legal and policy coherence. The third is that the access and benefit sharing measures envisaged by the Convention on Biological Diversity and the Nagoya Protocol tend to disregard the value of traditional knowledge for holders and their communities themselves, which is often non-economic.

This critique is timely for three main reasons: first, the implementation of the Nagoya Protocol is still in its early stages. Second, moves are afoot at WIPO to develop one or more legal instruments on intellectual property and genetic resources, traditional knowledge and traditional cultural expressions that would have a complementary relationship with Nagoya Protocol-based regulations. The latest version of draft articles on traditional knowledge that could form the basis for a legal instrument contains some very good language which would have the effect of 'pinning down' traditional knowledge in a very constructive way. They do address many of the concerns expressed in this article. However, all of the text is up for continued negotiation and some of the best language falls within the square brackets that mean it has a good chance of being deleted at some stage (WIPO 2016). Third, many

developing country members of the WTO have called for the rules on patents to be amended requiring that applicants disclose their use of genetic resources and the contribution of the associated traditional knowledge to the inventive achievement for which they seek patent protection, and the origin of these elements (WTO 2004). No agreement has yet been reached, and perhaps never will be, but it is quite possible that a WIPO instrument on intellectual property and genetic resources will introduce this measure in some form or another.

THE FALSE BINARY OPPOSITION OF TRADITION AND MODERNITY

Since the 1990s, the biopiracy discourse following established post Second World War practice (see below) has tended to treat traditional and modern[6] as binary opposites. Biopiracy is (i) the theft, misappropriation of, or unfair free-riding on, genetic resources and/or traditional knowledge through the patent system; and (ii) the unauthorized and uncompensated collection for commercial ends of genetic resources and/or traditional knowledge. Such unauthorised use and appropriation does happen though the chief offenders are not in fact the big drug companies, as is commonly supposed, but much smaller firms trading in various types of natural product such as foods, food supplements, herbal remedies and seeds (Robinson 2010). These tend to have lower profit margins on their products, though a change in their business practices could certainly provide some useful if modest benefits for local communities (Robinson, 2015). The critique being made here is not with the concept of biopiracy[7] but with usage of the other two terms in the sentence opening this part of the article including the relationship between them.

It is commonly supposed that tradition and modernity operate in separate spheres, except where the modern incorporates tradition in a decontextualized fashion and then claims it as its own. Such an opposition between tradition and modernity is a fundamental assumption of post Second World War modernization theory. A number of mostly U.S.-based social scientists in the Post War era identified fundamental social and cultural differences between traditional and modern societies and assigned to each a set of descriptive terms that were in opposition to each other. Accordingly, as they saw it, social and cultural evolution could be best understood in terms of progress that would entail the replacement of terms applicable to traditional societies such as 'community', 'patron-client relationship', 'routine', and 'solidarity', with their modern polar opposite counterparts: 'individual', 'bureaucratic relationships', 'innovation' and 'competition' respectively. Since evidence of progress essentially entailed the latter terms applying rather than the former ones, there was little accommodation for hybridity including its positive aspects for both societies.

Two major criticisms, at least of the cruder versions of modernization theory, aside from its ahistoricism, are its determinism and its failure to accommodate the idea of mixing and hybridization and their potentially beneficial aspects also for the traditional sector. At its crudest, modernization theory saw social progress and economic development as the necessary transformation of traditional societies into modern ones. It is 'tradition' that was holding societies back.

If the academic version of modernization theory went out of fashion decades ago, having given way to dependency theory (now also largely discredited), some of its basic assumptions have proved to be highly resilient. Examples include the overhyping of genetically modified plants in developing countries, the dismissal of landraces and local cultivars as old varieties

that should be abandoned, and the blanket contempt for traditional medicine (Tallis, 2004). Perhaps modernization theory's potentially most dangerous supposition is that *all* of what is true for modernity becomes the opposite for tradition.[8] This should immediately be cause for reflection: that tradition has tended, and to a large extent still does tend, to be used negatively as something outmoded. The word 'tradition' does not help here insofar as it implies some kind of pure condition that is not adulterated with or diluted by elements from other societies or transformed in any way endogenously. Seen in binary opposition, it follows that the more tradition you have the more modernization you need; the less tradition the better. Over the years some hard lessons were learned. For example, in the 1960s Balinese farmers forced to plant Green Revolution modern high yielding varieties and purchase industrial chemical inputs suffered diminished productivity and crop disease and pest outbreaks. However, according to Lansing's classic study, when they returned to their own varieties and their original management systems and practices of irrigation, fallowing and organic disease and pest management based on a network of water temples that had been in place for centuries, high productivity and sustainability recovered (Lansing, 2007).

The contraction of 'knowledge, innovations and practices' in Article 8(j) of the Convention on Biological Diversity to just plain 'knowledge' in the Nagoya Protocol, albeit attached to genetic resources using the phrase 'associated with', hardly helps. It tends to downplay the creativity and adaptiveness of indigenous groups of each generation, as well as other societies with tradition based bodies of knowledge that they wish to protect but that have changed culturally and in other ways from the groups and societies they were in the past. Companies pick up on this when their spokespeople say that traditional knowledge is old and is therefore in the public domain. The public domain is generally a good thing (Boyle, 2008) but to suggest everything placed in it *should* be in it goes too far when doing so violates people's

customary rules or cultural and spiritual values. The supposed beneficiaries of traditional knowledge protection thus find themselves between a rock and a hard place. To the business people, a moral obligation to share benefits with people whose knowledge is in the public domain can (conveniently) only be limited at best, besides which the problem of biopiracy has been grossly exaggerated and politicized. On the other hand, some powerful mainstream developing world advocates, despite their ideological preferences towards 'local community' empowerment, find themselves resorting to the view that support for communities can only be furthered by according more regulatory powers in relation to genetic resources and associated knowledge to governments, hence their tendency to strongly support national access and benefit sharing regimes. This seems to embolden some governments to step in and impliedly claim sovereign rights to traditional knowledge that is not easily attributable to specific groups or communities.

The use, borrowing, appropriation, misappropriation, or whatever name one chooses to call the inclusion of information, knowledge, methods and materials from one system of health or agriculture into another different and more dominant system tends to be seen as being unidirectional. As tradition wanes and modern waxes, people assume the latter takes bits of tradition, used in the form of informational leads or raw materials, and gives nothing back in return. Modern *appears* no less modern for doing this because there is a translation and repackaging which generally strips tradition of its origins and cultural and spiritual entanglements or else denies it entirely. Accordingly, modernity is parasitic on tradition. An understanding of global power disparities reinforces such a perspective. It follows that the way to respond is to create a market for knowledge transactions so that access is exchanged for monetary or non-monetary forms to even things up. Enter the Nagoya Protocol.

Systems of knowledge tend to be hybrids because they are generally open, and they tend to have two-way 'valves': knowledge, techniques, practices and materials go both out and in. Chinese medicine, for example, was not 'traditional' until it was named as such a few decades ago largely for political reasons. Traditional Chinese Medicine co-evolved with western scientific medicine and has accommodated elements of modern science, for example the germ theory of disease (see below). As for experiment and trying things out in a systematic way it is not just white-coated laboratory scientists who do this; many traditional healers and farmers, who often breed modern varieties with their own, do as well. Chinese 'traditional' medicine remains highly popular as do the classical traditional Indian systems such as Ayurveda, Siddha and Unani Tibb, not all of which originate – or are currently practised – entirely in the subcontinent anyway. They may have very deep historical roots, but they are hardly devoid of novelty or innovation. Isolated indigenous peoples in places like the Amazon possess localized knowledge of flora and ecosystems enabling them to meet many of their subsistence needs. But again it is unlikely that all of the biota they exploit or the knowledge they apply are entirely local or have ever been. Although uncontacted groups still exist in the Amazon, most human societies do not stay rooted to one spot over centuries *and* over a substantial period turn their backs on the world outside their own little part of it.

Adaptability and openness are the main drivers of innovation. So might there be advantages in no longer defining tradition as the polar opposite of modernity and instead seeing the two as actually related to each other and capable of interacting positively? In reality they do and have done from the age of Enlightenment if not before. That might sound counter-intuitive. But if it happens to be true then we should go with it and follow it to its logical conclusions.

Most biopiracy incidences have nothing to do with the pharmaceutical industry. Nonetheless, of all industries this one is considered by many to have gained more than any other from open access to genetic material and associated knowledge from today's developing countries. Indeed, one is tempted to agree with the critics that it has been parasitic on them pretty much continuously since its emergence. At the same time, its claims to being wholly science-based imply that it has never had such an intellectual or material dependency relationship. In fact, the history of the pharmaceutical industry exemplifies the subtleties of cross-cultural material and intellectual exchanges over time. It also raises questions as to the efficacy of adversarial approaches which assume that there will always be exploitation unless strong international rules are put in place. The transfer of genetic material and associated traditional knowledge is not, and has never been, an *inherently* zero sum game, though admittedly one can identify numerous individual cases where gains for some have been at the expense of others, usually the weaker parties.

The modern pharmaceutical industry really took off around the 1880s when scientists began to crack the problem of how to harness chemistry to other emerging scientific disciplines and practices to solve hitherto intractable health problems on a regular and systematic basis. Pharmaceutical products over the 150 or so years of the industry's existence have typically been single molecules, usually small ones. They work by binding to certain proteins and causing a change in their behaviour (Stockwell, 2011). Historically speaking, which type of protein was bound to and why a therapeutic effect ensued was generally unknown, as were the reasons why some people suffered from side-effects while others were unaffected. There is still often much that is unknown concerning mode of action and the way drugs work differently on different people.

Scientifically speaking, where did all this start? From about 1805 to the early 1830s, numerous therapeutically significant alkaloids were isolated from plants. Among the most important were morphine from opium (by Sertürner), emetine from ipecacuanha (by Pierre-Joseph Pelletier and François Magendie), quinine from *Cinchona cordifolia* (by Pelletier and Caventou), and codeine also from opium (by Robiquet). François Magendie's highly influential work displays a clear understanding of the importance of obtaining a consistent formulation and producing the right dosage, including of the fever-reducing cinchona alkaloids which of course include quinine (Greene, 2014). To Pelletier has been attributed the notion that purity has therapeutic value. Note that all of these natural products were used for medicinal and other purposes by indigenous peoples and other non-European populations.

However extreme as the theoretical and epistemological differences might appear from this, *there is no perfect traditional and modern divide marking out two quite separate worlds*. And nor was there from the moment that Europeans began to ply the seven seas in search of new lands, products and trading opportunities. One might assume that European colonials and traders had nothing but disdain for local *materia medica*, but this was not necessarily the case. From the early modern era, Europeans collected, documented, traded across the world and imported into Europe medicinal plants from the East and the New World. Perhaps the earliest example of a detailed treatise on medicinal plants imported into Europe from the Western Hemisphere is Nicolás Monardes '*Historia medicinal de las cosas que se traen de nuestras Indias Occidentales*' ('Medical study of the products imported from our West Indian possessions'), published in the 1570s and translated shortly after into several European languages.

The great international trading companies founded at the start of this age such as the Dutch East India Company were instrumental in these botanic transfers (Cook, 2007). Late eighteenth century introductions to the European pharmacopoeia coming from the New World included Jesuit's bark (quinine) and ipecacuanha (Bynum, 1994). American plants also reached Muslim regions and Portuguese possessions and trading posts in Asia, and in the other direction westwards to the Philippines. Apart from trading companies, merchants and Jesuits were also involved in moving these plants around the world. Other plants during the age of European exploration and colonization came into Europe from Asia and Africa. These included foods as well as drugs. Spices from the East not only flavoured otherwise tasteless or disgusting food, but possessing humoral effects were included in the *materia medica*: 'The history of spices is in part the prehistory of the pharmaceutical industry' (Arikha, 2007). Global bioprospecting efforts provided a large proportion of the drugs available to Europe in the later colonial era. Of the 175 plants in the 1885 British pharmacopoeia, 40 percent were of European origin, 25 percent each were from Asia and the Americas, 9 percent were African, and 1 percent was from Australia (Osseo-Asare, 2008).

What was the attraction of these plants coming from distant lands? It is frequently claimed that their exotic origins and names, as well as the colourful stories concerning their sources, the local uses of them, and the means by which they were 'discovered' by Europeans gave them much of their appeal. According to one recent historical work, their uses by native populations was likely to have been a factor in their popularity during the late seventeenth century (Gänger, 2015).

On the other hand, some fitted neatly into existing *material medica* and treatment practices because in certain senses they were *not* exotic. Their use may have been compatible with

humoral approaches to sickness and health, or else they were related biologically to already known plants. In some cases, as trade expanded and populations moved on a greater scale, so did disease. A treatment used for a disease in one part of the world was perhaps presumed often to work for the same affliction, or similar symptoms, in very distant places.

In addition to material, recipes in the form of written texts also crossed seas and continents, and not in one direction only. From Europe to China and the Islamic world between them, medical recipes were of two kinds: formulas and prescriptions. How are these different? 'The formula contains the standard way of preparing a medication – that is, its recipe as laid down by an authoritative text. The prescription, in contrast, is a medication for an actual patient, usually contained within a practitioner's case records' (Hanson and Pomata, 2017). From the seventeenth century, Jesuits translated medical texts from Chinese into Latin and French and vice versa. In 1693, quinine provided by Jesuits was used to treat the emperor of China (Ibid.).

Medical historian Abena Osseo-Asare makes an intriguing connection between high colonialism and modern pharmaceutical development, one that is worth closer inspection: 'The rise of pharmaceutical chemistry in Europe at the end of the nineteenth century dovetailed with the wars of imperial expansion in Africa' (Osseo-Asare, 2008). The 1880s are the decade when British and French colonial expansion had reached its highest point and new imperial nations like Germany and Belgium had just joined the global land grab, the United States following a decade later taking Cuba, Puerto Rico and the Philippines from the Spanish (Osseo-Asare, 2008). The Dutch and the Portuguese were hardy inactive either. The infamous Berlin Conference which carved up Africa for division among the European powers was concluded in 1885, the same decade as the dyestuff industry's pharmaceutical turn

(Dutfield, 2009) and the appearance of Antifebrin, Antipyrin, Pyramidon and Sulfonal, the first pharmaceutical industry products all of which were synthetic and had nothing to do with traditional knowledge however defined. Admittedly none of these was for a tropical disease. Nonetheless, that the industry emerged simultaneously with the Europeans' notorious scramble for Africa and domination of the world is certainly intriguing. Did colonialism stimulate expansion of the industry at just the right time, or have some other significance that merits consideration, such as that it was underpinned by mass outbreaks of biopiracy (as we now call it)?

Running empires required plenty of manpower and, in a reverse direction to today's population movements, substantial numbers of European peoples moved to the tropics, getting exposed to the same diseases as the native people. Economic and political interests are of course very important in determining where government support and private investment are directed in terms of pharmaceutical research and development. Colonialism certainly did affect which diseases should be studied, hence the interest in finding cures for tropical diseases and other ailments especially common in the colonies such as malaria, trypanosomiasis (sleeping sickness), yellow fever and plague. Numerous schools of tropical medicine were opened in Britain, Germany, other European colonial nations, and the United States (Bynum, 2006). Whether imperialism stimulated the growth of the industry, if not its initial emergence, is plausible. The colonies were sources of plants and ethnobotanical information, and markets for products. In addition, the colonies served effectively as scientific laboratories including for medical doctors (Tilley, 2011). Medical research facilities were also established in the colonies, primarily of course for the benefit of the colonizers, not those being colonized (Chakrabarti, 2012).

What is true of the past is partly true also of the present. As mentioned above, plants together with microorganisms remain the primary source of at least a quarter of new medicines being approved. In some cases as extracts or mixtures these were known about and used before industrial chemists and drug companies ever got their hands on them. To name a few drugs in the modern pharmacopoeia sourced from traditional medicine, reserpine, the vinca alkaloids, and the opiates spring to mind. Recent additions include artemisinin, arsenic trioxide, and nicosan.

Apparently the industry's initial existence does indeed owe something to traditional knowledge. But was the relationship between industrial biomedicine and traditional medicine purely parasitic? Or was it also symbiotic? A recent historical work on plant-based medicine in colonial and post-colonial Africa convincingly asserts that 'herbal medicine and pharmaceutical chemistry have mutually supportive, simultaneous histories up to the present' (Osseo-Asare, 2014). Indeed, the author even goes so far as to claim that biomedicine and African traditional healing 'were, in fact, actually adapted from one another.' This may go a little too far. But it is certainly more in step with the view that the former imperial nations of Western Europe have been shaped far more by their encounters with the people, societies and the biodiversity of their former colonies than traditional histories that tended to be Eurocentric and positivist were able to admit to as if there was nothing much to be learned (Drayton, 2000). As historian Richard Drayton explains the development of European science is intimately related not just to imperialism and commerce in natural products but also to what nowadays we call traditional knowledge: 'what we may call the sciences of collection and comparison – among which we may include botany, zoology, and geology – depended on Europeans becoming exposed to the planet's physical and organic diversity, and often to the scientific traditions of non-European people' (Drayton, 2000). In turn, as he argues, 'the

sciences shaped the pattern of imperial expansion'. A major consequence of this is that new economies came to arise 'on the basis of the discovery of the raw materials for food, medicines, dyes, and perfumes' (Ibid.). This sounds mostly quite bad. Europeans exploited the rest and benefited from it. As is well known too, the diseases Europeans spread were catastrophic in many places especially in the Americas.

But as we move towards the present one more clearly sees gains as well for the exploited. Life-expectancy rates in most developing countries have rapidly approved since historical times, and Western biomedicine has played a part in this including acceptance of the germ theory of disease. Traditional medicine practitioners who are open to certain biomedical perspectives and practices to supplement their own ones have also contributed. Most likely, competition from biomedicine has also discredited some of the less plausible traditional treatments and led to them being abandoned, as happened with the practice of bleeding in Europe.

Traditional medicines are of course very much in use today. Typically, they consist of processed or unprocessed single or mixed natural products of plant, animal or mineral origin, administered orally in solid or liquid form. Whole plants may be used, or else plant or animal parts or their products. Unlike pharmaceuticals they are not single chemicals obtained through industrial processes. The notion of the *active principle*, that is, the specific compound having the therapeutic effect, was, and remains, alien to traditional healers whose treatments are inherently *impure* allowing for the possibility of synergisms between the various ingredients. Further, their usage was, and still is, justified on the basis of theories of health, sickness, well-being and efficacy, as well as cultural and spiritual values, which most modern medical practitioners and pharmaceutical scientists understandably find impossible to accept.

In the West, they are subject to a very different regulatory system and tend to be sold over the counter by retailers.

Encounters between European chemistry and non-European scientific traditions have had long-term repercussions in various different ways right up to the present. Thus, in both India and China, there is a great deal of hybridization going on in terms of describing, formulating, making, testing, evaluating, commercialising, in the ways that therapeutic claims are justified, and also of the growing centrality of 'the drug' in healthcare (Lei, 2014; Pordié and Gaudillière, 2013). Western biomedical ways are impacting on *traditional* medicine in other ways as the latter's patient base expands globally. As the former aims to become more personalized, traditional medicines as they enter mainstream markets including over-the-counter outlets increasingly target more generalized use with standardized formulations and dosage instructions.

One must, however, distinguish between traditional remedies and traditional knowledge-*derived* treatments, the latter being traditional-modern hybrids. Indeed, some modern pharmacologists are re-investigating old herbal medicines (Adams et al., 2009; Everett and Gabra, 2014). It remains to be seen whether they will come up with some treatments to benefit today's patients. The very existence of the discipline of ethnopharmacology with its own journal, founded in 1979, underlines the argument being made here, that biomedicine and ethnobiology can and do interact – as they should. Nowadays, there is a consensus that such cross-cultural exchanges should be subject to fair procedures of consent and benefit sharing, at least where ethnobiological knowledge and the plants used are current rather than merely historical hence the CBD, Nagoya and the recent activities at WIPO.

Much has been lost but has tradition really gained nothing from its exposure to other modes of understanding sickness and health? Indeed, traditional knowledge in health has not gone away, nor has it remained unchanged (Hsu, 2001; Pordié and Gaudillière, 2013). A much cited figure from the World Health Organization is 80 percent for the proportion of the developing country population that relies on traditional medicine to meet its primary healthcare needs. Chinese 'traditional' medicine remains highly popular as are the classical traditional South Asian systems such as Ayurveda, Siddha and Unani Tibb. These are well documented and the systems themselves are officially sanctioned with their own recognized training facilities and registered practitioners. They may have historical roots going back a very long time, but they are hardly devoid of novelty or innovation. As mentioned, Chinese medicine, for example, was not 'traditional' until it was named as such. Traditional Chinese Medicine co-evolved with western scientific medicine and has accommodated elements of modern science, for example, the germ theory of disease (Lei, 2014). This largely sums up why the word 'tradition' is misleading and problematic, especially when applied broadly.

Of course, in other parts of the world traditional systems of health have in no way been mainstreamed. Isolated indigenous peoples in places like the Amazon possess localized knowledge of flora and ecosystems enabling them to meet many of their healthcare concerns. But it is unlikely that all of the biota they exploit or the knowledge they apply are entirely local or have ever been. Although uncontacted groups still exist in the Amazon (Lawler 2012; Wallace, 2011) most human societies do not stay rooted to one spot over centuries *and* over a substantial period turn their backs on the world outside their own little part of it. One interesting aspect of traditional medicine is the way that often similar treatments for similar ailments are used by ethnic groups in distant regions of the world. Thus the apparent oddity of the rosy periwinkle being used as a treatment for diabetes in both the Philippines and in

Jamaica. Similarly, researchers have shown that species of the *Fabaceae* family of plants are used as antimalarials in the Upper Negro region of the Amazon, Ghana and in coastal Kenya (Frausin et al., 2015). Is there far less isolation and conservatism among 'traditional' groups than we tend to assume, and sharing of knowledge among disparate groups is more common than supposed? Or are these cases of different people facing similar health threats identifying similar treatments in the plant world quite independently of each other? It would be fascinating to know more, but this would take us beyond the scope of this article.

This might all seem esoteric or at least irrelevant. It is not. One of the difficulties we have is that once we identify disparities in wealth and power we understandably see the presence of an injustice and then clamour that something be done about it. Responses may be realistic and effective but they may also take the form of poorly designed laws and regulations. This happened with many of the national and regional access and benefit sharing regimes that have mostly failed to entice commercial users of genetic resources and traditional knowledge to engage in equitable partnerships with traditional knowledge holding groups. I do not wish to be misunderstood about this point. There *is* injustice. It is done to indigenous peoples especially, but it is done to the rest of us too albeit in a less obvious or tangible way. The causes are not the above-mentioned disparities in wealth and power alone but also these legal and regulatory measures intended to alleviate them. Pharmaceutical scientists *can* and *do* learn from shamans and healers even if not usually directly or even consciously. Notwithstanding the view that most of the low hanging fruit has most likely been gathered already, one can still wonder how much more could be learned if healers and biomedical researchers got together more often than they do – which is almost never. At the same time indigenous peoples need much better access to the fruits of biomedicine. Legal monopolies and excessive pricing get in the way. Perhaps we need to deal with both problems at the same

time. Indigenous peoples, like the rest of us get cancer and all the other diseases afflicting humans around the world. If so many health products have arisen over centuries from exchanges of knowledge and material between different societies, even under the worst circumstances of colonial domination, then we should be encouraging interaction not discouraging it. To the extent that intellectual property rights and the assertion of bureaucratic access regulations lock up and separate knowledge and materials we are all the poorer for it. If for once we were to look beyond the Manichean zero-sum view that views dominance and subjugation as inherent conditions, we might see a rich potential for positive interaction between traditional medicinal knowledge and biomedicine, just as there has famously been with artemisinin.

DEFINING TRADITIONAL KNOWLEDGE: BROADLY OR NARROWLY?

Traditional knowledge continues to be the operative term and that is the way it is. The question arises of how broad or narrow should the regime define traditional knowledge so as to protect whatever is to be protected with as much effectiveness as possible? Clearly breadth can be excessive. Where does traditional knowledge end if, for example, anything done to or with turmeric (or some other product deemed to be a national heritage) by non-Indians is deemed to be misappropriation? An excessively broad meaning will unreasonably lock up vast amounts of publicly available knowledge which no identifiable group of people or nation could make any credible claim to, and whose circulation can no longer realistically be controlled anyway. The way that farmers in South Asia use neem tree seeds to protect their crops, to give one example, really is public domain information and compensation is due to nobody. It has been known about for a long time and has been well documented (Sheridan, 2005). The author is yet to hear of a compelling argument for saying it belongs to the farmers

of this generation or to the government of India, none of whom actually came up with the idea of using neem this way. The custodianship argument, that generations 'invest' in the responsibility of caring for resources and associated knowledge for future generations and should have rights on that basis, cannot take us very far in this particular context (though it might in others). It really is too widespread for that. Accordingly, constructing a moral case for compensation from others' commercial use can be a difficult if not impossible challenge. Neither James Watson nor the families of Francis Crick or Rosalind Franklin or the UK government has any right to claim benefits from those depicting DNA as a double helix or taking advantage of this discovered fact of nature to make money. They did not have such an entitlement at the time of the discovery and do not two generations later. It is hard to find a moral case for the government of India or of any other country to claim that any knowledge that ever came from their country that people and businesses elsewhere found commercially useful should be compensated for even when it gets hybridized, altered or otherwise transformed.

Indeed, a general presumption behind many of the attacks on neem-related patents in Europe and the United States was that India was a victim on the basis that (a) neem is an Indian tree, (b) the knowledge being 'stolen' is Indian, and (c) that neem-related patents are essentially theft of India's biocultural heritage. There are problems with this. First, research suggests the species is native to a broad area, probably large another to span Afghanistan and Myanmar. Second, the relevant 'traditional knowledge' is mostly very commonly known and is most unlikely to be bounded by the artificial frontiers of modern India. Third, the tacit assertion that all neem-related patents are biopiracy with India as victim is tantamount to the assertion of reach-through claims over all global neem-related innovations. This is hard to justify

legally, morally or on policy grounds. India, as with all countries, is not biologically or intellectually self-sufficient.

A narrower meaning, on the other hand, might exclude much of what many countries would like to have protected. Even so, this would get us far closer to a workable approach. What if one confined the legal regime to the knowledge, innovations and practices of 'indigenous peoples' as defined internationally under the International Labour Organization Convention 169 Concerning Indigenous and Tribal Peoples in Independent Countries? This approach could be justified in at least two ways. First, these are often culturally quite distinct groups of people. Consequently for such people an item of traditional knowledge may be more attributable unequivocally to such people. In some parts of the world, their knowledge and 'traditionality' are relatively unadulterated by mainstream knowledge systems and technologies. Second, they may have functioning customary norms governing access and use of certain knowledge and resources they possess (Tobin, 2014, 2015). This is very important: what is deemed to be public domain in the intellectual property sense should not automatically be considered to be freely open for others to appropriate because rights and duties over knowledge even after its circulation may be a matter for customary law. Why should we not take into account their own laws? In principle we must, though how this might be done requires further consideration.

There is a real dilemma here, though. By adopting this approach much of what some countries regard as being traditional knowledge would be excluded from protection, perhaps unfairly. Just because they may not be the originators of some valuable knowledge it does not necessarily follow that communities have no rights over it or deserve no compensation. We would still need to discuss this, but it is difficult to see how any *international* instrument

could really deal with this and achieve practical results. Also, we would still need to have a conversation about the innovations of this generation including those of individuals in communities that, in the words of the CBD, embody traditional lifestyles broadly construed? As for indigenous peoples their levels of acculturation vary widely. Should we ignore this or does it raise difficulties we would have to face up to? What about those who no longer live in such communities, and not necessarily by choice? Should their knowledge, innovations and practices be protected? After all these years important questions remain.

Another reasonable and very basic concern that the approach suggested here cannot fully satisfy is that even with 'indigenous peoples' so defined, attributing knowledge to one group and one group alone can still be controversial. To name one example, the use and knowledge of hoodia as a thirst and appetite suppressant is almost universally attributed to the San people of Southern Africa. However, recent research suggests the situation is not entirely clear. While the San may well be the original discoverers, many of them did not consume it, while various non-San and mixed populations have used it in recent centuries, and some of them cultivated it too (Osseo-Asare, 2014).

Yet another dilemma arises, which this author does not yet know how best to resolve. On the one hand, as explained above, a legal regime for traditional knowledge that focuses on culturally distinct indigenous communities appears to be the most realistic approach. However, for such people biopiracy is simply not the biggest problem that they face. Land rights and other economic, social and cultural rights may be far more important. Is there a point to seeking to protect their knowledge when their absence of legal title may be causing them much more harm? There *is* a point to parallel campaigns to promote the various rights that are crucial to their welfare. However, progress on land rights is probably an essential

condition for a knowledge protection regime, or regime complex linking together two or more agreements, to work. In this sense the more holistic approach offered by the 2007 United Nations Declaration on the Rights of Indigenous Peoples is more appropriate. Politically, confining the application of the regime in this way is a lot less interesting for governments who may lose interest in negotiating a legal instrument because other than a few indigenous groups who would benefit, the national economy perhaps does not stand to gain in any substantial sense.

WHAT ABOUT LOCAL VALUE?

As mentioned above, current approaches focus on the exchange values of genetic resources and traditional knowledge. There is a wealth of literature demonstrating that for indigenous peoples knowledge has local value, whether commercial, practical but non-economic, cultural or spiritual, which is far more important in peoples' everyday lives than the faint possibility of cash injections from commercially successful bioprospecting expeditions (e.g. see Posey, 1999). Furthermore, empirical studies strongly suggest that those engaged in economic development need to understand local knowledge, innovations, practices and norms well in order to achieve effective policy interventions to genuinely improve the lives of local people (e.g. Warren, Slikkerveer and Brokensha, 1995).

In contrast, by treating traditional knowledge as a unified, bounded counter-modern stock of useful knowledge for outsiders, it inevitably gets reduced to an array of raw inputs for life science corporations, which is then regulated accordingly. In doing so, we devalue it, essentially reducing it to a random compilation of leads, hints, hopes, errors, deceptions and *cul de sacs* from which the useful needs to be separated from the supposedly useless. The

rhetoric might suggest it is something more worthy and significant than that but close inspection of how traditional knowledge gets inputted into commercially oriented scientific research reveals that traditional knowledge has those diverse and generally rather limited qualities in that particular context. Anyway, the persisting hopes that TK has genuine value in that setting leads regulators and policymakers to focus their attention on the instrumental value of TK to others, and away from the holders themselves within their own communities and among others with which they socialize and otherwise interact. This has negative practical implications, and the approaches being considered internationally in their current form will not help, especially as these aforementioned leads, hints and hopes will not in most cases be reducible to traceable and enforceable single legal claims justified by having made a tangible contribution to a commercial product.[9] Meanwhile, the land and other rights of indigenous groups within the borders of countries whose representatives in Geneva clamour for international protection of traditional knowledge continue often to be denied.

CONCLUSION

Indiscriminate or coercive modernization can be highly destructive. Similarly, the mixing of knowledge systems, which *can* and certainly have been beneficial to all sides, can lead to the harmful erosion of the economically or politically weaker people's system. So one must be cautious in promoting the idea that all parties in exchanges can learn and benefit from each other just as if they have always done so in the past. An international instrument that promotes exchange but pays no heed to power imbalances is worse than not having an instrument at all. But at a very minimum we need to know what it is that should be protected and *how* that protection should be designed to the advantage in the first instance of weaker parties. After so many years progress has moved at a glacial pace. There is absolutely no consen-

sus even about 'genetic resources and traditional knowledge associated with genetic resources that occur in transboundary situations or for which it is not possible to grant or obtain prior informed consent', which the Nagoya Protocol identifies as unfinished business. The challenge of transboundariness is thus acknowledged as it is by a number of countries at WIPO (e.g. Government of India, 2013) including in the draft articles. However, it most probably applies to most traditional knowledge and genetic resources especially in the broad sense that this article has been criticising. Endemicity in biology and culture is less and less common. Borders are political constructs. Many ethnic groups straddle one or more borders, mass population movements and diasporas have been common in human history and are certainly present today. Species do not have national citizenship. Article 10 of Nagoya merely suggests the possibility of a global multilateral benefit-sharing mechanism to deal with these. Developing such a mechanism is likely to take several more years.

Oguamanam raises some salient matters after noting that 'during modernism's golden years, significant intellectual capital was invested in demarcating science from so-called pseudo sciences and other pretenders thereto'. He adds that 'there has yet to be an acceptable consensus among historians, philosophers and sociologists as to how to erect functional boundaries across knowledge systems, especially between sciences and various categories of epistemic traditions conveniently depicted as Indigenous knowledge' (Oguamanam, 2015). Debates go on as to what is and is not science but the scientific method as conventionally understood is undeniably powerful and has delivered us gravity, thermodynamics, relativity, quantum mechanics, evolution through natural selection, the structure of DNA, effective treatments for cancer, and of course nuclear weapons. One does not have to accept the extreme possibilities of what he says to grasp the essential point that where tradition ends and science starts is far less clear cut a matter than many suppose, and that both have and

continue to borrow from each other often in beneficial ways. If a global access and benefit sharing regime and/or a treaty on traditional knowledge protection can assist such healthy cross-fertilization in fair and equitable ways all well and good.

This article has identified basic conceptual problems that currently make such a noble goal hard to achieve. The first thing we need to do is to limit ambitions to what really can be achieved. Next we need to open the TK black box and make some tough decisions on what a legal regime should and should not cover. WIPO's heavily bracketed draft articles discussed earlier demonstrate how difficult this is to achieve, but it is really indispensable. No decision on the scope of the regime will please everybody. Only a narrow definition, perhaps one that would apply only to knowledge within culturally distinct groups can possibly help to deliver a workable regime.

A recent development, which some consider promising in this regard, is the so-called 'tiered approach' to scope of protection. This was introduced into the WIPO negotiations on TK protection in 2014. The most recent edition of the aforementioned draft articles offers the possibility to apply different legal, administrative and policy measures to secure traditional knowledge holders' moral and material interests according to whether the knowledge is secret, narrowly diffused or widely diffused. However, there is still no agreement about who the 'beneficiaries' are (or are not), which makes it possible for governments and others to make inappropriate claims. In addition, it remains to be seen whether this tripartite differentiation of traditional knowledge 'types' is sufficiently nuanced to ensure the beneficiaries are the right ones and the benefits to be gained are of the right kind and in the right quantity.

Ultimately, it is highly unlikely that anything other than piecemeal locally-driven and controlled solutions can provide much satisfaction for those keen for justice to be seen to be done. Indigenous peoples should be allowed to enjoy the full value of their knowledge *to themselves* first. Once that is achieved, they will no doubt be in a better position to exploit its exchange value with scientific institutions and commercial partners. The latter will need to be patient. If there is commercial value here they will wait and deal with the greater legal uncertainty of an absence of international rules and of harmony in national regulatory regimes.

This leads to a final point. Policymakers debating the Nagoya Protocol and seeking ways to implement it must at least face up to the futility of confining the norms of exchange to intellectual property rights, contracts, top-down government regulations and nothing more than those. Those are the laws of the powerful. Instead, the rules and principles of the weaker party should apply in the first instance. The weaker party is not the corporation, nor is it the government but the indigenous peoples. That is a matter of fairness but it is also the only practical basis for mutually advantageous relationships. We cannot wish away the patent system, nor inappropriate heavy-handed access and benefit sharing rules which might just deliver very occasional windfalls not all of which will filter down to the local level anyway. Instead we need to strengthen the role of customary law as a third source of regulatory norms that facilitates rather than stops two-way exchange but in ways that are culturally compatible with indigenous peoples' values and that further their interests (Coombe, 2001). Either that, or to develop 'hybrid approaches that interweave elements of western law and local, traditional rules for the circulation of knowledge' (Brown, 2005). These laws are local or national but they are not universal in their scope. What *is* universal though is that customary norms are far more ubiquitous than people assume. One should avoid romanticism. Not

everything about custom should be defended. But to disregard those local laws concerning the management of natural resources and the rights and responsibilities surrounding biological material and 'associated' knowledge which have stood the test of time and of the numerous forced changes and disruptions to traditional lifestyles is itself tantamount to an illegal act. The excuse of not knowing any better is no longer acceptable.

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NOTES

[1] Three other elements of the regime complex on traditional knowledge are the FAO International Treaty on Plant Genetic Resources for Food and Agriculture, 2001, the UNESCO Convention for the Safeguarding of the Intangible Cultural Heritage, 2003, and the UNESCO Convention on the Protection and Promotion of the Diversity of Cultural Expressions, 2005. However, their importance is relatively marginal in the present context and will not be covered in this article.

[2] The United States government has tended to argue for TK protection, if there should indeed be any, on the basis of minor tweaks to existing forms of intellectual property. This is unacceptable to the indigenous peoples' organisations observing the WIPO negotiations who are demanding a *sui generis* system founded on very different principles.

[3] WIPO's Intergovernmental Committee has met over 30 times since 2001. The first meeting of the Conference of the Parties to the CBD took place in 1994.

[4] For a useful survey of WIPO's work on traditional knowledge over the last few decades, see Bannerman (2015).

[5] Law 27811 Establishing the Regime for the Protection of the Collective Knowledge of Indigenous Peoples Relating to Biological Resources, 10 August 2002; Law 28216 on Protection of Access to Peruvian Biological Diversity and to the Collective Knowledge of the Indigenous Peoples, 1 May 2004.

[6] Or similar (in usage if not meaning) words like western or scientific.
[7] This is not to suggest that this word is immune to criticism either, but that we do not consider it on this occasion.
[8] For an excellent early critique highlighting the fallacies and harms caused by the use of tradition and modern as if they are binary opposites, see Gusfield, 1967.
[9] Albeit expressed rather differently, a similar argument is made by Angerer, 2011. Related to this difficulty is the issue of potentially extensive distance in material and cognitive terms between biological material and associated TK, the invention claimed in a patent, and a final product. Should benefit sharing obligations be calibrated so as to be in proportion to distance according to some kind of measurement? Accordingly, all other things being equal, the shorter the distance the greater would be the benefits. Similarly: Harrison, 2015; also see Tvedt et al, 2016.