

EDITORIAL

EQUITY IN SHARING SCIENCE AND THE OWNERSHIP OF KNOWLEDGE

Recent years have witnessed a growing debate about an as yet unsolved dilemma concerning global patents for synthetic drugs based structurally on compounds occurring naturally in plants resident in tropical rain forests and other niches. International patents are granted for the synthetic analogs (product patents) or the underlying synthesis (process patents) but are denied for the original natural compounds or the processes by which these compounds are extracted and initially tested for efficacy. The basis for focusing on these compounds and investing capital in the corresponding analog development rests in most cases with history: the folklore of the peoples of the rainforests and/or of national or local traditional medicine archives. Without this traditional knowledge the lag period of "discovery" would in most cases be much greater if not indefinite, but the knowledge keepers do not share in the spoils: knowledge colonialism runs rampant.

It is not only companies that are guilty. For example, for a mere \$1 million the government of Costa Rica, through a front company, sold rights to products from its extensive rainforests to a US transnational company: pocket money paid for a heritage lost.

The World Trade Organization (WTO) sanctions this inequity, indeed polices it, helps to enshrine industrial synthetic chemistry as if the prior historical knowledge did not exist, equating the latter to zero value. It does so knowing that the great majority of designated value is owned by rich nations, mostly per their rapacious multinational chemical and pharmaceutical giants, so that "value" becomes a private good. The rainforest resources from which the guiding scientific information was transferred becomes merely a free supplier of potential profit, the generations of knowledge keepers in those forests mere servants without recompense. No matter that the generations of indigenous experimentation to identify and trial useful compounds reduced greatly the cost in capital and time required for the moguls to narrow down their searches, no matter that the required chemistry is in many cases trivial by comparison. The WTO rewards the technology of this particular moment and disregards the evolutionary technology of past millenia. To survive in

the present era nations must join and obey the WTO rules laid down by the haves in vain attempts to reduce their status as have nots.

But the dimensions of the patent debate extend well beyond the rainforest sanctuaries of historic knowledge. The patenting of slightly modified organisms, of whole genomes including human genetic information renders off-limits many opportunities for catch-up strategies by smaller, poorer nations in the technology stakes. The outcome also determines the price of molecular constructs in the global market place, so that most are affordable only by the rich.

Molecular genetics in particular plays the devil's role in this deadly serious race for profit over equity. Patenting genes or whole genomes is surely the equivalent of patenting traditional knowledge of the rainforest. The knowledge contained in a DNA sequence has been there for eons of time, determining the sequence is simply another way of reading the rainforest book. But, it is argued, this reading exercise is carried out by white-coated chemists in rich country laboratories whereas the traditional knowledge lies in the memories of illiterate forest dwellers. This despite the simplicity of the one and the complexity of the other.

There is a challenge, it would seem, in the development of econometric models to identify means of quantifying traditional rainforest knowledge in a way that will permit patent-equivalents to offset the pharmaceutical pirates' chemical monopoly.

The rainforest is not the only environment to suffer in this way. Perhaps in some respects more serious is the use of science to subvert the cereal grain industry of the world. Cereal crops represent the mainstay of food production and also the livelihood of farmers, especially in poorer nations. Their knowledge is extensive, far beyond academic niceties. In their hands lies in part the biodiversity of germ-lines that determine survival in the context of environmental election pressures: drought, flood, viruses, fungi, insects. Although attempts have been made in many countries to preserve this diversity in extensive seed collections, the relentless pressure of agribusiness seeks to substitute genetically engineered monoculture crops for the original. Critically

these transnational agribusiness corporations seek to prevent farmers growing their crops each season from saved seed: they are forced to buy new seed of the engineered plants to provide the profit to the corporations.

This is triple jeopardy. The wild type diversity is rapidly being lost. The genetic engineers hold threat over the farmers, forcing them to buy seeds rather than thriftily saving enough for planting from the previous harvest. The resulting monocultures are susceptible to epidemic losses, depend on heavy applications of chemical fertilizers, pesticides and herbicides. The long term outlook is one of impending or at least potential global wipe out, all for short term profit in the corporate boardrooms, the quarterly bottom line.

It is important to reflect what the powerful tools of genetic engineering have wrought. The exciting promise of the 1970s, the rapid improvement in tools of trade in the 1980s have led to the exploitation of the 1990s and beyond. It is a breathtaking race of science to become the servant of the profit takers at the expense of the people who toil in the fields of the poor world, to offer the world to ransom of the corporate magnates. The story doesn't stop at that simple picture. Engineering pesticide and herbicide resistance into cash crops means the chemical industry can sell more pesticides and herbicides and hence fatten their profits as they pollute the world's soil and endanger those who struggle to make their living from that soil.

All this scientific effort is protected by patents. The biodiversity harbored so carefully by farmers over eons is left unprotected and disposable for the short term gain. What is forgotten is the wealth of natural genetic selection that is being discarded and lost forever. On that natural selection depends human survival in the long term through adaptive food

production, through mixed cropping, through seed saving. Seed banks have been established by forward looking organizations in an attempt to forestall the impending crisis but they represent small proportion of the natural genetic resources of the planet. And the political pressure by the seed companies may see their ultimate demise. The World Trade Organization will assist that process by its self-imposed role in defending the interests of the transnational chemical and agribusiness companies in the rush the global market place. The WTO thus holds the hand of the rich against the poor.

This provides a dilemma for the genetic engineers of poor nations: to join hands in the international cloning rat race, so to have a thin slice of the cake, or to stand firm in defence of sanity in the preservation of genetic biodiversity. It is a tough dilemma: the career path is clearer along the first road, the second path risks alienation from the engineering club. Yet arguably it is the second path that holds many keys to human welfare and survival. At the very least this scenario depicts the challenge to the genetic engineering armies: to consider the long term effects of narrow genetic modification against the value of nature's selection of diverse genotypes, the immediate excitement of splicing yet one more gene versus the potential broad negative impact on bios as a whole.

The patent problem will not go away. As the power of patent protection of genetically engineered products against traditional knowledge deepens, so will the marginalization increase of the keepers of that traditional knowledge in the rainforests and in the fields. So will the corporations grow richer and the world as a whole grow poorer. Science holds the key, sadly it would seem that those who turn it in the lock do not often look forward beyond the gene of the moment.

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