From: 
To: 
CC: 
Date: 2015/10/26 7:44 PM 
Subject: Re: SynBio - update

I agree with your position,

On Mon, Oct 26, 2015 at 5:52 PM, / wrote:

> Hi thanks for the thoughts.
> 
> As gene editing via small deletions are not discernible from mutations that we have not found in nature yet, I would argue that these not be regulated differently than conventional breeding. I.e we just haven’t found it yet, regardless of what process used.
> 
> Similarly null segregants, those that do not contain the transgene should not be regulated. This is the stance of course for the everywhere but EU.
> 
> Best,
> 
> *From:* 
> *Sent:* Monday, October 26, 2015 11:31 AM
> *To:* 
> *Cc:* 
> *Subject:* Re: SynBio - update

Philip Macdonald;
> Just now taking some time to digest what you wrote here regarding the
> definition of GMO/LMO and new breeding techniques, so my commentary here is
> intended more to improve my understanding than to take a position. While
> the definition of GMO/LMO seems in principle to be based on process "and"
> novelty, I would be interested to know how the CPB and the EU would deal
> with these two cases in practice: 1) an organism produced by transgenesis
> but expressing a non-novel trait (e.g. a transgenic plant where a native
> gene is introduced from one variety to another because it would be more
> rapid than breeding), or 2) an organism produced by chemical or radiation
> mutagenesis that expresses a novel trait.
>
> Relating to the CPB definition, case 1 possesses a non-novel combination
> of genetic material even though it is obtained through the use of modern
> biotechnology. Case 2 possesses a novel combination, but not through
> modern biotechnology. I would assume case 1 would be treated as an LMO,
> but case 2 would not? If that is the case, then process trumps novelty in
> the definition. So if gene editing techniques were employed to produce
> case 1, would case 1 still be an LMO, because it is captured by the "modern
> biotechnology" element? If so, then process would trump novelty again.
>
> Relating to the EU definition, case 1 is an organism in which the genetic
> material has "no" been altered in a way that does not occur naturally by
> mating and/or natural recombination (I'm actually now having trouble
> parsing our this definition). Case 2 has been altered by a process that
> results in a combination that does "not" occur naturally by mating and/or
> natural recombination. I would assume however that in the EU, case 1 would
> still be treated as a GMO, while case 2 would not? Likewise process trumps
> novelty in both cases. To me the hope that is offered by the EU definition
> is that one can argue the process of gene editing makes use of natural
> recombination processes (non-homologous end-joining and repair, for
> example) and therefore could be used to exempt both cases from the GMO
> definition.
>
> On Sat, Oct 24, 2015 at 9:57 AM,
Dear All,

I follow up on our communications about the Synthetic Biology discussions under the CBD.

Quick update and request for feedback:

*AHTEG SYN Bio*

The first AHTEG on SynBio took place from 21 to 25 September in Montreal. Several people on this email list participated in that AHTEG.

The feedback shows that this process was an eye-opener for many, at times frustrating for some, but that nevertheless the resulting report is found to be fairly balanced in that it reflects the various views on the topics:

- Relationship between synthetic biology and biological diversity;
- Similarities and differences between LMOs and SynBio;
- Adequacy of existing regulatory instruments to address SynBio;
- Operational definition of synthetic biology;
- Potential benefits and risks to the conservation and sustainable use of biodiversity;
- Best practices on risk assessment and monitoring;

We will inform you when the final report is posted on the CBD site. The report of the AHTEG will be submitted to the SBSTTA (see below).

As the AHTEG documents and discussion show, there are many links to topics under the Cartagena Protocol, e.g.:
- definitions
- Environmental Risk Assessment
- Socio – Economic considerations

As regards definitions, I draw your attention to a discussion we have in Europe on the definition of a GMO in relation to New Breeding Techniques. I attach below for your information an email exchange with my colleagues in Europe. Main message is that while the definitions of GMO and LMO refer to certain techniques, the decisive element in those definitions is whether the resulting organisms possess novel genetic combinations, i.e. genetic combinations that "do not occur naturally by mating or recombination" (as phrased in the EU) or "overcome natural physiological reproductive or recombination barriers" (as phrased in the CPB). In short, these
regulations are not 'process based', because both the use of the technique
and the novelty of the resulting genetic combinations are relevant. This
discussion will also be relevant for SynBio.

As to Environmental Risk Assessment and Socio–Economic considerations, we
have similar informal discussion groups on those CPB topics and will keep
you posted of relevant developments there.

*SBTTA *

The result of the on line discussion and the report of the AHTEG will be
submitted to the Subsidiary Body on Scientific, Technical and Technological
Advice. The first upcoming meeting of the SBSTTA is SBSTA-19 from 2 - 5
November 2015, Montreal. The next SBSTTA will be from 25 - 29 April 2016
in Montreal.

The topic is included on the agenda of SBSTTA-20, in April 2016. (see:

It will be very good if some of us who participated in the on line
discussions and/SBSTTA AHTEG can participate.

*COP13 *

The COP13 will be held from 4 - 17 December 2016, in Cancun.

(See: https://www.cbd.int/doc/?meeting=COP-13).

As discussed, in addition to being prepared for the negotiations, it will
be good to hold a side event on SynBio during COP13, preferably including
young students (e.g. the iGEM initiative). and
have already indicated to be willing to help with that. We will keep you
posted on that.

Wishing you all a great remainder of the weekend!

Dear All,
Many thanks for your responses to my emails about the EU/CPB definitions of GMO/LMO, and the implications for organisms developed by New Breeding Techniques (NBTs).

As several more people have been added to this list, let me briefly summarise:

While these definitions refer to certain techniques, the decisive element in those definitions is whether the resulting organisms possess novel genetic combinations, i.e. genetic combinations that "do not occur naturally by mating or recombination" (as phrased in the EU) or "overcome natural physiological reproductive or recombination barriers" (as phrased in the CPB).

In short, these regulations are not 'process based', but rather both the use of the technique *and* the novelty of the resulting genetic combinations are relevant.

This is concisely reflected in the CPB definition: "an LMO is a living organism that 1) possesses a novel combination of genetic material 2) obtained through the use of modern biotechnology".

In the EU definition this phrased a bit more opaquely with "an organism in which the genetic material has been altered in a way that does not occur naturally by mating and/or natural recombination". Over the years there has been some discussion as to whether "altered in way" refers to the technique, to the end result, or to both. As I illustrated in my previous emails, the definition and the annexes that belong to that definition shows that this "altered in a way" refers to both the technique used and the novelty of the genetic combination obtained.

This interpretation is nothing surprising, because this notion of 'novelty' has been the consistent element since the first definitions in the mid-80s, and (as the European Commission has stated) the EU GMO definition is consistent with the definition of the CPB.

Some of you have expressed concern that nevertheless the EC may follow a purely 'process based' interpretation. That seems unlikely, if you see for example what Commissioner Borg said in reply to questions from MEPs: "..... the definition of GMO in the EU legislation is referring both to the characteristics of the organism obtained and to the techniques used.....". See link

In addition, several EU Competent Authorities have written to the EC that they are of the view that the EU definition of a GMO relies "both" on the process used and the resulting organism/product.

Last but not least, your responses confirm that most – if not all – of you endorse the view that a purely technique based interpretation would make little sense.

What our email-exchanges have also taught us is that it is important to make clear whether we are expressing what we think the definition says, or whether we express what we think others believe what the definition says.

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Turning to organisms produced through NBTs: as said, for a meaningful discussion it is important to make clear to which NBTs we are referring, because genome editing techniques are for example very different from DNA methylation techniques, again different from Agroinfiltration, etc. etc.

As regards the question to what extent organisms produced through specific NBTs fall under the GMO/LMO definition: the answer to that question depends on whether these techniques have resulted in novel genetic combinations, i.e. combinations that go beyond natural mating or recombination / natural physiological reproductive or recombination barriers.

Such a nuanced approach is also reflected in the report of the WGNT, which for example for the ZFN technique made a distinction in FSN1, FSN2 and FSN 3, based on the extent of the alteration.

See also the attached letter of EFSA to the European Commission of 15 October 2015. While I believe that some details in that letter would need some further discussion, the overall approach confirms the notion that when talking about definitions the resulting organisms need to be taken into account. What I also find very important in the EFSA letter is the statement that we should remain aware that this field evolves rapidly. I fully endorse the notion that we should keep monitoring future developments, and I believe that in doing so we should look beyond NBTs, and also look at areas as Synthetic Biology (see some articles below this email), e.g. what about XNA?

As discussed, with the rapid development of new techniques and with the increasing knowledge of genomic variability, the challenging task is of course to fine tune the grey areas, which would be a great topic for a scientific brainstorm workshop to discuss 'how novel is novel' and related topics.

We have received many enthusiastic reactions to the idea of holding such a workshop, and a few of you have already prepared the attached draft info-sheet for CRISPR, that can be used in the discussions. Please keep that draft info-sheet to yourselves for now.

We have fixed the workshop on 9 December, at the Free University of Brussels. Program and details will follow.

Please send me at the latest on 5 November your interest in participation (repeated request: please do not copy everyone to avoid clogging of inboxes). For those who cannot cover their travel from their own budgets, we have secured some extra travel funds with the help of

Looking forward to hearing from you


PS: Below some recent articles on NBTs.
> Faculty of Sciences, Faculty of Law, Ghent University, Belgium
> Faculty of Science and Bio-Engineering Sciences, Free University Brussels (VUB)
> <https://caliweb.cumulus.vub.ac.be/caliweb/?page=course-offer&id=008938&anchor=1&target=pr&year=1415&language=en&output=html>, Belgium
> c/o International Plant Biotechnology Outreach (IPBO)
> <http://ipbo.vib-ugent.be/team/IIC/UGent>
> Technologiepark 3, B-9052 Gent-Zwijnaarde, Belgium
> The Economist | Gene editing: Even CRISPR:
> *Wired* covers Monday’s National Academy of Sciences meeting on human genome editing*
> *Wired:* Science Would Like Some Rules for Genome Editing, Please
> *Science:* Four synthetic biology inventions that flummox the feds
> *Wilson Center:* The DNA of the U.S. Regulatory System: Are We Getting It Right for Synthetic Biology?
> *Bloomberg View:* This Is No Way to Regulate GMOs
> <http://www.bloombergview.com/articles/2015-10-21/this-is-no-way-to-regulate-genetic-modification>
> *Nature Biotechnology:* DNA-free genome editing in plants with preassembled CRISPR-Cas9 ribonucleoproteins
> <http://www.nature.com/nbt/journal/vaop/ncurrent/full/nbt.3389.html>