

Meeting with the Professor Agnès Ricoch, Ph.D. (AgroParisTech)

1. Does CRISPR-Cas9 is a revolution according to you?

Organisms able to fracture the gene is not new. CRISPR-Cas9 does not bring any novelty on that point. Besides, the technique does not seem to be especially easy as we still have to get into the genome thanks to a transgenesis, which is not able to everyone. There is, thus, some tool to master to use CRISPR.

Economically speaking, subcontracting is still ongoing for CRISPR-Cas9. The technique is really accurate, that is one its biggest advantage. Thanks to doubled nickases, CRISPR-Cas9 is able to target a precise spot on the genome. Instead of seeing CRISPR technique as a revolution, it would be better to talk about a continuum. A big part of is CRISPR already existed and everything which appears as an innovation are in fact improvements. One of the other advantage of CRISPR is that the technique can serve to other organisms.

2. Current legislation on GMOs can cover the organism modified by CRISPR?

The problem comes from the fact, that it exists a wide range of legislations (there is no legislation but legislations) when it comes to GMOs. Yet, between GMOs and CRISPR, there is not a big difference when you consider that both technology implies transgenesis. In Europe, the legislation is based on the process unlike the American perspective more results-oriented.

Yet, with the current techniques it is possible to design a product without guessing that it has been subjected to genetic mutations. How to distinguish two legal objects when the distinction is not possible?

Currently, the directive is unenforceable. GMOs are actually senseless and outdated legal objects. We need a new paradigm, the law lag behind the technique and start to be surpassed by it.

Parenthesis

How to conduct research on the human embryo without a reflection on the process?

There is a consensus behind the use of human cells: yes for somatic cells, no for germinal ones.

Researches made are made on well-known plants. We do not try, for instance, to turn inedible plants into edible ones.

3. What do you think about the fears around the use of CRISPR technics (bioterrorism in particular)?

Why using CRISPR? Bioterrorism can be more easily implemented. The anthrax example shows it perfectly. The fears around the use of CRISPR are questions important to ask. There is a need to raise awareness around bioethical questions.

4. How to avoid GMOs critics? Is there a need of vulgarization on the major media?

Critics are systematic: the last notice from the French Academy of Sciences has been immediately criticized.

Concerning major media, we need to assume that they are directed to the public at large. This notion does not really exist. Everyone has a different degree of sensibility when it comes to scientific questions. In front of the public, it is necessary to show the pro and the cons: there are risks yes, but there is far and for most global issues to solve.

5. There is a difference concerning critics around GMOs and CRISPR due to the increase of precision between both techniques?

GMOs are criticized because they are less precise, but when you think about the context: GMOs were precise at the time. In several years, we will probably think that CRISPR was not so precise, CRISPR is the tool of the 21st century, we know more on the genome today that we knew about it.

A specific regulation for plants exist. Nevertheless, this one is not as precise as the one concerning GMOs. This lack of precision conduct to an absurdity, the same plant can belong to one or another category: one is authorized, but the other not.

6. Do you think that these innovations could help to solve contemporary challenges?

Yes. Among these challenges, you can find, for instance, the necessary increase of agriculture performances to feed the planet. The FAO (Food and Agriculture Organization) says that we need a 70% increase to be able to feed the whole planet. Today, we know how to enrich plants, so we need to use it.

The answer to these challenges must be accompanied by a smart climate approach. Biotechnologies solutions have to be integrated locally and are compatible with agro-ecology and agro-economy.