

No Patents on Life! Campaign Newsletter

December 2018

(The complete version is available only in Japanese: https://www.columban.jp/ja/4_life/)

Technology

Genetically Edited Babies: a bad idea, badly executed

December 2018

The Crispr/Cas9 technique of editing DNA is, by the standards of earlier methods, astonishingly quick and easy. It is not entirely reliable or accurate, but it places enormous potential power in the hands of ordinary scientists. It is also internationally widespread, and beyond the control of any single nation now. So reckless and unethical experiments were only to be expected; nonetheless, last week's announcement by a Chinese scientist that he had altered the germlines of twin girls to modify a gene involved in the transmission of HIV was a profoundly worrying one, for several reasons.

The most important is that there is no medical reason for what he did. There is a vitally important difference between editing the genes which are present in a body and those which are present in sperm or eggs. With the first kind of modifications, the effects die with the bearer. With the second, they are passed, like mutations, down into future generations. Of course such mutations might in theory be entirely beneficial. But scientists don't at the moment have nearly enough knowledge to judge whether this is true or even probable in practice. They'd need to know at least how any particular

modified gene will perform over a lifetime, and, ideally, what effects it might have in subsequent generations.

For those few gene variations where the evidence is entirely clearcut, there is almost always the possibility of testing embryos produced by IVF and implanting those which lack the fatal defect. That is already widely practiced in the rich world by couples at risk, and is not very controversial. Although disability activists are concerned about the risk that some conditions like Down's syndrome might be eliminated entirely by such means, there are other, much rarer, and more cruel conditions which make the short lives of affected babies unbearable both for them and for anyone who loves them.

But there is no need for Crispr manipulations to achieve this. What Dr He attempted was far more ambitious. He took embryos which were – so far as we know – entirely normal, but whose fathers were suffering from HIV, and altered one of their genes with partial and patchy success into a form which seems to be responsible for the immunity that some Europeans appear to have to the virus.

These babies were not otherwise in any greater danger of catching the virus than anyone else. Their mothers are not infected. Although he spoke at his presentation of the prospect of eliminating the disease from Africa by these means, this is a fantasy.

Very much cheaper and more effective methods of combating the disease are already available. The obstacles to their deployment are war, poverty and corruption, not lack of science.

It's very difficult to understand this story as anything other than a piece of scientific hubris, more driven by the desire to experiment than by real compassion. But although it has been roundly condemned by genuinely distinguished scientists such as Dr Francis Collins, it is unlikely to be the last such experiment. Gene therapy used once to be denounced as "playing God". That is no reason to abandon it. But if humans are to play God, they need to behave in a morally better way than unaided nature does. Evolution itself might be described as a vast programme of genetic experiments conducted with no regard for the cost or consequences. If human beings are to take control of the process – and gene editing allows them at least to affect it – we must learn to take into account both cost and consequence, and to use our new powers responsibly.

<https://www.theguardian.com/commentisfree/2018/dec/04/the-guardian-view-on-editing-human-dna-a-bad-idea-and-badly-executed>

Gene drives

Gene drives are techniques to promote the inheritance of specific alleles (the two or more alternative forms of a gene that arise by mutation and are found at the same place on a chromosome). (対立遺伝子 [染色体上で同じ位置を占める遺伝子の1つ]) Gene drives typically rely on the introduction of CRISPR RNA and Cas9 type proteins from integrated transgenes to drive gene

frequencies. Their ultimate goal is to alter the genetic composition of populations, including for the purposes of engineering population crashes or extinctions.

Gene drive organisms are 'products' that will likely not be able to be recalled, so any approval decision point must be presumed to be final and irreversible; and their reproductive and dispersal abilities imply the need to test a great number of endpoints, perhaps even more than either synthetic chemicals or agricultural GMOs.

"Gene drives are a powerful and dangerous new technology and potential biological weapons that could have disastrous impacts on peace, food security and the environment, especially if misused," said Jim Thomas of ETC Group.

Gene drive development is being funded primarily by the US military. The secretive JASON group of military advisors have undertaken two classified studies on genome editing and gene drives at the request of the US government. The gene drive study, which included input by a Monsanto executive, focuses on hostile use of gene drives and use of gene drives in agriculture.

The US military's Defence Advanced Research Projects Agency (DARPA) has granted CSIRO, the University of Adelaide, WA's Conservation Department and US affiliates "about \$6.4 million" to form a Genetic Biocontrol of Invasive Rodents (GBIRd) group. CSIRO says it will use new gene drive (species extinction) techniques to create self-destruct GM rodents for release on six West Australian islands and two US sites in the Pacific.

'Emerging Ag,' a private PR firm funded by the Gates Foundation, is working behind the scenes to stack key UN advisory processes with gene drive-friendly scientists, and has recruited ostensibly independent academics and public officials into a private collaboration to counteract proposed regulations and to resist calls by scientists and conservationists for an international moratorium.

<https://www.independentsciencenews.org/environment/gene-drives-a-scientific-case-for-a-complete-and-perpetual-ban/>

<http://www.abc.net.au/radionational/programs/sciencefriction/gene-drives/9874864>

<https://www.gmwatch.org/en/news/archive/18013-us-military-revealed-as-top-funder-of-gene-drives>

<https://www.smh.com.au/environment/conservation/could-wa-be-the-genetic-testing-ground-for-synthetic-mice-to-end-mice-20180221-h0wev9.html>

Gene-editing startups ignite the next 'Frankenfood' fight

August 2018

In a suburban Minneapolis laboratory, a tiny company that has never turned a profit is poised to beat the world's biggest agriculture firms to market with the next potential breakthrough in genetic engineering - a crop with "edited" DNA. Calyxt Inc, an eight-year-old firm co-founded by a genetics professor, altered the genes of a soybean plant to produce healthier oil using the cutting-edge editing technique rather than conventional genetic modification. Seventy-eight farmers planted those soybeans this spring across 17,000 acres in South Dakota and Minnesota, a crop expected to be the

first gene-edited crop to sell commercially, beating out Fortune 500 companies.

Gene-editing technology involves targeting specific genes in a single organism and disrupting those linked to undesirable characteristics or altering them to make a positive change. Traditional genetic modification, by contrast, involves transferring a gene from one kind of organism to another, a process that still does not have full consumer acceptance.

Gene-edited crops have drastically lower development costs and the U.S. Department of Agriculture (USDA) has decided not to regulate them.

<https://japantoday.com/category/tech/insight-gene-editing-startups-ignite-the-next-'frankenfood'-fight-1>

Gene editing in agriculture poses new risks to health, environment

September 2018 ^[1]_{SEP}

Gene editing techniques were lauded as more accurate than traditional genetic engineering, but it's becoming clear that they, including so-called 'gene drives', are error prone. In July 2018, scientists from the UK found that new genetic engineering techniques like CRISPR may cause "genetic havoc". Earlier this year, researchers found large deletions and complex rearrangements of DNA near the target site that were not intended by researchers. Two recent independent studies found that cells genetically engineered with CRISPR "have the potential to seed tumours", or may initiate mutations that develop into tumours.

A study also revealed that standard tests for detecting DNA changes miss finding this genetic

damage, and that caution and specific testing will be required for any potential gene therapies.

The European Court of Justice has ruled that organisms developed using new genetic engineering techniques must undergo GMO risk assessments.

<https://www.gmwatch.org/en/news/latest-news/18459-gene-editing-in-agriculture-poses-new-risks-to-health-environment>

<https://www.gmwatch.org/en/news/latest-news/18350-crispr-causes-greater-genetic-damage-than-previously-thought>

Medicine

Gene therapy finds a place in medicine

December 2017

The FDA approved Luxturna, the first gene therapy for an inherited disease, a form of blindness. The therapy injects a modified virus containing a corrective gene into the retina so the cells can make the protein. Children who received the treatment told what it was like to gain vision.

<http://mainichi.jp/english/articles/20171229/p2g/00m/0fe/024000c>

Boy with rare disease gets brand new skin

November 2017

Doctors treating a critically ill boy with a devastating skin disease used experimental gene therapy to create an entirely new skin for most of his body in a desperate attempt to save his life. Two years later, the doctors report the boy is doing so well that he doesn't need any medication, is back in school and even playing soccer.

<http://mainichi.jp/english/articles/20171109/p2g/00m/0fe/017000c>

Permission to create 'three-person babies'

February 2018

Doctors in Newcastle have been granted permission to create Britain's first "three-person babies" for two women who carry mutations in a gene that causes a rare condition known as Merrif syndrome, which can be a devastating neurodegenerative disorder.

To perform the procedure, doctors will create a fertilised egg using IVF as normal. But rather than letting it develop into an embryo, the parents' chromosomes are removed and placed inside a donor egg that has had its own genetic material removed. The embryo so created has all of the parents' chromosomes, but the mother's damaged mitochondria are replaced with the donor's healthy ones.

<https://www.theguardian.com/science/2018/feb/01/permission-given-to-create-britains-first-three-person-babies>

Cashing in on DNA

August 2018

As millions of people pay for home tests to check on ancestry or health risks, genetic data is becoming an increasingly valuable resource for drugmakers.

The U.S. Center for Medicine in the Public Interest believes handing over DNA deserves financial recompense when the benefits flow to for-profit companies. "People need to realise that they are actually paying for companies to monetize

their most personal information and they are getting nothing for it," he said.

<https://japantoday.com/category/features/health/focus-cashing-in-on-dna-race-on-to-unlock-value-in-genetic-data>

Urgent need to prepare for manmade virus attacks, says US government report

June 2018

The US National Academy of Sciences has warned of the possibility a new generation of bioweapons. Advances in synthetic biology mean that scientists now have the capability to recreate dangerous viruses from scratch; make harmful bacteria more deadly; and modify common microbes so that they churn out lethal toxins once they enter the body.

<https://www.theguardian.com/science/2018/jun/19/urgent-need-to-prepare-for-manmade-virus-attacks-says-us-government-report>

Genetically Engineered Animals

GE pigs immune to costly disease

June 2018

Scientists have genetically engineered pigs to be immune to one of the world's most costly animal diseases, porcine reproductive and respiratory syndrome (PRRS).

<https://www.theguardian.com/science/2018/jun/20/scientists-genetically-engineer-pigs-immune-to-costly-disease>

Genetically Engineered Plants

Argentine study links glyphosate herbicide to miscarriage, birth defects

April 2018

People living in an Argentine town in the heart of the GM soy and maize growing area suffer miscarriages at three times and birth defects at twice the national average rate, a new study shows. The pesticides measured were glyphosate, its metabolite AMPA, and chlorpyrifos, endosulfan, cypermethrin, atrazine, 2,4-D, and epoxiconazole. These were chosen because they are commonly used on crops in the region.

<https://www.gmwatch.org/en/news/latest-news/18245-argentine-study-links-glyphosate-herbicide-to-miscarriage-birth-defects>

Weedkiller found in wide range of breakfast foods aimed at children

August 2018

Significant levels of the weedkilling chemical glyphosate have been found in an array of popular breakfast cereals, oats and snack bars marketed to US children.

<https://www.theguardian.com/environment/2018/aug/16/weedkiller-cereal-monsanto-roundup-childrens-food>

GM Bt toxin is immunogenic, allergenic, and causes pre-cancerous intestinal changes

August 2018

GM Bt crops are engineered to express Bt toxins, insecticides that are intended to kill pests that feed on the crops. A new study performed in mice

found that the GM Bt toxin Cry1Ac is immunogenic, allergenic, and able to induce anaphylaxis (a severe allergic response that can result in suffocation).

<https://www.gmwatch.org/en/news/latest-news/18399-gm-bt-toxin-is-immunogenic-allergenic-and-causes-pre-cancerous-changes-in-the-colon>

Two pests targeted by GM Bt toxins hybridize to form global mega-pest

April 2018

The cotton bollworm and corn earworm are two pests targeted by the Bt toxins engineered into GM Bt insecticidal crops. Both pests have in past years become resistant to these GM Bt toxins. Now a new study has found that the two pests have hybridised, meaning that attempts to kill them with GM or chemical toxins are increasingly likely to fail.

<https://www.gmwatch.org/en/news/latest-news/18230-two-pests-targeted-by-gm-bt-toxins-hybridise-to-form-global-mega-pest-2>

Patagonia's bet on biotech fabrics may threaten livelihoods and ecosystems

September 2018

Patagonia Inc. has teamed up with Bay Area based biotech startup Bolt Threads to help promote clothes made from fabrics derived from genetically engineered microorganisms. Civil society experts suggest that any commercial-scale expansion of biotech textiles could undermine farmers worldwide, create a dangerous new source of biotech waste, put additional pressure on ecosystems, and divert support away from truly sustainable natural fiber economies.

<http://www.etcgroup.org/content/patagonias-bet-bio-tech-fabrics-may-threaten-livelihoods-and-ecosystems>

Impoverished Countries

The debate on GMOs in Tanzania

June 2018

A heated public debate on genetically modified organisms (GMOs) ensued during a seminar organised by MVIWATA – a network of smallholder farmers – in Morogoro, Tanzania. The meeting took place in May 2018 and was attended by more than a hundred people, including parliamentarians and high-level government officials. The event, which was intended only to raise public awareness about GM crops, saw tensions reaching fever pitched levels between those in favour of and those extremely wary of GM crops.

Tanzania is a key target country for the cultivation of GM crops, particularly by Monsanto and the Gates Foundation projects. Tanzanian scientists are vocal supporters of GMOs and do the lobby work for the biotech industry, often making outlandish promises about the miracle properties of GMO crops.

In 2015 the government weakened its biosafety law and in 2016 it authorised field trials of Monsanto's GM Water Efficient Maize for Africa (WEMA) Maize variety MON 87460[1]. Then last December, the government authorised field trials of Monsanto's double-stacked GM maize, which involved an obsolete GM trait that even South African farmers and government have rejected.

The public debate was marked by two powerful presentations. Dr Angelika Hilbeck, an independent biosafety scientist from the Institute of Integrative Biology (IBZ), showed how the promised miracles of GMOs failed to come to fruition over the last 20 years – an eye-opener to many present in the tense room. She was supported by a political food activist Dr Richard Mbunda, from the University of Dar es Salaam, who did a sterling job of debunking often flouted industry hype.

<https://acbio.org.za/en/debate-gmos-africa-rages-ti-me-tanzania>

Small-holder agroecological farmers' statement — South Africa

May 2018

There are things in the Bills that we do not agree with:

1. If you have seed in your seeds that have been registered by someone else, you will be fined – but we may have these without knowing. ^[1]_[SEP]

2. The definition of selling seeds that includes sharing and giving seeds – our cultural norms are to share and give seeds and the diversity that comes with this strengthens our seed. We are heartbroken by this selling being the same as sharing. ^[1]_[SEP]

We do not want to grow GM crops because:

- GM seed needs fertiliser to grow well and these chemicals kill our soil by killing the micro-organisms. ^[1]_[SEP]
- GM food is bad for our health. There are increasing studies with animals that should make us be cautious as they show allergies, organ problems and cancer. ^[1]_[SEP]

- GM seeds are grown with chemical sprays like herbicide – these kill good insects, harms nature, they are taken by the rain to contaminate our water and affect the people and animals around the spraying. ^[1]_[SEP]

<http://www.biowatch.org.za/docs/misc/2018/Biowatch-Roundtable-Dialogue-farmer%20statement-23052018.pdf>

The GM cotton push in in East and Southern Africa

(excerpts)

October 2017

African countries, except South Africa, have been reticent to adopt GM crops because of opposition from farmers, consumers and civil society at large. However, in the recent past, there has been a shift, with 13 African countries planting, undertaking field trials or granting approval for general release of GM crops in 2016. Of these, only South Africa and Sudan cultivate GM cotton commercially, with commercialisation expected in Ethiopia, Malawi and Kenya in 2018/19.

From the early 2000s onwards there has been a concerted effort, led by the US and its varied agencies, as well as ‘philanthropic’ organisations such as the Bill and Melinda Gates Foundation, to pave the way for multinational seed and agrochemical companies to establish themselves in Africa. A Food and Water Watch report in 2013 analysed the contents of the leaked diplomatic cables between 2005 and 2009 from US agencies to its embassies abroad. It concluded that the campaign to extend the interests of biotech companies in Africa has been coordinated from the highest levels, with

some instructions being given by then Secretary of State Hilary Clinton.

Through agencies such as USAID, the US has provided financial support for Monsanto's field tests, negotiated with governments regarding royalty payments, and pressured governments to amend their legislative and regulatory frameworks to allow the US entry to markets.

China is a major trading partner for many African countries and a major source of foreign direct investment and aid. One of the public intentions behind state-owned ChemChina's acquisition of Syngenta is to plant GM crops on a very large scale. There is an increasing number of in-country partnerships to share technology and expertise in Africa. An example is the China-Africa Development Fund's China-Africa Cotton Development Ltd. The company has fully owned subsidiaries in Malawi, Mozambique, Zambia and Zimbabwe, and is the largest cotton company in Malawi and one of the three largest in Zambia. It owns seven ginneries, two cotton seed oil extracting mills and a seed plant, and contracts tens of thousands of smallholder farmers to produce cotton.

The primary drivers of low productivity in Africa include the volatility of cotton prices on the global market and the extent of subsidisation of cotton farmers in the US, China and the European Union. As a Malian farmer noted at GM public consultations in that country, 'What is the point of encouraging us to increase yields with GMOs when we can't get a decent price for what we already produce?'

<https://acbio.org.za/wp-content/uploads/2017/10/GM-Cotton-US-Chinese-WEB.pdf>

Biopiracy

Ending Unauthorised Access To Genetic Resources

April 2018

"Access to genetic resources" and "the fair and equitable sharing of benefits arising from their utilization" have beleaguered all Conferences of the Parties to the 1993 United Nations Convention on Biological Diversity (CBD). Despite 25 years of efforts and an annual bio-economy of nearly one trillion dollars, few contracts have been concluded. And of those very few, the monetary benefits are so low that contracting parties are loathe to disclose them.

In February 2018, experts convened at the UN to thrash out the issue. Their Report suggests that "'bounded openness over natural information' may merit consideration."

Once genetic resources are interpreted as "natural information", the policy implication is bounded openness. Genetic resources would continue to flow freely (the openness) but would no longer be free (the boundedness). Royalties on intellectual property over the value added would be levied ex post utilization. The income would then be distributed to the countries of origin.

<http://www.ip-watch.org/2018/04/06/ending-unauthorised-access-genetic-resources-aka-biopiracy-bounded-openness/>

Industry

Industry writes its own rules for assessing pesticides, GMOs

February 2018

Eleven out of 12 EU pesticide and GMO risk assessment methods studied were developed or promoted by industry, a new report from Pesticide Action Network shows. The report says that harmful effects observed in animal safety studies on pesticides can be swept under the carpet by using these methods. For example, tumours seen in test animals can be classified as irrelevant for humans; harmful pesticide residues in groundwater or 50% of non-target insects being killed off by pesticide spraying are deemed acceptable; safe levels can be assumed for carcinogens; standards for protection of aquatic life can be relaxed; and a GM crop that unexpectedly differs markedly in composition from the non-GM parent can be waved through the approvals process with little challenge. These methods are designed to prevent a ban on harmful and risky substances and result in weakening the protection of the public and the environment.

<https://www.gmwatch.org/en/news/latest-news/18107-industry-writes-its-own-rules-for-assessing-pesticides-gmos>

Potato giant's license for new gene editing technology could boost crops while avoiding costly GMO regulations

August 2018 ^[1]_[SEP]

A multinational agricultural company has acquired gene editing licensing rights that could help farmers produce more crops and make them stay fresh for longer. J.R. Simplot Co. on Monday announced the agreement with the developers of the nascent gene editing technology: DowDuPont Inc. and the Broad Institute of the Massachusetts Institute

of Technology and Harvard University. Simplot is the first agricultural company to receive such a license.

The gene editing technology is called CRISPR-Cas9; "CRISPR" stands for "clustered regularly interspaced short palindromic repeats." The technology speeds up the traditional process of breeding generation after generation of plants to get a certain desirable trait, saving years in developing new varieties that are as safe as traditionally developed varieties, scientists say.

<https://www.japantimes.co.jp/news/2018/08/08/business/potato-giants-license-new-gene-editing-technology-boost-crops-avoiding-costly-gmo-regulations/>

Monsanto goes after civil society

February 2018

Avaaz, which the Guardian calls "the globe's largest and most powerful online activist network", and which promotes citizen action on issues such as climate change, human rights, corruption and poverty, has been hit with a court subpoena from Monsanto. Monsanto "commands" Avaaz to hand over every private email, note, or record it has regarding Monsanto, including the names and email addresses of all of those who have signed Monsanto campaigns.

<https://www.gmwatch.org/en/news/latest-news/18131-now-monsanto-goes-after-civil-society>