Biodiversity, Knowledge & Rights Series 1

The Inappropriateness of The Patent System for Life Forms and Processes

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The TRIPS Criteria for Patenting

Article 27.1 of TRIPS states:

> *"...patents shall be available for any inventions, whether products or processes, in all fields of technology, provided that they are new, involve an inventive step, and are capable of industrial application."*

The use of the phrase, "inventive step", to qualify "invention" immediately strikes one as tautological. This tautology is rectified by a footnote which states that "inventive step" means "non-obvious".

The use of the phrase, "capable of industrial application" also suggests that only those technologies that can be applied in factories can be patented. This restrictive interpretation is also dispelled by a footnote which states that "capable of industrial application" means "useful".

In this TRIPS provision on "Patentable Subject Matter", the term "invention" and the distinction between "product" and "process" make the patenting system inappropriate for life forms and life processes. Obviously this claim has to be substantiated and I will try to do just that.

Chapter 3

Invention and Discovery

Article 27.1 of TRIPS states that inventions are patentable. By implication, this means that discoveries are not patentable. The word "invent" is not defined, thus we have to resort to a dictionary definition of the term.

The Oxford Shorter Dictionary gives the word "discover" and the phrase "expose to view" as one set of optional meanings. I do not think that this is the intended meaning in TRIPS. Otherwise the whole Agreement is in serious trouble.

For example, a child is born with a blank mind. As it grows up, it discovers everything. Everything could then be everybody's "patentable subject matter". The WTO could not be established to enforce such an absurdity!

Another meaning is given as "devise as an untruth". This would make patenting a system of falsification. I am sure that this is not the intention of TRIPS.

A third meaning is "found" or "institute". Since institutions are not patentable, and since, even after the establishment of WTO, there has been no move in that direction, I can also discount this meaning. Otherwise, who would patent the WTO?

There are also three interrelated meanings:

- "devise by means of the intellect or imagination",
- "create, produce or construct by original thought or ingenuity"; and
- "devise or originate a new art, instrument, process, etc."

All three of these nuances of "invent" can apply as a requirement for patenting. They all have "devise" or "create" as the operative word. Both "devise" and "create" imply the making of something

that did not exist, and in the context of Article 27.1, "something" means technology. Therefore, they exclude the sense of "discover", even if what is discovered is a technology, e.g. an implement buried with some Egyptian Pharaoh of 7000 years ago.

Chapter 4

Are We Inventing Life?

Living things are made up of only some of the elements that constitute the non-living world. It is, therefore, possible that life could be "invented". Whether we believe this is possible or not is of little relevance to our present discussion. It is, however, important to note that no living thing has been obtained by human agency constructing it solely out of the non-living world. If someone invented a living organism in that manner, she/he would definitely be entitled to patent the invention, and perhaps revel in being a god.

What, then, are the claims for inventing life?

Finding a hitherto "unknown" – even "unknown" refers only to the "modern" sector; it is likely to be known to some local or indigenous communities – trait or traits is said to be a patentable technology in some countries. Obviously, these countries accept that "discovery" is "invention".

Determining the nucleic acid sequence of a gene is also said to enable patenting. Whether the nucleic acid sequence is known to anyone or not at all will not make the slightest difference to the traits of the organism. Such a sequencing is, therefore, merely a discovery. It should not be patentable.

In any case, many of the genes are the same across species. A given gene is, therefore, the same for many species. If I determine the nucleic acid sequence of a gene from a bacterium and patent it because of this fact, what would happen if another person determined the nucleic acid sequence of the same gene from a tree? Whose patent should "protect" the gene? If I were to determine the nucleic acid sequence of the same gene in two different species, could I have two patents on the same gene? Or, will the first patent prevent further patents?

Even assuming that I have sequenced a gene from a bacterium and it has not been sequenced in any other species, does that make it unique? No. This is because, to claim that, all other forms of life would have had to have all their genes sequenced, and I have to have all that information at my disposal.

So far, scientists know all the nucleic acid sequences for the bacterium *Escherschia coli*. Recently, it was reported that the genes of rice have also been sequenced, and rapid progress has been made on the sequencing of the human genome. And yet estimates of the number of species in the biosphere range from 10 to 60 million. Would we, thus, ever be certain that a gene is unique?

When a specific gene (a nucleic acid sequence) is introduced into an organism, the introduced gene may be expressed (i.e. it may result in a trait new to the receiving organism). But, just as the gene existed in another organism, so did, presumably, the trait it determines. Obviously, anyone who introduces a gene in this manner deserves to be rewarded for the technique used in introducing that gene or genes, and/or for the skill for doing so. The invention of the technique should be patentable, but neither the introduced gene, nor the expressed trait, are inventions and they should thus not be patentable. The particular skill is presumably rewarded through the salary payment system.

But of course, to make the effort of patenting worthwhile, the technique will have to be one that can be used often enough, e.g. the gene gun, with differing genes and differing recipient organisms. If it is a once off technique, nobody would bother to patent it.

The expression of the introduced gene is not always as predicted *a priori*. Its expression in its new host organism may be different from its expression in its parent organism. Should it then be patentable? In other words, would it then be a discovery or an invention? I maintain that it would be a discovery.

A comparison with the behaviour of water would help clarify this

issue. Water, like all substances, reduces in volume as it cools down. However, when it turns to ice, it suddenly expands. That is why many a wine bottle put in the freezer and forgotten, shatters. Simply because icy water at freezing behaves differently from liquid water at room temperature, can we say that it is natural in one state, but is not natural and is thus invented in another state? No. we can only say that, by freezing it, we discover additional properties of water.

Similarly, the fact that one gene, when in the cell environment of one type of organism behaves differently from that when it is in the cell environment of another type of organism does not make its new behaviour an invention, only a discovery of an additional property. Besides, if a trait that is expressed is different from the one that had been expected *a priori*, it would only show a weakness in the prediction, not an invention. I do not believe that the patent system is aimed at rewarding weaknesses!

Genes and Traits

Genes determine traits. A stringing together of chemicals known as "nucleic acids" into two counterpart strands, not unlike a twisted rope, makes up a chromosome. The substance of chromosomes, which is made of nucleic acids, is called Deoxyribonucleic Acid (DNA). Chromosomes are found in the nucleus of a cell, but organelles, e.g. plasmids, which are outside of the nucleus, may also contain DNA.

Points on a strand of a chromes have specific nucleic acid sequences which, together, make up a gene. A gene in one strand has the same function as its opposite counterpart in the other strand. The nucleic acid sequence in two opposite genes (known as alleles) may be either the same or different. If the same, then they reinforce each other in producing a trait and the organism is homozygous with respect to that gene. If different, then one of the pair of sequences

determines the traits, and the effect of the other is eclipsed.

When this happens, the trait of the homozygous state of the dominant allele and this heterozygous state are similar. The alleles may also be equally dominant and the compromise trait is different from that of the homozygous state.

Genes are responsible for the presence of specific enzymes in the cell. These enzymes influence the complex chemical reactions that are constantly taking place in the cell. Specific traits are, therefore, the outcomes of the interactions among many molecules. The individual steps of the interactions are directed by specific enzymes.

In genetic engineering, a specific gene or genes are introduced into the cell and may get inside an organelle or inside the nucleus. Hence, it or they may attach itself or themselves to any part of the chromosomes in the nucleus or to DNA bodies in an organelle.

The physical relationship among genes may influence "gene expression" or a trait. If the new gene attaches itself to the DNA in an organelle, its amount in the cell will vary because the numbers of a particular organelle (e.g. plasmid) in a cell are variable as the organelle divides and multiplies unrelated to the mother-cell division.

It is perhaps for these and similar reasons that the impacts of genes introduced through genetic engineering cannot be predicted beforehand with any absolute certainty. It is not unusual to encounter many unexpected traits.

Chromosomes physically reorganize at each cell division. Because of the reorganization, some of the reproductive cells end up without one or more of the introduced genes. Thus for this reason and for other complexities of genetics, the

number of individual organisms without the introduced gene increases with increases in the generations coming forth from a genetically engineered organism.

Chapter 5

Some Problems Associated with Patenting Life

If we ignore the biological objections to treating what is now being done with molecular biology (which studies, among others, the physics and chemistry of nucleic acid sequences) and genetic engineering as "inventions" and, consequently support Article 27.3 of TRIPS, we create problems for the system of patenting.

We will now look at some of these problems.

5.1. Product or Process?

What is a product and what is a process in a living organism?

It seems to me that the way of introducing a gene into an organism is a process. If I want to make a carburettor, I use a combination of human hands, tools and machines. This is analogous to introducing the gene into an organism which did not have it before. Then the transgenic (genetically engineered) organism and the carburettor would both be products.

My aim in inventing the product called carburettor is to carry out another process: that of burning fuel efficiently. Similarly, my aim of producing the product called transgenic organism is to have the process of, say, producing a measles vaccine in wheat.

Now, the process of living takes over from the transgenic individual and makes it produce many more transgenic individuals through reproduction. This extra process has no mechanical counterpart or analogue. It is not caused by my introduction of the foreign gene. It is something in all life, something I have not influenced by my genetic engineering. This process substitutes in each generation the hand, the tool and the machine needed to make each carburettor.

If the introduction of a gene is an invention, each ensuing generation becomes "self inventing" and creates the next generation. Is it then logical or fair, even if we ignore the distinction between inventing and discovering, to I say that I "invent" any generation beyond that particular individual into which I originally introduced the foreign gene? If I had invented the reproduction process also, then all succeeding generations would have been my invention. The reproduction process, which is needed to produce all the transgenic individual organisms which come out of the genetically engineered single parent, thus wipes out every "invention".

If I insist that I have the right to expropriate the biosphere and claim this "self invention" of my transgenic organism as being my creation, I should also be responsible for whatever happens through that process. In which case, I would be responsible for:

- the "loss of quality" that occurs with each generation producing individuals without the gene I have introduced;

- the change that would occur in non-target individual organisms which cross with my "invention" through the usual process of sexual reproduction;

- any unforeseen behaviour of the transgenic variety; and

- any impact, be it positve or negative, and thus becoming absolutely liable in case of any damage or manifestation of any trait or behaviour not specified beforehand.

It is also usual to patent the use of specific biomolecules, which are outcomes of biological processes. For example, if aspirin had been discovered recently, its use would have been patented.

There are now literally thousands of patented biomolecules. The extraction of biomolecules from living things is obviously a discovery, not an invention, since the biomolecules existed prior to being extracted. The method of extraction can, however, be an invention and patentable.

Since the biomolecule existed before extraction, its properties also existed before extraction. The extraction process does not add anything to, or decrease anything from, its properties. The use of a biomolecule is simply the result of recognising one existing useful property of the biomolecule.

Patenting that use is, therefore, inconsistent with "invention" as a criterion. When Article 28 of TRIPS gives monopoly control over the "making, using, offering for sale, selling or importing" a product, therefore, the provision should apply only to molecules constructed by humans, not those extracted. The practice of patenting so far, however, also includes those molecules extracted from living things.

Even a biomolecule "constructed" becomes an invention only if it does not also exist in any organism or part of that organism, be that alive or dead. Otherwise, it becomes merely a synthesis of a biomolecule that is identical with what already exists. Of course the technique for the synthesis could be invented and should be patentable.

5.2. In Quest of Justice

The use that a biomolecule is put to is often the same as that which the organism or its part has long been put to by some local or indigenous communities. Would it then be fair to patent that biomolecule merely for knowing its use while those who knew its use beforehand give it away free and receive no material benefit out of it?

Assuming that the use is entirely new, is it fair that those who discover scientific truths, e.g. the nature of quarks, cannot patent them, but someone who finds a new use for a naturally occurring enzyme can?

If I patent a gene in an organism, is it fair that that one gene is used to prevent everybody also from getting hold of the thousands of other genes in that organism? In this age of extinction, the patented

organism could be the sole source of those genes. In any case, even if extinction were not an issue, keeping others out should be possible only when ownership is absolute and complete. I should have the right to keep others out of my own house, but not out of the city I live in!

Chapter 6

Conclusions

It seems to me that society knows the distinction between discovery and invention. It is greed that makes individuals distort these meanings so that, in the name of invention, they can monopolise discoveries.

But discoveries should also be rewarded. A system for such rewards should be developed. However, distorting the meaning of patenting in order to make it applicable to life only serves to attract the rejection of the whole system. Who ever worried about the legitimacy of patenting before the 1990's, before it became known that the USA was allowing the patenting of living things? But now, opposition is growing all the time, opposition not only to the legitimacy, but also to the legality, of patenting.

Appendix

Patenting and Owning Life: Some Questions and Answers

The system of patenting was developed for machines. Now, it is being forced onto living things and most of the problems of patenting life arise from this fact. In the following, several questions are raised pertaining to the patenting of life with brief answers.

Imagine that I invent a new kind of carburettor that economises on fuel.

Q **If I patent it, is the rest of the car also patented?**

A No.

Q **When I patent an organism because I claim to have invented a gene, do I patent also the whole organism?**

A Nominally, no. In practice, yes. This is because the carburettor is sold individually, but the gene is in the organism. I am thus prevented access to the whole organism in the name of protecting the patented gene.

Q **Conversely can I patent a whole organism because I claim to have been inventive in the context of one of its genes, or one of its traits?**

A Yes, in some countries. Nominally, no. But, in either case, I effectively keep out users of the other genes. Therefore, in practice, yes in all cases.

Q **If I have invented a carburettor, would I not be able to scale it up or to scale it down to make it fit a lorry or a motor cycle?**

A Yes.

Q **When I do this would I not know beforehand what the effect would be on the lorry or on the motor cycle?**

A Yes, though some fitting trials, as with a garment being tailored, will be needed. Making it fit is always possible.

Q **When I introduce a gene into one organism or another, do I find that its impact in both cases is as predicted?**

A Often, not.

Q **When not, can I change the scale (or whatever dimension) of either the gene or the organism, to make it match my prediction?**

A No.

Patenting life thus indeed becomes owning it. But whilst I create my carburettor out of materials that have nothing to do with delivering measured amounts of petroleum, I introduce genes or traits into an organism only if they already exist as such in another organism or organisms.

Therefore, breeding and genetic engineering reorganise something existing; they do not create anything *de novo*. Considering achievements in reorganising as if they were inventions is a distortion of meaning, with the aim of distorting reality. This distortion is made for a specific purpose, for controlling living things in the same way as one can control machines one has invented.

Those who patent living things will claim that they are not distorting anything but that they are merely asking for a recognition of their own creativity that has gone into making the living thing what it actually is.

Q **But do they create the living thing?**

A They do not. Even they would only claim that their creativity is reflected in the living thing, not that they have made it.

Q **What can creativity contribute to the gene that has already been created to keep it as it has been since it was created?**

A Nothing other than protecting the variety that contains it from extinction. But then, this important issue is ignored in patenting.

Q **What would creativity mean then?**

A Nothing. If genetic engineers want reward, they could ask society to develop a system appropriate for their role in the improvement that comes from reorganising. Society pays for many of the services it gets. A service given does not have to be a creation in order to be rewarded; it only needs to be useful.

When genetic engineers claim creativity in relation to life, one of the activities they point to is the extraction of biomolecules. They deliberately confound discovering what exists to make it seem as if it were something that is different from its actual self, that is not itself, that has been brought out of non-existence.

Q **Why else would a chemical extracted from a living thing be patented?**

A Why else indeed since we are told that discoveries are not patentable? A newly created instrument for making the discovery would, however, be patentable.

Q **Or are discoveries per se patentable?**

A At least the Patent Office of the USA thinks so.

Another basis for claiming creativity is the detailing of how the biomolecule is to be used. Such a use is often the same as

what is traditional to local communities somewhere.

Q **If a company patents that traditional use as its own "invention", is it not then plagiarism or piracy?**

A No doubt about it.

Q **Is the patent office that has allowed it then not legalising robbery?**

A Definitely.

Q **Does an act stop being a crime merely because the law allows it to be committed?**

A No. Did not Europe and North America set the Nuremberg trials to punish acts that had been legal in the Nazi era?

The use of a biochemical might also be newly discovered. This is claimed to be patentable.

Q **Is that new use an invention, or a discovery?**

A A discovery. If a use could be invented, imagine what a difference it would make to invent a use that would make rock become food directly!

Q **Should then the use, or the chemical itself, be patented?**

A Neither, since they are both discovered.

Q **Which is currently being patented in the various industrialised countries, the biomolecule or its use?**

A Both the biomolecule and the use of a biomolecule.

Q **When it is the use that is patented, should access to that**

patented biomolecule then remain open, and making and using it for other purposes be allowed?

A Yes. I realise however, that once a chemical is available to the public, it is not easy to restrict its use in order to exclude that which has been patented.

Q **Is it then fair to deny other uses in order to protect one particular use which has been monopolised?**

A If the claim is that patenting is aimed at maximising service to society, no. If patenting is for monopoly control only, then yes.

Q **In other words, should we err in favour of society as a whole or in favour of one particular legal or natural person?**

A In my view as a citizen of a developing country, I would say we should err in favour of society. If I head a genetic engineering corporation, I would presumably have said that you should err in my favour.

Extracted biomolecules can often be synthesised and thus be made artificially in a chemical plant. Such synthesised chemicals are claimed to be patentable.

Q **Will the synthesised molecule, then, have been invented?**

A No.

Q **Should it then be patented?**

A No. I have no problem with patenting the particular process used for the synthesis. But I would find it impossible to accept that the synthesised molecule is considered invented. This is because I would then have to assume that the synthesised molecule is different from the natural one. But even the so

called inventor would not accept this distinction: the rationale behind synthesising something is the making of an exact replica.

In my view the more audacious claim for patent is that for the organism. If the nucleic acid sequence that corresponds to a trait were invented, that it did not exist in nature in any species, such a claim could be understood. But, in fact, we know that a trait is often the result of an interaction among many genes or nucleic acid sequences. That is why we can never tell for sure what a newly introduced gene will do in an organism. We only introduce it and find out the effect. This fact alone would have made such a claim dubious.

Q **Do laws allow the patenting of only specific traits? Only nucleic acid sequences? The whole organism?**

A According to the information I have, USA laws allow the patenting of traits and of the introduced gene(s). In theory, the whole organism is not patented; but in practice, the patented gene(s) or trait locks up all other genes and traits. The European Patent Directive would have done the same as that of the USA; but it is not yet in effect: it is being challenged by the Netherlands and Italy.

Q **What about simply crossing individuals to create a new individual with a new combination of nucleic acid sequences and traits?**

A In laws that allow the patenting of traits, this will be patented. In laws that require the deliberate introduction of a selected gene or genes, e.g. through recombinant DNA technology for patenting, this will not be allowed.

Q **Is the organism then an invention?**

A It cannot be, even if so claimed.

Q **Or do the nucleic acid sequences have to be introduced only through recombinant DNA technology to make the organism an invention?**

A The claim is that through this or through technologies that achieve the same (transformation) process in other ways, the organism becomes "invented". Obviously, this is absurd.

Q **Or will simply identifying the nucleic acid sequences that determine the traits make the organism an invention?**

A It should not. But for the USA, the answer is yes since determining nucleic acid sequences enables patenting. Obviously, this is absurd since the organism is not even modified, as it remains the same whether someone knows its chemistry or not. But then the patent is said to be for the nucleic acid sequence, not for the organism. Even thus the nucleic acid sequence remains the same whether someone knows its chemistry or not. If every time we "knew" something it changed, there would never be knowledge.

Q **In which case what has genetic engineering or DNA sequencing got to do with patenting?**

A Only satisfying the desire for monopoly control. It is true that recombinant DNA technology combines genes that would not have come together through natural processes. But the genes are not invented. Then the patent should apply only to the particular technology used to bring unlikely genes together, not to the genes themselves. "Product patenting" is valid only when the product is brought out of non-existence.

Q **Why is it then said that the organism is invented?**

A In order to have a monopoly control over it.

Q **Would it not suffice to say that it is the process of combining the genes that has been invented?**

A It should. But this would enable only the monopoly control of research. Such a limited control would not be very lucrative. Patenting the organism enables the monopoly control of all economic activities involving it. The desire for greater control and for more gain thus brought about the patenting of the organism. There is an Ethiopian proverb: "You rename a vulture which you want to eat, a chicken or a francolin".

Conversely, when we find an organism, it is with all its nucleic acid sequences inside it.

Q **Why cannot we patent it, if all that genetic engineering does is combine existing DNA sequences?**

A When we patent traits, as in USA, we do precisely that since an organism is made up of its traits and/or genes.

The consequences of this distortion are multifaceted. Some examples follow.

Q **Would allowing a gene or a trait to be patented not make the other genes and traits in the whole organism unavailable to others?**

A As already pointed out, yes. That is the whole idea.

Q **Should not one, looking for ways of using that organism without the patented trait or gene, be allowed to use it?**

A You can guess that I think that one should.

Q **Does one have the right to excise or splice out the patented gene or trait and use the rest?**

A I believe that one should. But then, one is not allowed to do research on a patented organism as one wishes. It may be argued that one could use other organisms in that species that do not contain the patented traits or genes.

Q **What if that organism with those patented genes or traits is the only surviving variety of the species?**

A Too bad, though in this age of extinction, this is not unlikely.

Q **What if there are other genes or traits that occur only in that variety with patented genes or traits?**

A Again too bad. And yet this is a very likely scenario. Access to that variety could then be continually denied by patenting traits or genes every time an existing patent is about to lapse.

Q **Is this fair?**

A No. But again - too bad.

Q **If we use the determination of the nucleic acid sequence constituting a gene as a criterion for patenting, and I understand that this is the case, how would we know that the sequence is unique to the organism being patented?**

A We would not. But if you find the same sequence in another organism, too bad for your apparent good luck.

Q **Assuming that the patenting of a nucleic acid sequence can be allowed only if it is new to life, which would make it a genuine invention, could we ever be certain that a nucleic acid sequence which we find in an organism is really new to life?**

A In theory, yes. But the human species as we now know it will probably be no more before we can be absolutely certain, since we shall be certain only after we have worked out the DNA sequences of all genes found in nature.

Q **If we allow patenting for a mere determination of nucleic acid sequences, how will we cope with the sequences which are the same but are in different species?**

A Presumably on a first come first served basis. However, I do not know. I do not think that this problem has as yet arisen. But many of the genes are the same even in species as different as bacteria and humans. And the number of species on earth is estimated to be ten to sixty million depending on who has done the estimating. So far, we know the nucleic acid sequences of all the genes only for a very small number of species.

[**Editor's Note:** Recently scientists have sequenced the genes for rice and the plant *Aspidistra*, and rapid progress is being made on the Human Genome Project.]

When I patent a carburettor, it is for the use of the carburettor as such (*per se*). This carburettor remains unchanged until it is thrown away either because it is broken or gets old. When I patent an organism, it is for its reproductive capacity.

Q **Assuming that an organism is "invented" and can thus be patented, should the progeny also be patented?**

A I do not know. Do you?

Q **If the progeny inherits a patented status from its parent, is it then identical with its parent?**

A In the case of sexually reproducing organisms, even when hermaphroditic (i.e. they do not cross with other individuals) the progeny is still different. Even in a vegetatively reproducing (splitting to make two or more individual) organism, there sometimes is change in the progeny. A transgenic (with gene(s) introduced from other organisms) has a portion of its progeny without the patented gene(s).

Q **If what is being patented is the reproductive capacity, and the patented trait or gene is not always in the progeny, would society accept patenting a carburettor which, every**

season (c.f. cropping season) reverted partly to iron ore? Who would buy a steadily rusting carburettor?

A Nobody.

Q **Is that the reason why genetic engineering companies make farmers buy new seed every season?**

A Yes. But also because they get more money that way.

Q **If they are doing so because their transgenic organisms do not always breed true, should supplying new seed every year not be a free service given to maintain their patents?**

A Yes. But there is nothing like making money out of somebody else's position of weakness!

Patenting seems totally inappropriate for applying to life. If we want to reward researchers in the life sciences, we must find another system. If we continue with the distortion of the meaning of invention, we do not know where we will end up.

Q **I wonder how many of you have heard of Mr. Moore of the United States of America whose liver has been patented?**

A I do. He went to the hospital. They took out a piece of his liver and they cultured it. They patented it. He claimed that they had no right to patent his liver, because it was his own. I am told that the judge said that since it is outside of him it is not his and that, therefore, it can be patented, i.e. it is invented. But that piece of liver is the same whether inside or outside Mr. Moore. The judge did not dare say that that part inside him is also invented.

Q **But how long will it take for the continuing distortion of inventing to press home the fact that the piece of liver**

inside him is the same as that outside him, and, following the habit of distorting, declare that the liver inside is also the patent holder's invention?

A At the going rate, no time at all.

Q **Then what?**

A Suppose that, then, I buy the patent on Mr. Moore's liver, and suppose that I also patent his blood in a similar manner, and suppose that I want my liver out of him in the style of Shylock, then I can get grim. Even Shakespeare's defence of not allowing me to spill blood would not prevent me. I will spill my blood and take my liver, and I will still walk away free in "this world of growing freedom and democracy." Unless, of course, Mr. Moore is rich enough to keep giving me my royalties for his liver and for his blood!

ABOUT THE AUTHOR

Dr Tewolde Berhan Gebre Egziabher is a distinguished academician who has served in Addis Ababa University as lecturer, Science Faculty Dean and Keeper of the National Herbarium and then, as Asmara University's President. He is a well-known negotiator representing the Ethiopian government in international fora, especially on issues of biosafety and biodiversity. In 2000, Dr Tewolde was awarded 'The Right Livelihood Award' for his exemplary role in representing the Like-Minded Group at the biosafety negotiations in Cartagena and Montreal, and in achieving an outcome that stressed the importance of the conservation of biodiversity and the traditional rights of farmers and communities in developing countries to their genetic resources. Currently, he is the General Manager of the Environmental Protection Authority of Ethiopia.

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