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1. Preface:

Motivation:

We chose this topic because we think that a lot of people are not aware of the fact that there are companies with the power to do patents of genes. We also think that these patents will have consequences to further generations and therefore we need to create a certain awareness for that topic. It is also an ongoing legal debate between companies and farmers or environmentalists. We see no reason for patenting genes in this magnitude because we think that genes of animals, plants or humans have to stay property of everyone.

Questions:

- Is gene patenting really only a bad thing?
- Can people be helped by genetically modified food?
- What are the problems occurring when genes of plants, animals or humans get patented?
- Are there some possibilities to optimize the strategies of big gene technology concerns like Monsanto?
- What are the logic consequences when a) genes get patented or b) genes could be used by everyone for free?

2. Introduction:

Gene patenting really started in 1980. Before that time life forms were considered to be a part of nature and they were not patentable. The case “Diamond v. Chakrabarty” changed that when he wanted to patent a modified bacteria which is an oil-dissolving bioengineered microbe. He succeeded because the U.S. Supreme Court decided that bioengineered bacteria were patentable because they did not occur like this in nature.

In 2010 there was a first sign of a counter movement to insure that human DNA stays collective property. In that case a New York court refused to accept patents of “Myriad Genetics“ on two

genes linked to breast and ovary cancer. (More informations about that can be found at the end of the paper under the title “Up-to-date information”.) This development points to the direction of opening research in the field of bioengineering. Thus this could also lead to a decrease in research funds for bioengineering because without a patent the exclusive right will not give advantages to the companies funding those projects. However this will remain speculations at this point. So at the moment there is a controversy on whether human DNA should be patentable or not. Supporters of this form of patenting say that the motivation to find the genes and develop tests to find it is to have a patent on this gene to make money. Opponents say that it blocks scientific research and it prevents poorer people from getting tested because the prices for these tests are high when there is a patent on the test. At the moment about 20 percent of the human DNA is patented in the United States.

In 2010 scientists wrote an open letter to the FBI requesting the publication of their DNA database for scientific research. The FBI refused to release the data because it could jeopardize their investigation so researchers often face denial and have a hard time getting data to analyze. Research gets limited by not only patents but also by refusal of handing out data. This example also shows a huge risk authorities face with growing DNA databases. Because some law enforcement agencies take DNA samples upon arrest these samples also end up in this database and are therefore an ethical disaster.

A gene patent is „a patent on a specific gene sequence, its chemical composition, processes for obtaining or using it, or a combination of such claims.“¹.

Furthermore an invention must be “useful” (the inventor has to give a purpose), “novel” (unknown before the filing) and “non obvious” (this means that it has to be an improvement that not just anyone in this relevant area would have easily done also). The invention has to be described in sufficient detail to enable one skilled in the field to use it for the stated purpose. A patent is good for 20 years after it is filed.

This definition is essential to our topic.

It means that gene sequences that occur in nature and are not modified are not patentable. However there are about three million genome-related patent applications in the world today. Some of them are just patent applications on so called expressed sequence tags (ESTs) which are 300- to 500-base gene fragments. They represent about 30% of the human DNA. These applications were rejected or are still rejected by the Patent and Trademark Office (USPTO) in the Department of Commerce because they are not revealing any use or purpose of these genes and are therefore just blocking research on these genes. Genes that are deciphered or isolated to produce a unique form not found in nature can be patented to insure the intellectual property of the discovering scientist.

Many biotechnology patents have been filed as provisional patents. This means that the company filing the provisional patent application has one year time to file the real patent claim. This one year period is not included in the 20 years a patent is valid

If a disease gene is found there are tests developed to look for that gene in humans which are suspected to carry that gene which finally leads to the onset of said disease. In that case these tests are patented by the owners of the disease gene patent. Then only people licensed by the disease gene patent holder can conduct those tests.

A patent is therefore a protection for invention. It excludes other companies or research institutes from making and using this invention. It also hides the results of research from the competition This is interesting for industrial research. In contrast to that are public-sector research institutes which publish their results often without patenting them.

There is still one problem with some of these gene patents. In one case farmers wanted to get a refund of the biotechnology company “Monsanto” because their bio-engineered corn lead to a significant decrease of the fertility of animals fed with this corn. In that case the company had a clause in their contract which refused to account for the damage or consequences made by their products.

3. Description of engineering technique:

To illustrate the importance of gene patenting in today's society we use a pretty new development which is taking place right now. The biotechnology company Monsanto wants to do a patent on a certain pig gene which according to Monsanto makes the pigs fatter and the meat better. The problem is that this gene is not only present in those modified animals but also in the normal animals of farmers who did not purchase Monsanto's products. Further the problem of proving the fact that these pigs are not offspring of Monsanto's modified pigs is from a certain point impossible and therefore Monsanto could claim licensing fees for these pigs. So even if the farmer did not purchase a Monsanto product he could be sued for owning pigs with this certain gene. Another example of how reckless and unfair the company is acting is an example from the corn farmers. Their genetically modified corn crops have already infiltrated a broad part of the farmland by distribution with wind. When Monsanto became aware of that fact they started suing those farmers which had genetically modified crops but did not pay Monsanto for those. This led to a panic among farmers and they calculated that it would be cheaper to just buy those Monsanto crops other than just being sued for having "acquired" them illegally. So Monsanto uses its influence and the fear of farmers to build up a monopoly. This is an example of how gene patents can destroy lives and prevent proper research. Monsanto is according to sources not doing enough research before releasing their product and therefore they did not look for long-term consequences. This is one of the many dark sides of Monsanto's effort to provide food supplies to the world.

MONSANTO



Monsanto – existing since 1901, 2010 named the “Company of the Year” by the Forbes Magazine

4. Documentation and pictures of research institutions visited:

Actually we didn't visit any institutions. The main cause was that we haven't had an idea where to go for a visit or whom to ask some questions about this topic. As an alternative we watched two videos concerning gene patenting and its problems. The links to those videos you can find at the end of this term paper. There are some interested interviews and comments of farmers, lawyers and former employees of Monsanto. We apologize for the fact that the videos are both in German.

5. Discussion:

Future research steps:

We share the opinion that the basic concept of genetically modified animals and plants is a necessary step to fight famines around the world and to prepare for a world with more people. Therefore genetically modified plants and animals are needed to face the need for food. But according to a movie we saw, Monsanto does insufficient testing and bribes officials of the FDA to approve their products. And this is not the right way to act as an internationally leading biotechnology company because they have a responsibility to the outside world of preserving nature and not changing it in a careless way.

To show our pro and contra arguments, we decided not just to list up the aspects. We created a fictive discussion between a public relations employee of Monsanto and a farmer:

Public relations employee of Monsanto:

I hold the view of Monsanto in this discussion and I think that it's important to control the food chain for helping the world to produce their food more efficiently so that less people would suffer from hunger.

Farmer:

So you would say that your concept really could help people? I would rather say that you just aspire political and economical influence, don't you?

I can only repeat myself; we want to help the people! In a modern society it's necessary to produce more food and that's exactly what we're trying to do.

Alright, but why then do you want to patent your results of analyzing? It's impossible for many farmers like me to pay you so much money! It would be much more helpful if everybody could profit from your success for free!

Well, this idea is an illusion. We need your money to get our products admitted by the FDA (U.S. Food and Drug Administration) and also for the research on some new genes. Besides that, food production is more efficient if there are few large concerns instead of many smallholders.

But you damage the farmers with this principle. If you really want to help the world you cannot destroy the existence of some people to help some others. There must be a better way!

Namely?

You should help the farmers so that they can enlarge their amount of products. In consequence, the farmers could sell their food cheaper and more people would be able to buy it then, of course. That's the way you could help the world! But you won't do this because then your own profit would decrease. I'm quite sure that you have already thought about that, haven't you? No? Well, then I think you're after all more avaricious than social.

Look, of course we have thought about that. But there is not always a perfect way! If we don't get the money gained out of our patents we can't invest that much in new genes and technologies. It's a kind of agreement we need.

Of what kind of agreement are you speaking then?

I think the best way would be some State subsidies. That means that the costs of our researches would not have to be borne by the farmers but by all the citizens.

That makes sound sense. But the costs are not the only problem. There are still some worse things. You put some insufficiently tested genes on the market. That's very dangerous. But don't you care about that?

We always tried to test our products enough, but sometimes we work under time pressure because our competition works on the same things at the same time. If they are faster and successful at the same time, all our researches would only have been a waste of a lot of money and time. That's also a reason why we try to hold the competitions on distance to get the only big concern engineering on genetically modified food. I'm sure that in the end everybody would profit of this.

That sounds quite logical, but I see another problem there. I'm afraid of the thought that you could push up the prices for those genes as much as you want. If there is no competition, you're the only one to determine the costs of your products. And because the demand of genetically modified food will rather increase than decrease, those costs would rise ad infinitum. If your bosses realize that, hardly no one would be able to buy your genes any more. Besides that, are you aware of the fact that gene patents on humans are blocking medical aid because the costs to do tests on patients are getting bigger when genes are patented and then more people die?!

Well but we have to protect our inventions from others and that's also a huge problem because we are forced to get those patents. But genetically engineered plants have brought also great advantages. Look at the golden rice which is genetically modified but still is a healthy and great way to offer food supplies.

There you're right, but I think your ideas would only then be functional, if there would exist a kind

of contract that limits the size of your prices.

At this point I can only repeat what I have already said before. There is no optimal way. Both parts have to come to an agreement, otherwise there will always be a fight. Be aware of this fact.

This is probably true. But it's also obvious that it cannot be continued the way it is right now.



Monsanto – Big but friendly, by Chris Kelly, 1999

6. Summary:

In the end, the main conclusion we can get out of this term paper is that gene engineering indeed is important, but the way how to solve this problem makes the difference. Of course new genes can help increasing the world's food production. If more food can be produced faster and cheaper, less people in the world would suffer from hunger. That's no question. The problem really occurs not until the patenting of the genes. When doing this, the big companies like Monsanto may use their big profits just to force their economical and political influences. That would also mean that genetically modified food would become much more expensive and many people wouldn't be able to buy it anymore. Medical aid would be blocked because the costs to do tests on patients would be too big. Many farmers would have to give up their business and only a few large companies would survive – another reason why the costs for the “good genes” would rise ad infinitum. If gene engineering will go on in this direction, people will not be helped in case of hunger, but more and more people will die of it. We really hope that this won't happen.

But gene patenting has not only negative sides. There are also some positive aspects of course. The money could be used for further researches or to support people in the third world. The whole thing would probably also work better if for example the state, meaning the tax-payers would help the farmers to pay the companies for their genes. With that, the costs could be shared over a whole country instead over a little number of poor farmers. That sounds probably a bit too easy, but why not try it when it could help the world's population?

We think it was worthwhile to think about this topic a bit more detailed because we now know more about the problems occurring on both sides, the giants and the tiny ones.

Up-to-date information:

Concerning a report published on 03/29/2010 at *businessweek.com* by Susan Decker in Washington and Thom Weidlich from Manhattan. A New York court declined patents concerning some genes

connected to breast cancer. The main reason was that in case of mutations the danger to get breast cancer increased instead of decreasing. Another reason was, that the earnings of the patents were less and less used for new researches in the last time. The court fixed its arguments by saying that genes are something natural and not invented by human individuals or concerns. The American biotechnological-concern Myriad Genetics which asked for this patent pronounced a revision now.



Myriad Genetics – Founded in May 1991

On the whole, patent-announcing increased since the 1980's and had its peak around 2001. Henceforward, gene patenting is decreasing again, which is a good thing we think.

7. References:

Links to sources on the internet:

Videos:

Google video: Arme Sau – Das Geschäft mit dem Erbgut:

<http://video.google.ch/videoplay?docid=7746737223581129999&hl=de#>

Google video: Monsanto – Mit Gift und Genen:

<http://video.google.ch/videoplay?docid=-7781121501979693623&ei=ADyhS7jyDNm-AaKq9ShDQ&q=monsanto#>

Websites:

Wikipedia: Gene patent:

http://en.wikipedia.org/wiki/Gene_patent

Wikipedia: Monsanto:

<http://en.wikipedia.org/wiki/Monsanto>

Businessweek:

<http://www.businessweek.com/news/2010-03-29/myriad-loses-ruling-over-breast-cancer-gene-patents-update1-.html>

Kein Patent auf Leben: Gen-Patente:

<http://www.keinpatent.de/index.php?id=63>

Human Genome Project:

http://www.ornl.gov/sci/techresources/Human_Genome/elsi/patents.shtml

Pictures:

Macalester: Monsanto logo:

<http://www.macalester.edu/environmentalstudies/students/projects/citizenscience2008/rbgh/images/Monsantologo.jpg>

Romanocentral: Myriad logo:

<http://romanocentral.com/images/vendors/myriad.gif>

Wiseeats: Monsanto labeling – a comic strip by Chris Kelly:

http://wiseeats.files.wordpress.com/2009/08/monsanto_labelling1.jpg